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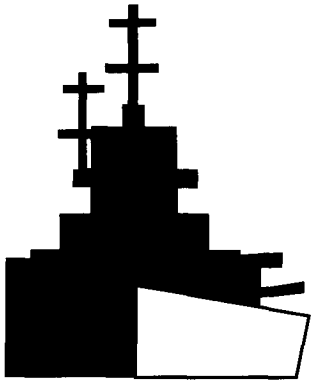

FINAL
REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT IR SITE 35, AREAS OF CONCERN IN TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105-1
April 2007

Volume I of V

Submitted to:

Department of the Navy
Base Realignment and Closure
Program Management Office West

1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

FINAL
REMEDIAL INVESTIGATION/ FEASIBILITY STUDY REPORT
IR SITE 35, AREAS OF CONCERN IN TRANSFER PARCEL EDC-5
ALAMEDA POINT
ALAMEDA, CALIFORNIA

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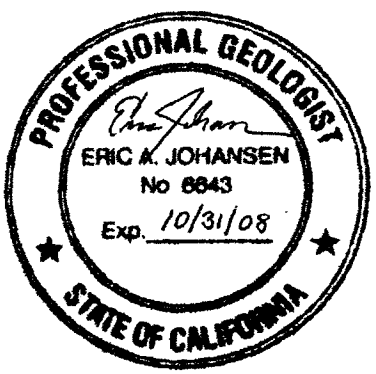
Volume I of V



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Contract No. N-68711-95-D-7526 **Document Control No.** CTO-0077/0105-1

File Code. 0214

TO: Contracting Officer
NAVFAC Southwest
Ms. Graciela R. Steinway, AQE.GS
1220 Pacific Highway
San Diego, CA 92132-5190

DATE: April 25, 2007
CTO #: 0077
LOCATION: Alameda, California

FROM: _____
Janet L. Argyres, Project Manager

DESCRIPTION: Final Remedial Investigation/Feasibility Study Report, IR Site 35, Areas of Concern in Transfer Parcel EDC-5, for Alameda Point, Volumes I through V – Dated April 2007

TYPE: Contract Deliverable (Cost) ___ CTO Deliverable (Technical) X Other ___

VERSION: Final (e.g., Draft, Draft Final, Final, etc.) REVISION #: 0

ADMIN RECORD: (PM to Identify) Yes X No ___ US EPA Category ___ Confidential ___

SCHEDULED DELIVERY DATE: 4/27/07 ACTUAL DELIVERY DATE: 4/27/07

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April 26, 2007

Contracting Officer
NAVFAC Southwest
Ms. Graciela R. Steinway, AQE.GS
1220 Pacific Highway
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Subject: Final Remedial Investigation/Feasibility Study Report
IR Site 35, Areas Of Concern In Transfer Parcel EDC-5 – Volumes I through V
Alameda Point, Alameda, California
Dated April 2006

Dear Ms. Steinway:

Enclosed, please find 5 copies of the insert pages along with a CD for the Final Remedial Investigation/Feasibility Study Report, IR Site 35, Areas Of Concern In Transfer Parcel EDC-5, Alameda Point, Alameda, California, dated April 2006. As directed by the Navy RPM, we are concurrently transmitting copies to Ms. Anna-Marie Cook of U.S. EPA; Ms. Dot Lofstrom of DTSC; and Mr. Erich Simon of the RWQCB. In addition, we are forwarding copies on behalf of the Navy to the parties listed on the attached transmittal sheet.

If you have any questions, please contact Michele Dermer, CTOL, at (415) 768-2832 or me at (415) 768-9917.

Very truly yours,

Janet L. Argyres
Project Manager

JLA/EJ/sp

Enclosure

BECHTEL ENVIRONMENTAL, INC.

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CHANGE PACKAGE

FINAL
REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT
IR SITE 35, AREAS OF CONCERN IN TRANSFER PARCEL EDC-5,
ALAMEDA POINT, ALAMEDA, CALIFORNIA
VOLUMES I THROUGH V

Please make the following page replacements to the draft final version of the Remedial Investigation/Feasibility Study, IR Site 35 Areas Of Concern in Transfer Parcel EDC-5 Report, Volumes I through V dated March 2007. This change package will constitute the final version of this document.

Remove and discard the following pages[a]	Insert the following replacement pages[b]
Volume 1	
Document spine	Document spine
Document cover	Document cover
Compact disk	Compact disk
Signature page, March 2007	Signature page, April 2007
pages 11-17 through 11-20 (two double-sided pages)	pages 11-17 through 11-20 (two double-sided pages)
pages 11-25 and 11-26 (one double-sided page)	pages 11-25 and 11-26 (one double-sided page)
Volume 2	
Document spine	Document spine
Document cover	Document cover
Title page, March 2007	Title page, April 2007
Appendix K	
pages K2-3 and K2-4 (one double-sided page)	pages K2-3 and K2-4 (one double-sided page)
pages K4-3 and K4-4 (one double-sided page)	pages K4-3 and K4-4 (one double-sided page)
Table K4-2 pages 1 and 2 (one double-sided page)	Table K4-2 pages 1 and 2 (one double-sided page)
Volume 3	
Document spine	Document spine
Document cover	Document cover
Title page, March 2007	Title page, April 2007
Volume 4	
Document spine	Document spine
Document cover	Document cover
Title page, March 2007	Title page, April 2007
Volume 5	
Document spine	Document spine
Document cover	Document cover
Title page, March 2007	Title page, April 2007

Notes:
[a] text pages show the date March 2007 and chron number CTO-0077/0105 in the header
[b] revised text pages show the date April 2007 and chron number CTO-0077/0105-1 in the header; unchanged pages are included only when necessary for double-sided printing

PREFACE

These five volumes contain the Remedial Investigation (RI) and Feasibility Study (FS) Report for Installation Restoration Program Site 35, Areas of Concern (AOCs) in Transfer Parcel Economic Development Conveyance (EDC)-5 at Alameda Point (formerly Naval Air Station Alameda) located in Alameda, California. This preface provides an overview of how the report is organized. Because of the report's length, an abbreviated table of contents is included. The complete table of contents is provided under separate tab following the Executive Summary.

ORGANIZATION

The RI/FS Report comprises the following five volumes.

- **Volume I** contains the main report.
  - An executive summary, including figures and tables, is provided first.
  - A comprehensive table of contents and acronym/abbreviation list are next.
  - The RI portion of the report is presented in Sections 1 through 7.
  - The FS portion of the report is presented in Sections 8 through 11.
  - References are listed in Section 12.
  - Figures and tables called out in the main text are under separate tabs at the end of the volume.
- **Volume II** contains the 15 appendices and 3 of the 25 attachments.
  - The appendices provide information supporting the main text.
  - Attachments A, B, and C address AOCs 1, 2, and 3, respectively. Attachments provide details on the RI by study area. Each attachment includes text, figures, and tables under a single tab.
- **Volume III** contains the next eight attachments.
  - Attachments D through K address study areas AOCs 4, 5, 6, 7, 8, 9, 10, and AOC 11/Environmental Baseline Survey (EBS) Parcels 78–79, respectively.
- **Volume IV** contains the next seven attachments.
  - Attachments L through R address study areas AOCs 12, 13, 17, 18, 20, 21, and 23, respectively.
- **Volume V** contains the last seven attachments.
  - Attachments S through W address study areas AOC 24, AOC 25, EBS Parcel 205, Solid Waste Management Units (SWMUs), and Polynuclear Aromatic Hydrocarbon (PAH) Areas, respectively.
  - Attachment X lists all the acronyms/abbreviations used in the attachments.
  - Attachment Y lists all the references used in the attachments.

REPORT MEDIA

Most of this report is in hard copy format. Some supporting information is presented on compact disk (CD) (in Volume II) to save space and to provide easy search capability.

- **Hard copy**: main text, tables, and figures; Appendices A, J (text and tables), K, L, and M; and all attachments, tables, and figures
- **CD**: Appendices B, C, D, E, F, G, H, I, N, and O, and Appendix J attachments

A CD of the entire report is also available.

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EXECUTIVE SUMMARY

The Navy conducted a remedial investigation (RI) and feasibility study (FS) in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at Installation Restoration (IR) Program Site 35, Areas of Concern (AOCs) in Transfer Parcel Economic Development Conveyance (EDC)-5 at Alameda Point (formerly Naval Air Station [NAS] Alameda) located in Alameda, California. This RI/FS Report was prepared as part of the remedy-selection process described in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This RI/FS Report meets the specific requirements of Title 40 *Code of Federal Regulations* (C.F.R.) Section (§) 300.430(d).

In September 1993, NAS Alameda was designated for closure by the United States Congress and the Base Realignment and Closure Commission (Figure ES-1). The base officially closed in April 1997. Because Transfer Parcel EDC-5 (which contains IR Site 35) may be transferred early for redevelopment, the RI/FS process for IR Site 35 was performed on an accelerated schedule. Results of the RI/FS are presented in this report. As prescribed by the Alameda Point Federal Facility Agreement, the RI portion of this RI/FS Report provides the basis for the Navy's recommendation for the FS. The analytical data and risk assessments were used to determine the types of remedial alternatives considered in the FS portion of this report.

SITE BACKGROUND

Based on previous investigations and historical uses of Transfer Parcel EDC-5, the Navy and regulatory agencies concluded that further study of portions of the transfer parcel was necessary. These areas within Transfer Parcel EDC-5 were defined as IR Site 35, which comprises 23 separate study areas occupying approximately 75 acres and distributed across the northeastern portion of Alameda Point (Figure ES-2). The study areas consist of open space, residences, and commercial/industrial buildings. The Navy and regulatory agencies agreed that the following 23 study areas (Figure ES-3) would be subject to further sampling and evaluation during the RI at IR Site 35:

- 19 AOCs:
  - AOCs 1, 2, 3, 5, 6, 8, 9, 10, 12, 13, 17, 18, 20, 21, 23, 24, and 25 required additional sampling and analysis.
  - AOCs 4 and 7 had sufficient data to perform risk evaluations and make decisions.
  - AOC 11 was combined with data gap areas Environmental Baseline Survey (EBS) Parcels 78 and 79 (discussed below).
  - AOCs 14, 15, and 16 were incorporated into the Polynuclear Aromatic Hydrocarbon (PAH) Areas (discussed below) because they had been identified solely on the basis of the presence of PAHs.
  - AOCs 19 and 22 were removed from IR Site 35 and included with adjacent IR Site 6 and Corrective Action Area (CAA)-B, respectively, and are no longer study areas for IR Site 35.

- 2 data gap areas:
  - EBS Parcels 78 and 79 were combined with AOC 11, based on their previous use and geographic proximity, to become study area AOC 11/ EBS Parcels 78–79.
  - EBS Parcel 205
- 1 solid waste management unit (SWMU) study area, including the following subareas:
  - aboveground storage tanks (ASTs) 016, 039, 152, 173A, 173B, 173C, and 392
  - oil/water separator (OWS) 017
  - underground storage tank (UST) (R)-11, also known as Tank 393, located in AOC 23
- 1 study area referred to as the PAH Areas. The Navy agreed to further assessment of residual PAHs in soil in Transfer Parcel EDC-5. This included PAHs having residual benzo(a)pyrene (B[a]P) equivalent concentrations above the Alameda Point residential preliminary screening criterion (PSC) of 620 micrograms per kilogram (µg/kg).

REMEDIAL INVESTIGATION

Sampling for the IR Site 35 RI was conducted in November and December 2005. A total of 137 soil borings were advanced using direct-push technology. A total of 353 soil samples were collected; 121 grab groundwater samples (including 33 duplicates) were collected from temporary wellpoints. In addition, a groundwater sample was collected from an existing monitoring well, and two sediment samples were collected from two storm sewer manholes. Soil and groundwater samples were analyzed for one or more of the following analyte suites: volatile organic compounds (VOCs), semivolatile organic compounds, total petroleum hydrocarbons (TPH), pesticides, polychlorinated biphenyls (PCBs), and metals. Thirteen samples (9 soil and 4 groundwater) were also analyzed for hexavalent chromium. Fourteen soil samples were collected and analyzed for geotechnical parameters, and most groundwater samples were analyzed for total dissolved solids (TDS).

CONCEPTUAL SITE MODEL

Results from previous investigations and the RI were used to develop a conceptual site model (CSM) for IR Site 35. The CSM provided the context for interpreting chemical results, evaluating potential risk to human health, and developing RI recommendations and FS evaluations.

The shallow subsurface geology of IR Site 35 consists of primarily coarse-grained fill material overlying the mostly fine-grained material of the Bay Sediment Unit (BSU) (the Young Bay Mud). Depth to the BSU varies, although it generally increases from

near the surface in the eastern portion of IR Site 35 to approximately 18 feet below ground surface (bgs) to the west. At IR Site 35, the first water-bearing zone (FWBZ) is unconfined, generally occurs in the fill material, and extends vertically to the Young Bay Mud. This FWBZ in the fill layer is a local feature of Alameda Point and is not present regionally (TtEMI 1999). The Young Bay Mud portion of the upper BSU is a semipermeable aquitard between the FWBZ and the second water-bearing zone and is expected to inhibit hydraulic communication between these zones. Based on studies performed at nearby sites, the thickness of the BSU in the vicinity of IR Site 35 is up to 35 feet.

Depth to groundwater ranges from approximately 3 to 9 feet bgs, although the groundwater table typically exists between 4 and 6 feet bgs. General groundwater flow direction is toward the shoreline. As such, a groundwater mound exists in the central portion of Transfer Parcel EDC-5 and flows outward toward surface water bodies located to the north (Oakland Inner Harbor) and south (Seaplane Lagoon). Additionally, a groundwater low has been observed north of IR Site 7.

TDS concentrations in groundwater were variable across the site and changed from 184 milligrams per liter (mg/L) (at AST 039) to 21,900 mg/L (at AOC 23). The average TDS concentration at IR Site 35 was 3,464 mg/L. Thirty samples exceeded 3,000 mg/L (San Francisco Bay Regional Water Quality Control Board [Water Board] municipal and domestic water source TDS exemption criterion) and six samples exceeded 10,000 mg/L (United States Environmental Protection Agency [U.S. EPA] TDS exemption criterion). Slow groundwater recharge was observed during the RI at borings in AOCs 5, 24, and 25, and at selected borings in AOC 23. It is unlikely that groundwater yield at these study areas at IR Site 35 could be sustained at a sufficient rate to support municipal or domestic drinking water supply.

Groundwater beneath AOCs 1, 2, 18, 20, and 21 and EBS Parcel 205 would not be considered a drinking water source, based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation (RWQCB 2003). Although it is unlikely that the groundwater beneath the rest of IR Site 35 would be used as a drinking water source, U.S. EPA has classified the FWBZ groundwater in this area as a Class II aquifer (a current or potential source of drinking water).

PRELIMINARY SCREENING CRITERIA AND BACKGROUND METALS

PSCs were used in assessing the nature and extent of contamination at IR Site 35. PSCs were identified to focus the discussion on a subset of chemicals most likely to represent a concern to human health or the environment. However, PSCs were not used to eliminate chemicals from risk evaluation. Some PSCs are not directly applicable to the medium being assessed. For example, groundwater concentrations from all study areas were compared to maximum contaminant levels (MCLs), whether or not the groundwater was considered a potential drinking water source in that area. Groundwater concentrations in areas near surface water bodies were also compared to surface water PSCs even though

surface water criteria are not applicable to groundwater. PSCs pertinent to IR Site 35 are the following:

- Soil – residential preliminary remediation goals (PRGs) (U.S. EPA 2004), lead removal action objective of 199 milligrams per kilogram (mg/kg) for study areas subject to non-time-critical removal actions for lead-based paint (LBP), Alameda Point B(a)P equivalent concentration screening level of 620 µg/kg (DON 2001b, Cal/EPA 2006) for carcinogenic PAHs benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, B(a)P, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and naphthalene; and environmental screening levels (ESLs) for TPH (RWQCB 2005)
- Groundwater – MCLs and advisory level for lead (U.S. EPA 2002b, DHS 2006) and ESLs for TPH (RWQCB 2005)
- Groundwater adjacent to or near Oakland Inner Harbor and Seaplane Lagoon – California Toxics Rule (40 C.F.R. § 131.38, U.S. EPA 2000a), National Recommended Water Quality Criteria (U.S. EPA 2002b, 2006), and surface water ESLs for TPH (RWQCB 2005)

In addition, metals concentrations in soil and groundwater were compared to the Alameda Point background soil and groundwater concentrations (95th percentiles) to help discriminate between site-related and naturally occurring metals (TtEMI 2001c, 2004). For ease of discussion in this report, the Alameda Point 95th percentile concentrations for metals in soil (pink background data set) and groundwater are referred to as "background."

NATURE AND EXTENT OF CONTAMINATION

The nature and extent of contamination were assessed using analytical results from all investigations conducted at IR Site 35 and comparing reported concentrations in samples from IR Site 35 to PSCs. Analytes reported above PSCs in soil and groundwater at IR Site 35 include VOCs, TPH, PAHs, pesticides, PCBs, and metals. Individual chemicals that were reported at concentrations above PSCs are listed by study area in Table ES-1. Regardless of concentration, all reported metals (except required human trace nutrients) were included in the risk evaluation.

Metals were reported at concentrations above PSCs and above background in soil and/or groundwater samples from AOC 2, 4, 5, 10, 11/EBS Parcels 78–79, 12, 17, 20, 23, 24, and 25. An evaluation that included correlation analyses of metals in soil was performed to help assess whether the metals in samples from IR Site 35 are naturally occurring or the result of Navy activities. Results of the statistical analyses showed a significant positive correlation of arsenic, cobalt, copper, manganese, and vanadium in soil with aluminum and iron in soil, suggesting that these metals may generally represent naturally occurring concentrations rather than a release from industrial activities (except for lead at AOCs 10 and 12, and possibly for some outliers of these metals).

A time-critical removal action (TCRA) removed soil with the highest concentrations of PAHs in the upper 2 feet bgs. B(a)P equivalent concentrations were calculated for

samples of soil remaining outside the TCRA areas. While some individual samples had B(a)P equivalent concentrations above 620 µg/kg, average concentrations were below the PSC of 620 µg/kg. Average concentrations in 18 risk assessment decision areas ranged from 6 to 506 µg/kg. As agreed upon with the agencies in the Work Plan (BEI 2006), B(a)P equivalent concentrations in Transfer Parcel EDC-5 were evaluated in this RI/FS Report and are referred to as the PAH Areas.

The following summary lists the study areas in groups based on similar types of chemicals with reported concentrations above PSCs. B(a)P equivalent concentrations above the PSC are not included because they were evaluated separately. Potential TPH concerns identified at IR Site 35 are being referred for review under the Navy's Alameda Point TPH Program.

- **AOCs 1, 9, and 18; and SWMUs OWS 017, AST 016, AST 039, and AST 392** – No chemicals were reported in soil or groundwater at concentrations above PSCs. (Although AOC 1 had no chemicals reported at concentrations above PSCs, a naphthalene concentration reported in groundwater at this AOC is discussed below.)
- **AOCs 2, 6, 7, and 8** – Only PCBs were reported in soil at concentrations above PSCs. Aroclor 1254 was reported at AOCs 7 and 8, and Aroclor 1260 was reported at AOCs 2 and 6. The Aroclors were reported infrequently, and their extent was generally limited both laterally and vertically.
- **AOCs 4 and 5** – Metals were reported in soil and groundwater at concentrations above PSCs and above background. These concentrations in soil are believed to represent naturally occurring metals. In groundwater, metals above background are likely due to dissolution of naturally occurring metals in soil as a result of reducing conditions.
- **AOCs 10 and 12** – Metals were reported in soil at concentrations above PSCs and above background. Lead concentrations outside of removal action areas to address LBP (and possibly arsenic at AOC 12) are considered study area–related and not naturally occurring.
- **AOCs 3 and 13** – Pesticides in soil were the only analytes reported at concentrations above PSCs. At AOC 3, heptachlor was the primary pesticide reported at a concentration above the PSC. At AOC 13, dieldrin, 4,4'-dichlorodiphenyltrichloroethane, and 4,4'- dichlorodiphenyldichloroethane were reported in soil at concentrations above PSCs at three locations. Results of samples near these locations suggest that the extent of pesticides in soil at concentrations above PSCs is limited; however, the lateral extent of heptachlor was not completely defined at AOC 3 (as discussed below).
- **EBS Parcel 205** – TPH, cis-1,2-dichloroethene, and vinyl chloride were reported in groundwater at concentrations above PSCs. MCLs are the comparison criteria for the two volatile compounds; however, because of the study area's proximity to Seaplane Lagoon, it is unlikely that groundwater in this area would be used as a drinking water source due to saltwater intrusion

from sustained pumping. Additionally, this study area is west of Saratoga Street, where groundwater is not considered a potential drinking water source.

- **AOC 21 and ASTs 152, 173A, 173B, and 173C** – TPH was reported in soil and groundwater at concentrations above PSCs at AOC 21 and ASTs 173A, 173B, and 173C. TPH was reported only in groundwater at concentrations above PSCs at AST 152.
- **AOCs 11/EBS Parcels 78–79, 17, 20, 24, and 25** – TPH was reported in soil and/or groundwater at concentrations above PSCs, and metals were reported above PSCs and above background. The metals concentrations in soil are believed to represent naturally occurring metals. In groundwater, metals above background are likely due to dissolution of naturally occurring metals in soil as a result of reducing conditions and likely from suspended matter in unfiltered samples at AOCs 17 and 25.
- **AOC 23** – VOCs, TPH, and PCBs were reported in soil at concentrations above PSCs, and metals were reported above PSCs and above background. In groundwater, VOC, PAH, and TPH concentrations were above PSCs, and metals concentrations were above PSCs and above background. The metals concentrations in soil are believed to represent naturally occurring metals. In groundwater, metals above background are likely due to dissolution of naturally occurring metals in soil as a result of reducing conditions.

The highest concentrations of contaminants were generally identified at AOCs 1, 3, 10, 12, and 23. The nature and extent of contamination at these study areas are further described below.

AOC 1

A naphthalene concentration of 1,200 micrograms per liter (µg/L) was reported in one grab groundwater sample adjacent to an OWS at AOC 1. A groundwater PSC has not been identified for naphthalene. The extent of naphthalene in groundwater at AOC 1 has not been completely defined upgradient (to the southwest) of this sampling location; however, samples from downgradient locations suggest the extent is limited.

AOC 3

At AOC 3, heptachlor was reported in shallow soil at a concentration of 18,000 J µg/kg, more than two orders of magnitude above the residential PRG. However, heptachlor was not reported in the deeper soil sample from the same boring, nor in 14 other soil samples from six nearby borings. Samples were not collected west of this location, although the extent of soil impact is expected to be limited.

AOC 10

Lead was reported above the PSC in shallow soil in localized areas at AOC 10 outside of the LBP removal action areas. Soil with elevated lead concentrations is limited to the

upper 1 foot of soil at AOC 10. The lateral and vertical extent of lead concentrations above the PSC has been defined.

AOC 12

Lead was reported above the PSC in shallow soil (upper 1.5 feet) in localized areas outside the LBP removal action areas at AOC 12. Arsenic was reported at concentrations above the PSC at three locations at AOC 12 in the same areas as elevated lead concentrations. It is not known whether these arsenic concentrations are naturally occurring or the result of study area activities. The lateral and vertical extent of lead concentrations above PSCs has been defined. Additionally, lead was reported at a concentration above the PSC in one sediment sample collected from a manhole along the storm sewer pipeline that drains AOC 12.

AOC 23

In soil, vinyl chloride and benzene were both reported once at concentrations above residential PRGs. Results from recent nearby soil samples did not confirm the concentration of benzene reported in the EBS sample, and the benzene in soil may have been removed during fuel line closure activities.

Vinyl chloride was reported in groundwater samples at concentrations above MCLs in the central portion of the AOC around Building 13 and at one location in the southern portion of the AOC. The lateral extent of vinyl chloride in groundwater is defined by analyses of grab samples. The U.S. EPA classifies the groundwater beneath AOC 23 as a potential drinking water source. Additionally, the vinyl chloride concentration was slightly above a surface water criterion and was reported at the southern location about 150 feet from Seaplane Lagoon. However, it is considered unlikely that this detection would migrate 150 feet and result in a concentration above a surface water PSC.

A single concentration of benzene was slightly above the MCL in the northeastern portion of AOC 23 (EBS Parcel 71). Two concentrations of 1,2,-dichloroethane were reported in the eastern portion of AOC 23 (EBS Parcel 126), and are likely associated with the adjacent IR Site 3 and CAA-3A.

B(a)P was the only PAH reported in groundwater at a concentration above the PSC at AOC 23. It was reported in one grab groundwater sample and is likely an artifact of sampling (associated with suspended material) rather than representing a dissolved concentration. B(a)P is not expected to be dissolved in groundwater because of its low solubility and tendency to sorb to clay-size particles and organic matter in soil.

Aroclor 1260 was reported at a concentration above the PSC in one soil sample but was below the PSC in the duplicate sample from the same location. Analytical results of surrounding soil samples suggest the extent of Aroclor 1260 is limited both laterally and vertically. Aroclors 1016 and 1260 were also reported in one groundwater sample at AOC 23 at concentrations below PSCs. It is suspected that these groundwater concentrations are associated with suspended material in the sample because PCBs have

low solubility and a tendency to sorb to organic matter in soil, and are not expected to dissolve in groundwater.

Statistical analyses for selected metals in soil at AOC 23 (Appendix H) indicate that the aluminum, arsenic, cadmium, chromium, manganese, and vanadium concentrations were not statistically different from background. Concentrations of arsenic, iron, thallium, and vanadium were present at concentrations above PSCs in soil; however, only the iron and thallium concentrations were also above background. Iron is believed to be naturally occurring. Only one thallium concentration reported in soil was slightly above the PSC.

Four (total) concentrations of aluminum, arsenic, and iron were identified as possible statistical outliers. As mentioned, aluminum and arsenic concentrations are consistent with background, and iron is believed to be naturally occurring.

Thallium and arsenic in groundwater were above the PSCs but below background. Statistical analysis performed for select metals at AOC 23 (Appendix H) indicated that arsenic and thallium concentrations at AOC 23 were not statistically different from background. Iron, manganese, and vanadium were above background in groundwater, and are likely due to dissolution of naturally occurring metals in soil as a result of reducing conditions.

HUMAN-HEALTH RISK ASSESSMENT

The planned future reuse of IR Site 35 is mixed use (industrial, residential, commercial, and open space), which is identical to its current use. The residential exposure scenario was the only scenario evaluated because it is protective of all other potential uses.

Four types of risk evaluation were conducted for various portions of IR Site 35.

- Pre- and post-TCRA PAH risk evaluations were performed for each decision area. Cancer risk and noncancer hazard values for PAHs in soil were calculated. Decision areas were developed because a significant portion of the housing at IR Site 35 was located in a single, large EBS parcel (EBS Parcel 98). This large parcel (and others, as appropriate) was subdivided for the purposes of risk assessment, to help assure that estimates of potential human-health risks were conservative.
- Tier 1 risk evaluations, as defined by the California Environmental Protection Agency, were performed for 14 study areas (AOCs 2, 4, 5, 6, 7, 8, 9, 13, 17, 18, 20, 21, 24, and 25) where analytical data indicated that decisions on whether remediation is warranted could be made based on the results of a Tier 1 approach. Cancer risk and noncancer hazards were calculated based on the maximum reported concentrations and risk-based levels published by regulatory agencies.
- Baseline human-health risk assessments (HHRAs) were conducted for five study areas (AOCs 1, 3, 11/EBS Parcels 78–79, and 23, and EBS Parcel 205) where site-specific considerations and statistical analyses of the data were needed.

- Lead-only evaluations were performed for two study areas (AOCs 10 and 12) at which lead (sourced from LBP) removal actions had occurred. The health effects of lead were evaluated by comparing the exposure point concentration to the site-specific PRG for lead.

The residential use of groundwater is included in the Tier 1 risk evaluations and HHRAs even though it is considered unlikely that shallow groundwater at Alameda Point would be used as domestic water supply. Drinking water at Alameda Point is provided by East Bay Municipal Utilities District.

The Tier 1 and HHRA risk results are presented by the following three exposure groups:

- Exposure Group 1 – all soil and groundwater exposure pathways
  - total (all chemicals of potential concern [COPCs])
  - COPCs without metals below background
- Exposure Group 2 – exposure pathways for soil and vapors from VOCs in groundwater
  - total (all COPCs for this exposure group)
  - COPCs without metals below background
- Exposure Group 3 – exposure pathways for residential use of groundwater
  - total (all COPCs for this exposure group)
  - COPCs without metals below background

Table ES-1 summarizes results for the first two exposure groups.

U.S. EPA has established a risk management range from 1 in 10,000 (i.e., a risk of 10^{-4}) to 1 in 1,000,000 (i.e., a risk of 10^{-6}) for making decisions on whether remediation is warranted. Risks below 10^{-6} are considered negligible. Risks above 10^{-4} typically warrant additional assessment or remediation. Risks within the risk management range may be managed and considered tolerable, depending on decisions made by risk managers. The noncancer health risk associated with exposure to a chemical is expressed as a hazard quotient (HQ) or a hazard index (HI) for cumulative noncancer risk. The target risk management level for HQ and HI values is 1. Significant results of the risk evaluations for each study area are summarized in Table ES-1.

ECOLOGICAL RISK ASSESSMENT

As agreed upon by the Navy and regulatory agencies and documented in the final Work Plan for IR Site 35 (BEI 2006), an ecological assessment of terrestrial receptors was not conducted because of the lack of suitable habitat and the absence of threatened, endangered, or special-status species at IR Site 35. Ecological habitats and natural resources at IR Site 35 are discussed in Section 2.8 of the main RI/FS Report. However, groundwater results for study areas adjacent to or near surface water bodies were compared to criteria for protection of aquatic receptors (Section 4 of the main RI/FS

Report and applicable attachments). Based on these comparisons, it is unlikely that chemicals in groundwater with concentrations above aquatic ecological PSCs would reach surface water.

REMEDIAL INVESTIGATION CONCLUSIONS AND RECOMMENDATIONS

Data collected during the RI and previous investigations were used to evaluate the nature and extent of contamination; to conduct site-specific Tier 1 risk evaluations, baseline HHRAs, and human-health lead assessments; and to support decisions on the necessity for response actions at the IR Site 35 study areas. It was determined that these data characterized the nature and extent of contamination sufficiently to support evaluating human-health risks at IR Site 35 and performing an FS. A detailed summary of the recommendations for each study area, along with the rationale for the recommendation, is provided in Table ES-1.

The following study areas are addressed in the FS portion of this RI/FS Report:

- AOC 1 – naphthalene in groundwater, with refinement of the lateral extent in groundwater
- AOC 3 – heptachlor in the upper 2 feet bgs of soil, with additional sampling to define the western extent in soil
- AOC 10 – the area of soil with elevated lead concentrations remaining in the upper 1 foot bgs
- AOC 12 – the area of soil with elevated lead concentrations remaining in the upper 1.5 feet bgs; the three elevated concentrations of arsenic are also addressed, because they are in the same areas as the elevated lead concentrations; sediment with an elevated lead concentration in one storm drain is also addressed
- AOC 23 – vinyl chloride in groundwater at AOC 23; the exceedance in soil reported just above the water table southeast of Building 13 is also addressed; concentrations of vinyl chloride were just a few micrograms above the MCL and were collected from grab groundwater samples; therefore, the FS includes well installation and sampling to verify that concentrations are above the MCL, since results from a well sample are more accurate and often lower than from a grab sample
- PAHs in soil – per the Work Plan, PAHs with B(a)P equivalent concentrations in soil above the Alameda Point residential screening criterion are included in the FS to consider whether remedial action is needed to reduce or manage risk

Additional soil sampling is recommended at AOC 6 to complete characterization of the western extent of Aroclor 1260; otherwise, no further action is recommended for this study area. Fuel concentrations above PSCs (TPH ESLs) will be reviewed under the TPH Program to determine whether the Water Board's criteria for closure of low-risk fuel sites are met or additional work is warranted, and whether areas within the boundaries of

IR Site 35 should be incorporated into an existing CAA. If additional work is needed at any study area, it will be conducted as part of the TPH Program.

REMEDIAL ACTION OBJECTIVES

The general remedial action objectives for IR Site 35 are as follows.

- Protect existing beneficial uses of groundwater underlying IR Site 35.
- Protect existing beneficial uses of surface water for those portions of IR Site 35 that are adjacent to surface water.
- Protect human health by preventing unacceptable exposure to impacted soil.
- For those areas where groundwater is considered a potential drinking water source for CERCLA decision-making purposes, protect human health by preventing exposure to concentrations of chemicals of concern (COCs) that present unacceptable risk for domestic use and other complete pathways.
- For those areas where groundwater is not considered a potential drinking water source for CERCLA decision-making purposes, protect human health by preventing unacceptable exposure to VOCs via inhalation of indoor air vapors that may migrate from groundwater.

This RI/FS Report presents risk-based criteria (preliminary remediation goals [preliminary RGs]) for use in the evaluation of potential remediation alternatives. Final remediation goals (RGs) will be determined when the remedy is selected, in accordance with the NCP (40 C.F.R. § 300.430[e][2][i]).

Remedial action objectives were developed for COCs carried forward to the FS at AOCs 1, 3, 10, 12, 23 and for residual PAHs in Transfer Parcel EDC-5 as follows:

- preliminary RGs for soil
  - heptachlor at AOC 3: 110 µg/kg
  - lead at AOCs 10 and 12: 184 mg/kg
  - PAHs in PAH Areas: 1,000 µg/kg B(a)P equivalent
- preliminary RGs for groundwater
  - naphthalene at AOC 1: 100 µg/L
  - vinyl chloride at AOC 23: 0.5 µg/L

The Navy and the regulatory agencies have been actively discussing appropriate RGs and exposure depth intervals for PAHs in soil at IR Site 35, as stated in Section 8.4.3.1. The preliminary RG for PAHs in soil at Transfer Parcel EDC-5 is 1,000 µg/kg B(a)P equivalent; this is the same RG that was used for previous TCRA activities within Transfer Parcel EDC-5 (which includes IR Site 35). Additionally, this is consistent with the After Action Report (meeting minutes) summarizing discussions at the PAH technical meeting held on May 31, 2001. These meeting minutes are also included as an attachment

to California Environmental Protection Agency Department of Toxic Substances Control's letter to the Navy dated July 13, 2006, that summarizes a regulatory meeting on May 22, 2006, on PAHs relative to IR Site 25 at Alameda Point (Cal/EPA 2006).

SCREENING OF REMEDIAL TECHNOLOGIES

Remedial technologies for consideration in this RI/FS Report are identified based on U.S. EPA guidance, remedial technology literature, Alameda Point experience, and the NCP requirement for at least one alternative that removes or destroys contaminants to the maximum extent feasible.

Soil remedial technologies evaluated in this RI/FS Report include no action, institutional control (ICs), containment, *in situ* treatment, removal and treatment/disposal, and *ex situ* treatment. Groundwater remedial technologies evaluated include no action, ICs, monitoring, monitored natural attenuation (MNA), containment, extraction and *ex situ* treatment, source removal and disposal, *in situ* treatment, and disposal.

REMEDIAL ALTERNATIVES FOR SOIL

Twelve remedial alternatives for soil at IR Site 35 were developed and screened in the FS portion of this RI/FS Report; all 12 were retained for detailed analysis. These alternatives are summarized in Table ES-2 and discussed below.

Alternatives AOC 3-1, AOC 10/12-1, and PAH-1: No Further Action

No further action of any type would be conducted in the impacted soil areas for the no action soil remedial alternatives AOC 3-1, AOC 10/12-1, and PAH-1. As stipulated in the NCP (40 C.F.R. § 300.430[e][6]), the no action alternative for soil was evaluated in the same manner as the other remedial alternatives considered in this report. The no action alternative serves as the baseline against which the remaining soil alternatives may be compared.

Alternatives AOC 3-2, AOC 10/12-2, and PAH-2: Cover and/or ICs

The cover and/or ICs alternatives involve installation of a cover to act as a barrier and provide separation between the underlying impacted soil and potential receptors, and/or the use of ICs to restrict removal of existing pavements, hardscape, or buildings over contaminated soil. ICs would prohibit actions that could damage or reduce the effectiveness of the cover. Cover and/or IC alternatives include AOC 3-2, AOC 10/12-2, and PAH-2.

For Alternative AOC 3-2, a soil cover would be placed over the impacted soil and graded to prevent ponding and direct surface water drainage off-site. The source material for the soil cover is assumed to be clean, imported soil from an off-site area. ICs would be put in place prohibiting actions that could damage the cover or reduce its effectiveness.

For Alternative AOC 10/12-2, limited excavation and off-site disposal of lead-impacted soil exceeding the preliminary RG in unpaved areas would be performed. The storm

drain with sediment containing lead at concentrations above the preliminary RG would also be cleaned out and disposed of off-site as part of this alternative. Existing hardscape and pavements over lead-impacted soil would remain in place, and ICs prohibiting removal of the hardscape and pavements would be put in place.

For Alternative PAH-2, ICs would be put in place that would require a soil sampling plan to be implemented when existing buildings and/or hardscape are removed in the IC area. Once human-health risk is demonstrated to be similar to or less than the risk for soil in unpaved areas, the ICs would no longer be required. (The previous TCRA for PAHs removed shallow soil with B[a]P equivalent concentrations above the preliminary RG in unpaved areas, so a soil cover was not considered necessary for Alternative PAH-2.) The area of ICs would include the northeastern portion of Transfer Parcel EDC-5, where the majority of higher PAH concentrations in soil remain.

Alternatives AOC 3-3, AOC 10/12-3, PAH-3a, PAH-3b, PAH-4a, and PAH-4b: Excavation and Off-Site Disposal

The excavation and off-site disposal alternatives AOC 3-3, AOC 10/12-3, PAH-3a, PAH-3b, PAH-4a, and PAH-4b involve the removal of impacted soil at each respective study area.

Before excavation, additional soil samples would be collected and analyzed as needed to identify the spatial limits of the impacted soil for removal in the areas (e.g., the western boundary of heptachlor in AOC 3 soil). Under several of the excavation alternatives, existing paved surfaces within the planned excavation areas would be demolished and removed to allow for removal of underlying soil. The underlying soil would then be excavated, stockpiled, and characterized before off-site disposal.

For PAHs in soil, Alternatives PAH-3a and PAH-3b would involve excavation to remove additional mass of PAH-impacted soil to a depth of 2 feet bgs. Alternatives PAH-4a and PAH-4b would involve excavation to remove additional mass of PAH-impacted soil to a depth of 4 feet bgs. Under Alternatives PAH-3a and PAH-4a, paved areas would not be excavated. Under Alternatives PAH-3b and PAH-4b, both paved and unpaved areas would be excavated. Alternatives PAH-3a, PAH-3b, and PAH-4a would include the same ICs described for Alternative PAH-2. Alternative PAH-4b would not include ICs.

REMEDIAL ALTERNATIVES FOR GROUNDWATER

Nine remedial alternatives for groundwater at IR Site 35 were developed and screened in the FS portion of this RI/FS Report; seven were retained for detailed analysis. The alternatives developed for groundwater at IR Site 35 are summarized below and in Table ES-3.

Alternatives AOC 1-1 and AOC 23-1: No Action

No further action of any type would be conducted in the impacted groundwater areas at AOCs 1 and 23 under the no action groundwater Alternatives AOC 1-1 and AOC 23-1,

respectively. The no action alternative assumes that the AOC will remain in its current state. As stipulated in the NCP (40 C.F.R. § 300.430[e][6]), the no action alternative for groundwater was evaluated in the same manner as the other remedial alternatives considered in this RI/FS Report. The no action alternative serves as the baseline against which the remaining groundwater alternatives may be compared.

Alternatives AOC 1-2 and AOC 23-2: MNA and ICs

MNA and IC remedial alternatives would address impacted groundwater at AOCs 1 and 23. No enhancements to the MNA process would be included, and no source removal or soil removal actions would be performed. As part of the MNA and ICs alternative, a groundwater investigation would be performed to verify the contaminant concentrations and the extent of contaminant concentrations above preliminary RGs. Monitoring wells would need to be installed to collect samples for the MNA program at AOCs 1 and 23 because there are no existing groundwater monitoring wells in the impacted areas.

Alternative AOC 1-3: Source Removal, Enhanced Aerobic ISB, and ICs

Alternative AOC 1-3 combines removal of the suspected source area (the OWS at AOC 1) and adjacent impacted soil, enhanced aerobic *in situ* bioremediation (ISB), and ICs to address the naphthalene-impacted groundwater area at AOC 1. Under Alternative AOC 1-3, a groundwater investigation would be performed to delineate the extent of naphthalene in groundwater at concentrations above the preliminary RG. In addition, three monitoring wells would be installed to verify naphthalene concentrations in monitoring well samples and to track the progress of aerobic ISB.

Alternatives AOC 1-4 and AOC 23-3: Enhanced ISB and ICs

Remedial alternatives AOC 1-4 and AOC 23-3 would address impacted groundwater areas at AOCs 1 and 23, respectively, using enhanced ISB and ICs. A groundwater investigation would be performed to verify the extent of contaminant concentrations exceeding RGs and assess the current configuration of the impacted areas. For FS purposes, the aerobic ISB process is assumed to utilize an oxygen-releasing ISB enhancement, such as the proprietary Oxygen Release Compound or a similar technology, to release oxygen and accelerate the biodegradation of naphthalene at AOC 1. Similarly, the anaerobic ISB process is assumed to utilize an ISB enhancement, such as the proprietary Hydrogen Release Compound or a similar technology, to provide a carbon source to accelerate the biodegradation of vinyl chloride by reductive dechlorination at AOC 23. ISB enhancement products would be injected by direct-push drilling methods into the source areas in the FWBZ to accelerate the reduction of naphthalene and vinyl chloride. These alternatives were eliminated from further consideration due to their relatively longer durations and higher costs compared to other alternatives.

Alternatives AOC 1-5 and AOC 23-4: ISCO

For Alternatives AOC 1-5 and AOC 23-4, *in situ* chemical oxidation (ISCO) would be utilized to address the impacted groundwater areas at AOCs 1 and 23. ICs are assumed not to be required for these alternatives because of their short duration. The same groundwater investigations as described above would be performed for the ISCO alternative. The ISCO process would use the modified Fenton's process (or similar) to chemically destroy dissolved-phase naphthalene and vinyl chloride in groundwater at AOCs 1 and 23, respectively. Chemical reagents would be injected into the FWBZ using a grid system at locations where naphthalene and vinyl chloride concentrations above the preliminary RG are identified; these reagents produce oxidizing agents that convert organic chemicals to innocuous end products (water and carbon dioxide). It is expected that ISCO operations would result in a rapid reduction in contaminant mass.

COMPARATIVE ANALYSIS OF ALTERNATIVES

The performance of each remedial alternative considered in this RI/FS Report is compared to the nine NCP evaluation criteria to assess the merits of each alternative and identify key options the Navy must consider when selecting a cleanup remedy. The NCP criteria are as follows:

- threshold criteria
  - overall protection of human health and the environment
  - compliance with applicable or relevant and appropriate requirements (ARARs)
- balancing criteria
  - long-term effectiveness and permanence
  - reduction of toxicity, mobility, or volume through treatment
  - short-term effectiveness
  - implementability
  - cost
- modifying criteria
  - state acceptance
  - community acceptance

Because both NCP threshold criteria must be satisfied for a remedial alternative to be eligible for selection (unless a waiver of ARARs applies), the selection of eligible remedial alternatives is based on a comparison of how well an alternative meets the five balancing criteria and the two modifying criteria.

The alternatives are rated for each of the balancing criteria in terms of their performance relative to other alternatives. Alternatives that would perform best relative to other

alternatives are assigned a score of "high." For the cost criterion, a "high" ranking represents low comparative costs, and a "low" ranking represents high comparative costs. Alternatives that receive the best combination of relative rankings are rated highest overall in the balancing criteria. No individual criterion is weighted more heavily than another in this process.

Comparative analyses for the retained remedial alternatives for soil and groundwater are presented in Tables ES-4 and ES-5, respectively, and summarized below.

Soil Alternatives

Among the alternatives that address heptachlor in soil at AOC 3, Alternative AOC 3-3 (excavation and off-site disposal) was rated highest overall in satisfying the balancing criteria. This alternative was judged to be the most effective in the long and short term, and more implementable than Alternative AOC 3-2. The alternatives are comparable in cost.

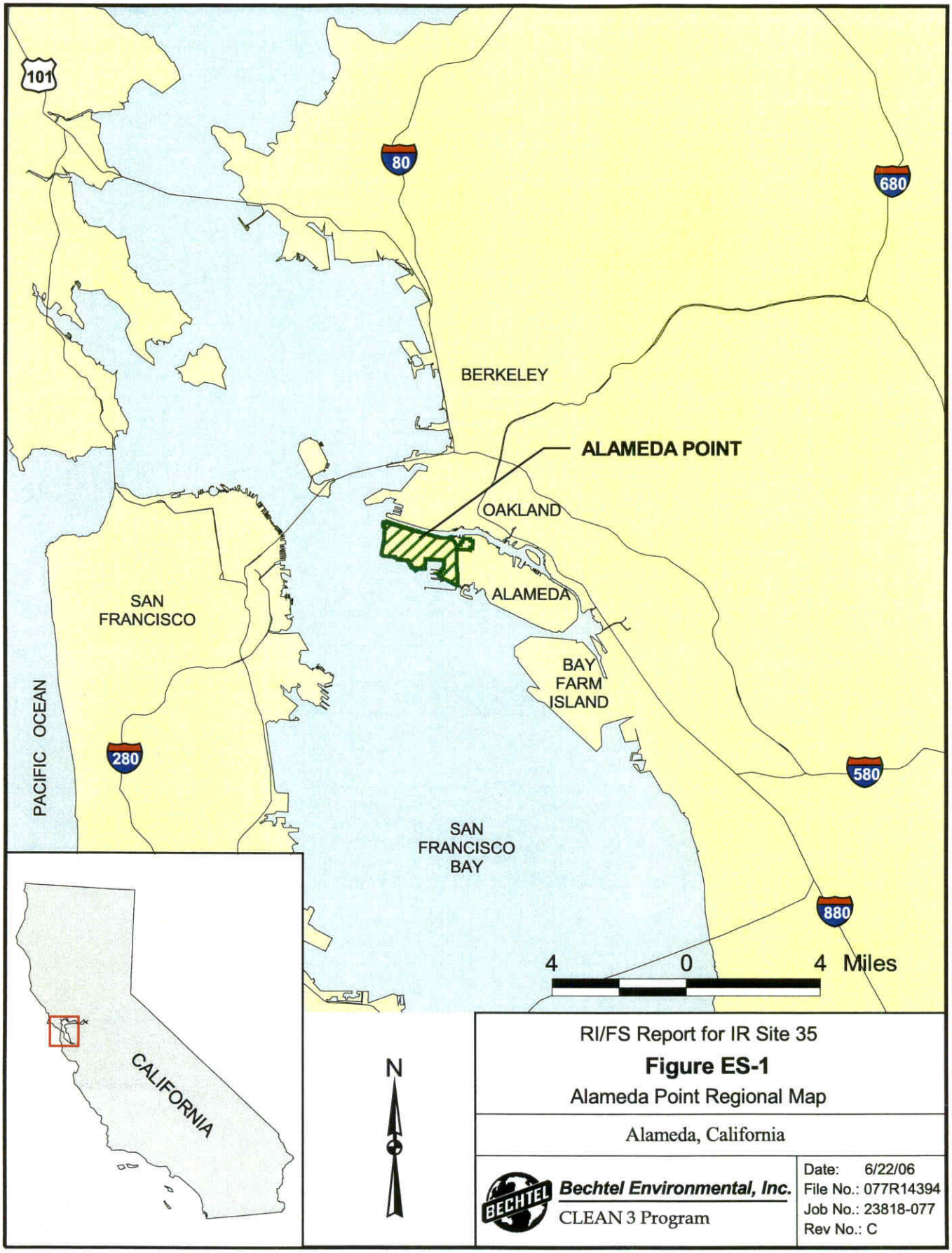
Among the alternatives that address lead in soil at AOCs 10 and 12, Alternative AOC 10/12-3 (excavation and off-site disposal) was rated highest overall in satisfying the balancing criteria. This alternative was judged to be the most effective in the long and short term, and less costly than the other active remedial alternative (Alternative AOC 10/12-2).

Among the alternatives that address PAHs in soil in Transfer Parcel EDC-5, Alternatives PAH-1, PAH-2, PAH-3a, and PAH-3b all rated comparably in satisfying the balancing criteria. These alternatives are all considered protective of human health and the environment, and would be less costly than the other active remedial alternatives (Alternatives PAH-4a and PAH-4b).

Groundwater Alternatives

Among the alternatives that address naphthalene in groundwater at AOC 1, Alternative AOC 1-5 (ISCO) was rated highest overall in satisfying the balancing criteria. This alternative was judged to be effective in the long and short term, implementable, and less costly than Alternative AOC 1-3 (source removal, enhanced ISB, and ICs).

Among the alternatives that address vinyl chloride in groundwater at AOC 23, Alternatives AOC 23-2 and AOC 23-4 rated comparably in satisfying the balancing criteria. Although Alternative AOC 23-4 (ISCO) has higher costs, it may be preferable because the RGs at AOC 23 are expected to be achieved more quickly than under Alternative AOC 23-2 (MNA and ICs).



RI/FS Report for IR Site 35

Figure ES-1

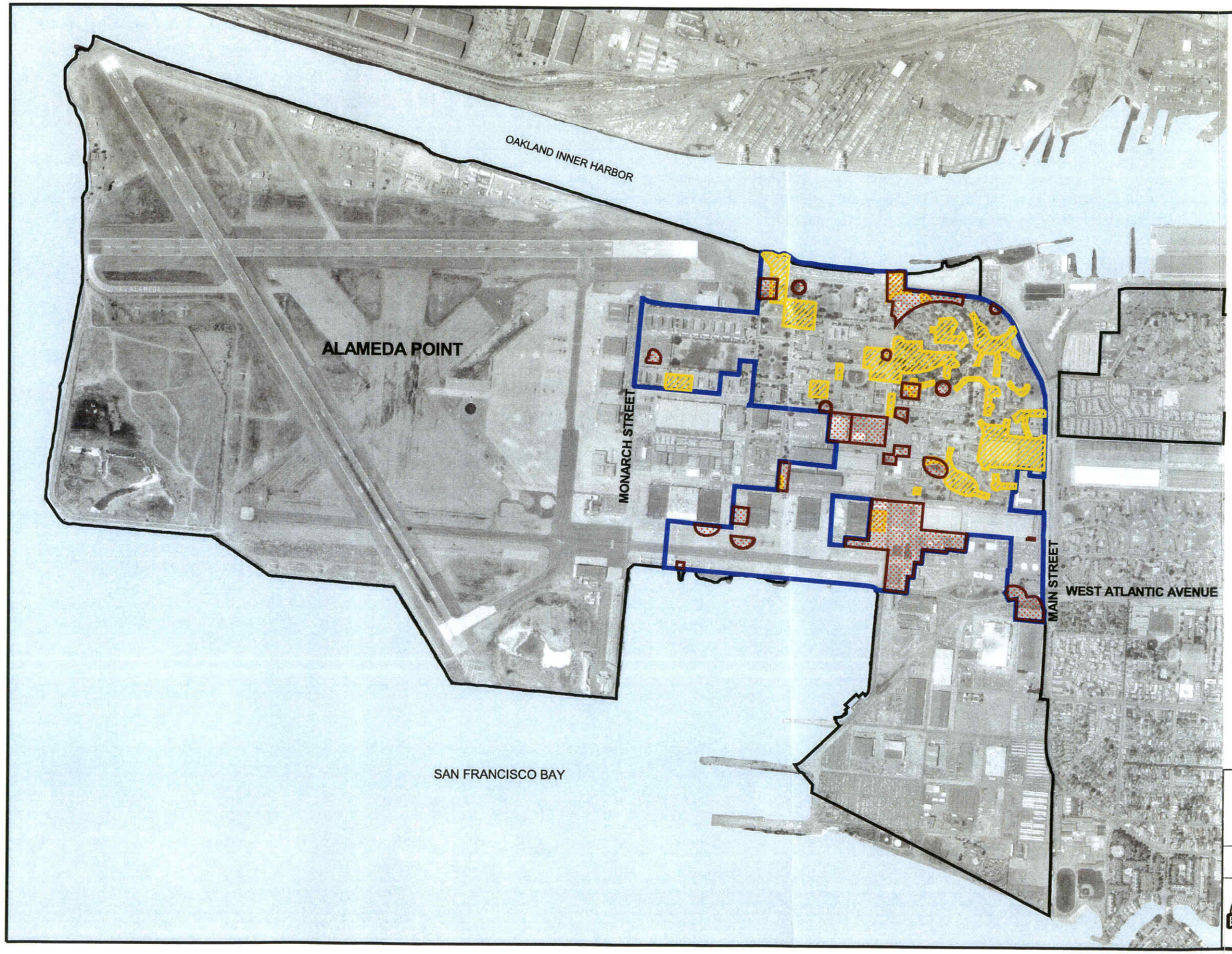
Alameda Point Regional Map

Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 6/22/06
File No.: 077R14394
Job No.: 23818-077
Rev No.: C



LEGEND

- IR SITE 35 AOCS AND DATA GAP AREAS
- IR SITE 35 PAH AREAS
- TRANSFER PARCEL EDC-5 BOUNDARY
- NAVY ONSHORE PROPERTY BOUNDARIES
- WATER

NOTES:

AOC – AREA OF CONCERN

EDC – ECONOMIC DEVELOPMENT CONVEYANCE

IR – INSTALLATION RESTORATION (PROGRAM)

PAH – POLYNUCLEAR AROMATIC HYDROCARBON

RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

N

1200 0 1200 Feet

RI/FS Report for IR Site 35

Figure ES-2

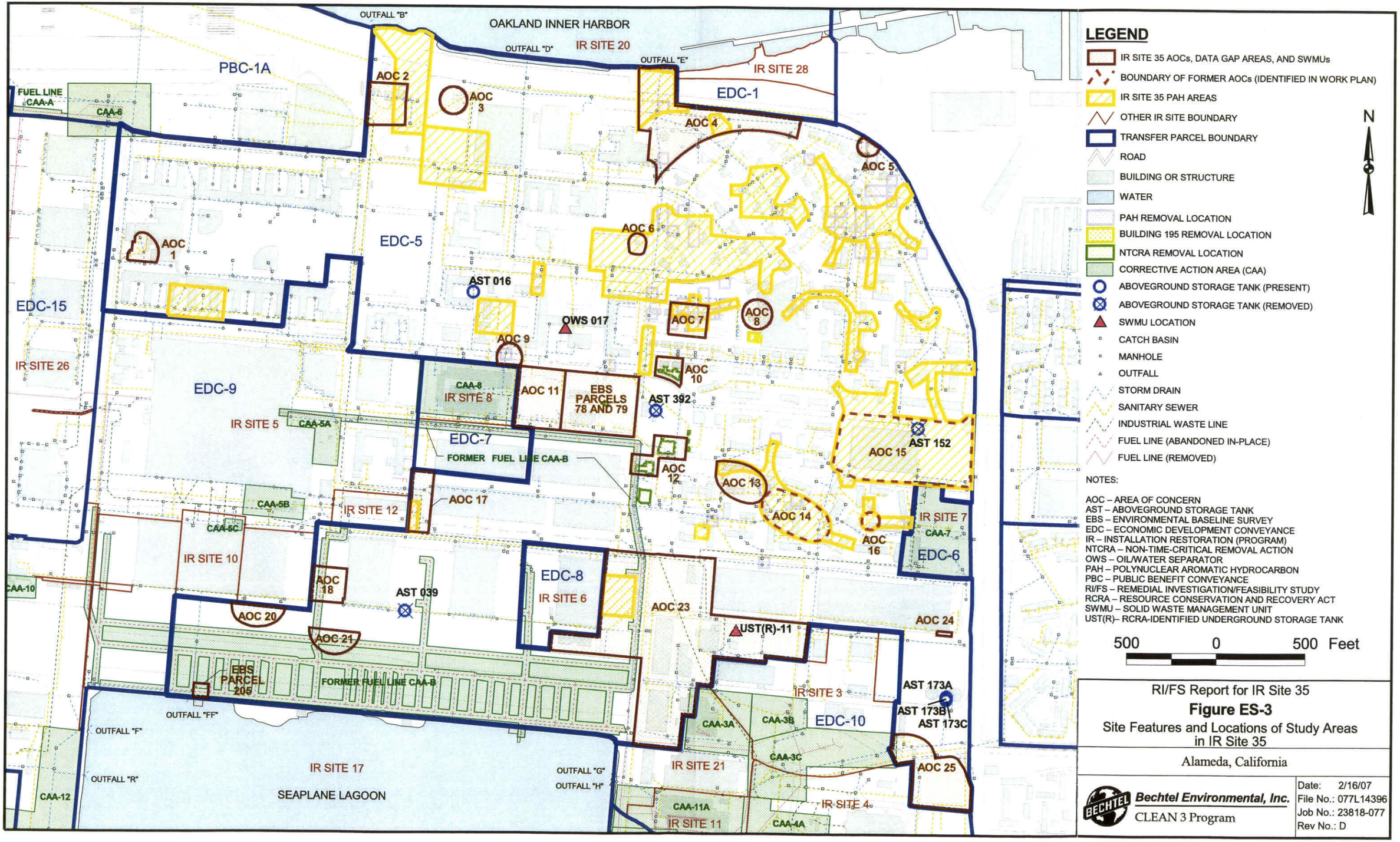
Site Location Map

Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 6/22/06
File No.: 077L14395
Job No.: 23818-077
Rev No.: C



RI/FS Report for IR Site 35

Figure ES-3

Site Features and Locations of Study Areas in IR Site 35

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 077L14396
Job No.: 23818-077
Rev No.: D

Table ES-1
IR Site 35 Remedial Investigation Summary and Recommendations

Study Area/Type of Risk Evaluation	Study Focus	Nature and Extent [a]	Risk Evaluation Results [b]	Conclusions	CERCLA Recommendations
AOC 1 *Baseline HHRA*	Three OWSs per regulatory agencies' request	*Chemicals above PSCs and background in soil* – none *Chemicals above PSCs and background in groundwater* – none; however, naphthalene was reported at 1,200 µg/L. The extent is not completely defined in area southwest of OWS 063A. A possible release of naphthalene is indicated from the OWS. Metals data were not collected in accordance with the Work Plan (BEI 2006).	***Exposure Group 1 (all pathways)*** U.S. EPA: 1×10^{-6} Cal/EPA: 4×10^{-3} HI: 29 *Cancer risk driver*: B(a)P in soil and naphthalene in groundwater *HI driver*: Naphthalene in groundwater ***Exposure Group 2 (soil pathways and VOCs in groundwater to indoor air)*** U.S. EPA: 1×10^{-6} Cal/EPA: 5×10^{-5} HI: 2 *Without PAHs in soil*: U.S. EPA: not calculated [c] Cal/EPA: 5×10^{-5} HI: 2 *Cancer risk and HI driver*: Naphthalene in groundwater	• Naphthalene in groundwater: – Possible indication of a release from the OWS – Extent not defined • Groundwater would not be considered a drinking water source based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.	• Conduct FS for naphthalene in groundwater. • Include sampling to define southwestern extent.
AOC 2 *Tier 1*	PAHs in soil; hazardous materials storage area	*Chemicals above PSCs and background in soil* – Aroclor 1260 (2 of 24 samples) and B(a)P equivalents; all metals below background • The extent of PCBs is limited based on results of nearby samples. *Chemicals above PSCs and background in groundwater* – none; manganese above background (1 of 2 samples)	***Exposure Group 1 (all pathways)*** Cancer: 2×10^{-3} HI: 7 *Without metals below background* [d]: Cancer: 1×10^{-5} HI: 4 *Cancer risk driver*: Aroclor 1260 in soil and arsenic in soil and groundwater *HI driver*: Manganese in groundwater ***Exposure Group 2 (soil pathways and VOCs in groundwater to indoor air)*** Cancer: 2×10^{-4} HI: 3 *Without metals below background* [d]: Cancer: 9×10^{-6} HI: 0.6 *Cancer risk driver*: Aroclor 1260 in soil	• PCBs in soil: – Defined extent and limited number of detections – Cancer risk associated with PCBs is within risk management range; noncancer HI below 1 – Not likely to impact groundwater based on fate and transport characteristics – Risk based on maximum concentration • PAHs in soil will be addressed as part of the PAH Areas. • Manganese in groundwater: – The result of dissolution of naturally occurring manganese in soil due to reducing conditions in groundwater • Groundwater would not be considered a drinking water source based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.	No further action.
AOC 3 *Baseline HHRA*	Pesticides in soil	*Chemicals above PSCs and background in soil* – heptachlor (1 of 16 samples); metals data not collected in accordance with the Work Plan (BEI 2006) • The extent of the pesticide heptachlor is not completely defined to the west. *Chemicals above PSCs and background in groundwater* – groundwater samples not analyzed because pesticides not reported in the deepest RI soil samples, in accordance with the Work Plan (BEI 2006)	***Exposure Group 2 (soil pathways)*** U.S. EPA: 3×10^{-3} Cal/EPA: 3×10^{-3} HI: 3 *Without PAHs in soil*: U.S. EPA: 3×10^{-3} Cal/EPA: 3×10^{-3} HI: 3 *Cancer risk and HI driver*: Heptachlor in soil	• Heptachlor in soil: – Cancer risk above the risk management range of 10^{-6} to 10^{-4} and the HI is above 1 – Not likely to impact groundwater based on fate and transport characteristics	• Conduct FS for shallow soil containing heptachlor. • Include sampling to define the western extent.
AOC 4 *Tier 1*	PAHs in soil, and metals in soil and groundwater	*Chemicals above PSCs and background in soil* – iron (1 of 4 samples) and B(a)P equivalents • Iron. This sample was part of the data set used to develop the background values and is considered to represent naturally occurring concentrations.	***Exposure Group 1 (all pathways)*** Cancer: 2×10^{-3} HI: 5 *Without metals below background* [d]: Cancer: 5×10^{-7} HI: 3 *HI drivers*: Iron in soil and groundwater	• Risk based on maximum concentrations. • Without metals below background, cancer risk is within the risk management range. • Iron in soil: – Likely naturally occurring – Health effects of iron not additive with other COPCs, and iron is not a concern due to its low toxicity	No further action.

Table ES-1 (continued)

Study Area/Type of Risk Evaluation	Study Focus	Nature and Extent [a]	Risk Evaluation Results [b]	Conclusions	CERCLA Recommendations
AOC 4 *Tier 1* (continued)		*Chemicals above PSCs and background in groundwater* – iron (1 of 3 samples), mercury (1 of 3 samples), and zinc (1 of 3 samples): • Mercury was not reported in soil, and was reported in only one groundwater sample at 0.14 µg/L, above a surface water PSC of 0.025 µg/L. • Zinc was reported in soil below background and was reported in one groundwater sample at 113 µg/L, above the surface water PSC of 81 µg/L and background.	***Exposure Group 2 (soil pathways and VOCs in groundwater to indoor air)*** Cancer: 9×10^{-5} HI: 2 *Without metals below background* [d]: Cancer: 5×10^{-7} HI: 2 *HI driver*: Iron in soil	• PAHs in soil are addressed as part of the PAH Areas. • Iron, mercury, and zinc in groundwater: – Zinc was above the PSC and background in only 1 of 3 samples. A mercury source was not indicated by soil results, and is considered unlikely to migrate 400 feet in groundwater and result in surface water concentrations above the PSC – Iron is the result of dissolution of naturally occurring iron in soil due to reducing conditions in groundwater	
AOC 5 *Tier 1*	Sewage pump station per regulatory agencies' request	*Chemicals above PSCs and background in soil* – iron (2 of 12 samples), manganese (2 of 12 samples), and B(a)P equivalents • The maximum manganese concentration is associated with native clay (Bay Sediment Unit) in soil at 6.5 feet bgs. *Chemicals above PSCs and background in groundwater* – (each in the same 2 of 3 samples) arsenic; iron and manganese above background	***Exposure Group 1 (all pathways)*** Cancer: 5×10^{-3} HI: 12 *Without metals below background* [d]: Cancer: 4×10^{-3} HI: 10 *Cancer risk driver*: Arsenic in groundwater *HI drivers*: Iron and manganese in soil and groundwater ***Exposure Group 2 (soil pathways and VOCs in groundwater to indoor air)*** Cancer: 1×10^{-4} HI: 6 *Without metals below background* [d]: Cancer: 4×10^{-7} HI: 5 *HI drivers*: Iron and manganese in soil	• Risk based on maximum concentrations. • Iron and manganese in soil: – Considered naturally occurring • PAHs in soil are addressed as part of the PAH Areas. • Arsenic, iron, and manganese in groundwater: – Likely the result of dissolution of naturally occurring metals in soil due to reducing conditions in groundwater	No further action.
AOC 6 *Tier 1*	PCB-contaminated oil spill with no confirmation samples collected	*Chemicals above PSCs and background in soil* – Aroclor 1260 (1 of 12 samples) and B(a)P equivalents; metals data not collected in accordance with the Work Plan (BEI 2006). • The extent of PCBs in soil is partially defined and is limited. *Chemicals above PSCs and background in groundwater* – groundwater data not collected in accordance with the Work Plan (BEI 2006)	***Exposure Group 2 (soil pathways)*** Cancer: 5×10^{-6} HI: not calculated [c] *Cancer risk driver*: Aroclor 1260 in soil	• PCBs in soil: – Partially defined extent and limited detections – Cancer risk within risk management range (HI was not calculated) – Risk based on maximum concentration – Not likely to impact groundwater based on fate and transport characteristics • PAHs in soil are addressed as part of the PAH Areas.	The Navy will perform soil confirmation sampling to define PCBs in soil to the west of borings A06B02 and A06B03 during future investigation activities. Approximately three soil borings will be advanced for collection of shallow soil samples. Otherwise, no further action.
AOC 7 *Tier 1*	PAHs and PCBs in soil	*Chemicals above PSCs and background in soil* – Aroclor 1254 (2 of 18 samples) and B(a)P equivalents; all metals below background • The extent of PCBs in soil is largely defined and is limited. *Chemicals above PSCs and background in groundwater* – groundwater data not collected in accordance with the Work Plan (BEI 2006)	***Exposure Group 2 (soil pathways)*** Cancer: 9×10^{-5} HI: 0.4 *Without metals below background* [d]: Cancer: 4×10^{-6} HI: not calculated [c] *Cancer risk driver*: Aroclor 1254 in soil	• PCBs in soil: – Defined extent and limited detections – Cancer risk within risk management range – Risk based on maximum concentration – Not likely to impact groundwater based on fate and transport characteristics • PAHs in soil are addressed as part of the PAH Areas.	No further action.
AOC 8 *Tier 1*	PCBs in soil	*Chemicals above PSCs and background in soil* – Aroclor 1254 (1 of 14 samples); metals data not collected in accordance with the Work Plan (BEI 2006) • The extent of PCBs in soil is defined and limited. *Chemicals above PSCs and background in groundwater* – groundwater data not collected in accordance with the Work Plan (BEI 2006)	***Exposure Group 2 (soil pathways)*** Cancer: 3×10^{-6} HI: not calculated [c] *Cancer risk driver*: Aroclor 1254 in soil	• PCBs in soil: – Defined extent and limited detections – Risk within risk management range – Risk based on maximum concentration – Not likely to impact groundwater based on fate and transport characteristics	No further action.

Table ES-1 (continued)

Study Area/Type of Risk Evaluation	Study Focus	Nature and Extent [a]	Risk Evaluation Results [b]	Conclusions	CERCLA Recommendations
AOC 9 *Tier 1*	Pesticides in soil due to close proximity to IR Site 8 and potential releases from grease trap per regulatory agencies' request	*Chemicals above PSCs and background in soil* – none *Chemicals above PSCs and background in groundwater* – none (groundwater analyzed for TPH)	***Exposure Group 2 (soil pathways)*** Cancer: 9×10^{-5} HI: 0.001 *Without metals below background* [d]: Cancer: not calculated [c] HI: 0.001	• Risk based on maximum concentrations. • Without background metals, cancer risk is less than 10^{-6} and noncancer HI is less than 1.	No further action.
AOC 10 *Lead Risk Evaluation*	Lead in soil outside lead removal area	*Chemicals above PSCs and background in soil* – lead (5 of 144 samples) • The extent of lead in soil is defined and limited. *Chemicals above PSCs and background in groundwater* – groundwater data not collected in accordance with the Work Plan (BEI 2006)	***AOC-wide data***: EPC for lead of 105 mg/kg, below site-specific PRGs of 184 mg/kg (with homegrown produce) and 322 mg/kg (without homegrown produce) ***Subarea***: EPC of 385 mg/kg, above both site-specific PRGs	• The EPC for the subarea is above site-specific PRGs for lead. • Not likely to impact groundwater based on fate and transport characteristics.	Conduct FS on the area where elevated lead concentrations remain in soil.
AOC 11/EBS Parcels 78–79 *Baseline HHRA*	Chemical storage at the parcel, stains observed, and minimal sampling conducted; EBS Parcels 78–79 included at regulatory agencies' request	*Chemicals above PSCs and background in soil* – iron (5 of 35 samples), vanadium (1 of 54 samples), and TPH-d (3 of 32 samples) • TPH remaining in soil appears to be limited laterally in extent and defined vertically. • Iron and vanadium are highly correlated throughout IR Site 35 so are likely to occur together naturally. *Chemicals above PSCs in groundwater* – none; arsenic, iron, and manganese above background • Area-specific statistical analyses indicate arsenic, iron, and manganese are not above background.	***Exposure Group 1 (all pathways)*** U.S. EPA: 3×10^{-3} Cal/EPA: 8×10^{-3} HI: 233 *Without metals below background* [d]: U.S. EPA: 2×10^{-3} Cal/EPA: 5×10^{-3} HI: 222 *Cancer and HI driver*: Mostly Aroclor 1260 and pesticides in groundwater, and to a lesser extent, arsenic, iron, and manganese in groundwater ***Exposure Group 2 (soil pathways and VOCs in groundwater to indoor air)*** U.S. EPA: 2×10^{-5} Cal/EPA: 8×10^{-5} HI: 2 *Without metals below background* [d] *and PAHs in soil*: U.S. EPA: 4×10^{-6} Cal/EPA: 1×10^{-6} HI: 2 *Cancer risk driver (U.S. EPA)*: TCE in groundwater *HI driver*: Iron in soil	• TPH in soil appears limited, is defined vertically, and does not provide a significant, if any, source of soluble constituents to groundwater. • Iron in soil: – Likely naturally occurring • PAHs in soil are addressed as part of the PAH Areas. • PCBs and pesticides in groundwater: – PCBs reported in only 1 of 10 samples below MCL – PCBs and pesticides likely artifacts of sampling and rarely a threat to groundwater • TCE in groundwater to indoor air: – Cancer risk within risk management range – Below MCL	No further action.
AOC 12 *Lead Risk Evaluation*	Lead in soil outside lead removal area; sediment samples to assess if lead-containing soil entered storm sewer system during removal action	*Chemicals above PSCs and background in soil* – arsenic (4 of 139 samples), iron (2 of 2 samples), lead (10 of 248 samples), thallium (2 of 139 samples), and vanadium (2 of 139 samples) • The extent of lead in soil is defined and limited. *Chemicals above PSCs and background in groundwater* – groundwater data not collected in accordance with the Work Plan (BEI 2006) Lead was reported in sediment at an elevated level from one storm sewer sample located downflow of AOC 12.	***AOC-wide data***: EPC for lead of 77.5 mg/kg, below site-specific PRGs of 184 mg/kg (with homegrown produce) and 322 mg/kg (without homegrown produce) ***Subarea***: EPC for lead of 267 mg/kg, above site-specific PRG with homegrown produce	• The EPC for the subarea is above site-specific PRG for lead with homegrown produce, and lead is above the PSC in one sediment sample from a storm drain. • Arsenic concentrations above the PSC and background are located in the same areas as the higher lead concentrations. It is not known whether these concentrations are naturally occurring or associated with historical use of pesticides along railroad tracks. • Iron and vanadium in soil are likely naturally occurring. Thallium in soil was not consistently above the PSC in a primary and duplicate sample. • Lead is not likely to impact groundwater based on fate and transport characteristics.	• Conduct FS on the area where elevated lead concentrations remain in soil. • FS will evaluate sediment remediation alternatives. • Arsenic will be addressed along with lead.
AOC 13 *Tier 1*	Pesticides in soil	*Chemicals above PSCs and background in soil* – 4,4′-DDT (2 of 24 samples), 4,4′-DDD (1 of 24 samples), dieldrin (1 of 24 samples), and B(a)P equivalents • Except for the concentrations at one deeper soil sampling location, the lateral and vertical extent of pesticides is defined.	***Exposure Group 2 (soil pathways)*** Cancer: 1×10^{-4} HI: 0.0007 *Without metals below background* [d]: Cancer: 6×10^{-6} HI: 0.0007 *Cancer risk drivers*: 4,4′-DDD, 4,4′-DDT, dieldrin in soil	• Pesticides in soil: – Limited number of detections – Extent largely defined – Noncancer HI is less than 1; cancer risk without metals below background within risk management range – Risk based on maximum concentration	No further action.

Table ES-1 (continued)

Study Area/Type of Risk Evaluation	Study Focus	Nature and Extent [a]	Risk Evaluation Results [b]	Conclusions	CERCLA Recommendations
AOC 13 *Tier 1* (continued)		*Chemicals above PSCs and background in groundwater* – groundwater data not collected in accordance with the Work Plan (BEI 2006)		– Not likely to impact groundwater based on fate and transport characteristics • PAHs in soil are addressed as part of the PAH Areas.	
AOC 17 *Tier 1*	Assess whether historical activities at adjacent IR Site 5 or at AOC 17 have impacted soil or groundwater	*Chemicals above PSCs and background in soil* – TPH-mo (1 of 14 samples), TPH-d (1 of 14 samples), iron (1 of 18 samples), and B(a)P equivalents • TPH in soil is limited and was not reported in groundwater samples. • Iron is likely naturally occurring. *Chemicals above PSCs and background in groundwater* – aluminum (2 of 6 samples), chromium (2 of 6 samples), and nickel (1 of 6 samples); iron and vanadium each exceed background in 1 of 4 samples. • Groundwater concentrations above PSCs were reported in grab samples in 2001 that were likely not filtered. Concentrations above PSCs were not reported in filtered RI samples.	***Exposure Group 1 (all pathways)*** Cancer: 2×10^{-3} HI: 16 *Without metals below background* [d]: Cancer: 2×10^{-6} HI: 13 *Cancer risk driver*: Chromium in groundwater *HI risk drivers*: Iron in soil and groundwater, and aluminum and vanadium in groundwater ***Exposure Group 2 (soil pathways and VOCs in groundwater to indoor air)*** Cancer: 7×10^{-8} HI: 3 *Without metals below background* [d]: Cancer: 5×10^{-8} HI: 2 *HI driver*: Iron in soil	• TPH in soil is defined and limited, and not providing a source of soluble constituents to groundwater. • Risk based on maximum concentrations. • Cancer risk without metals below background is within risk management range. • Iron in soil: – Likely naturally occurring • PAHs in soil are addressed as part of the PAH Areas. • Aluminum, iron, and vanadium in groundwater: – Based on possibly unfiltered sample; not above background in filtered RI samples	No further action.
AOC 18 *Tier 1*	Assess possible impact of hazardous materials storage (NAS GAP 23) on soil and groundwater	*Chemicals above PSCs and background in soil* – none *Chemicals above PSCs and background in groundwater* – none; however, naphthalene was reported in groundwater (maximum reported concentration of 3.6 µg/L)	***Exposure Group 1 (all pathways)*** Cancer: 8×10^{-5} HI: 1 *Without metals below background* [d]: Cancer: 4×10^{-5} HI: 0.04 *Cancer risk driver*: Naphthalene in groundwater ***Exposure Group 2 (soil pathways and VOCs in groundwater to indoor air)*** Cancer: 4×10^{-5} HI: 0.9 *Without metals below background* [d]: Cancer: not calculated [c] HI: 0.0004	• Total noncancer HI for soil and groundwater is below 1 without metals below background. • Risk based on maximum concentrations. • Total cancer risk is within the risk management range and HI is 1.	No further action.
AOC 20 *Tier 1*	Two OWSs per regulatory agencies' request	*Chemicals above PSCs and background in soil* – none *Chemicals above PSCs and background in groundwater* – TPH-d, TPH-g (each in 1 of 3 samples), and arsenic (1 of 2 samples) • TPH results in the duplicate groundwater sample were nondetect. • The two reported values for arsenic are 11.2 and 26.9 µg/L compared to the 95th percentile and maximum concentrations of 20.72 and 40.7 µg/L, respectively. • Arsenic was reported above the surface water PSC of 0.14 µg/L.	***Exposure Group 1 (all pathways)*** Cancer: 4×10^{-3} HI: 2 *Without metals below background* [d]: Cancer: 4×10^{-3} HI: 1 *Cancer risk driver*: Arsenic in groundwater ***Exposure Group 2 (soil pathways and VOCs in groundwater to indoor air)*** Cancer: 4×10^{-5} HI: 1 *Without metals below background* [d]: Cancer: 3×10^{-8} HI: 0.4	• TPH data should be evaluated along with CAA-B under the TPH Program to see if the AOC meets the Water Board's criteria for closure of low-risk fuel sites. • Without metals below background, cancer risk associated with soil and residential use of groundwater is 4×10^{-3} and the HI is 1. However, the cancer risk is due predominantly to arsenic in groundwater, and arsenic is considered to be naturally occurring because concentrations are within the range of background concentrations. Without metals below background and without residential use of groundwater, cancer risk is below the risk management range and the HI is below 1. • Risk based on maximum concentrations. • Arsenic in groundwater: – Concentrations likely not different than background • Groundwater would not be considered a drinking water source based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.	No further action.

Table ES-1 (continued)

Study Area/Type of Risk Evaluation	Study Focus	Nature and Extent [a]	Risk Evaluation Results [b]	Conclusions	CERCLA Recommendations
AOC 21 *Tier 1*	VOCs in groundwater	*Chemicals above PSCs and background in soil* – TPH-d (1 of 8 samples) and TPH-g (2 of 8 samples) • The vertical extent of TPH concentrations above PSCs has been defined in soil. *Chemicals above PSCs and background in groundwater* – TPH-d (2 of 5 samples) and TPH-g (1 of 5 samples) • Reported concentrations of TPH in downgradient groundwater samples are below PSCs. Metals data were not collected in accordance with the Work Plan (BEI 2006).	***Exposure Group 1 (all pathways)*** Cancer: 1×10^{-6} HI: 0.07 ***Exposure Group 2 (soil pathways and VOCs in groundwater to indoor air)*** Cancer: 2×10^{-8} HI: 0.04	• TPH data should be evaluated along with CAA-B under the TPH Program to see if the AOC meets the Water Board's criteria for closure of low-risk fuel sites. • Risk based on maximum concentrations • The total for soil and groundwater cancer risk is 1×10^{-6} and noncancer HI is below 1. • Groundwater would not be considered a drinking water source based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.	No further action.
AOC 23 *Baseline HHRA*	Assess soil and groundwater for contamination in areas previously used for chemical storage or handling at eight EBS parcels (EBS Parcels 71, 72, 110, 121, 123, 124, 125, and 126); additionally, the regulatory agencies requested further evaluation of NAS GAP 29, NADEP GAP 43, OWS 067, and SWMU AOC 098	*Chemicals above PSCs and background in soil* – Aroclor 1260 (1 of 134 samples), arsenic (10 of 160 samples), iron (19 of 123 samples), thallium (1 of 160 samples), vanadium (2 of 160 samples), vinyl chloride (1 of 157 samples), benzene (1 of 150 samples), TPH-mo (9 of 169 samples), TPH-d (11 of 176 samples), TPH-g (4 of 171 samples), and B(a)P equivalents • Benzene previously reported in soil was not reported during the RI. Soil removal occurred in this area. • TPH was reported in the upper foot of soil at one location beneath Building 399, which is adjacent to CAA-3A. • Area-specific statistical analyses indicate arsenic and vanadium are not above background. • Iron is likely naturally occurring. • Thallium was only slightly above the PSC in one sample. *Chemicals above PSCs and background in groundwater* – arsenic (1 of 46 samples), vinyl chloride (4 of 65 samples), benzene (1 of 65 samples), 1,2-DCA (2 of 65 samples), TPH-mo (7 of 54 samples), TPH-d (20 of 54 samples), and B(a)P • Arsenic, iron, manganese, and vanadium concentrations were reported above background in groundwater and are risk drivers. The concentrations of these metals in groundwater are the result of dissolution of metals into groundwater due to reducing conditions. • PCBs and some PAHs were reported in groundwater but are likely associated with suspended material due to turbidity. • 1,2-DCA in groundwater, reported in the eastern portion of AOC 23, is limited in extent and is likely associated with the adjacent CAA-3A. • Concentrations of arsenic in soil and groundwater are below background as shown by additional statistics.	***Exposure Group 1 (all pathways)*** U.S. EPA: 2×10^{-2} Cal/EPA: 3×10^{-2} HI: 408 *Without metals below background* [d]: U.S. EPA: 2×10^{-2} Cal/EPA: 3×10^{-2} HI: 401 *Cancer drivers*: Primarily PCBs (Aroclors 1260, 1254, and 1016) in soil and groundwater and PAHs in groundwater *HI risk drivers*: PCBs in groundwater. Without PCBs in soil and groundwater, HI is 5 due to hazard quotients at or below 1 for 12 COPCs ***Exposure Group 2 (soil pathways and VOCs in groundwater to indoor air)*** U.S. EPA: 3×10^{-5} Cal/EPA: 2×10^{-4} HI: 3 *Without metals below background* [d] *and PAHs in soil*: U.S. EPA: 1×10^{-5} Cal/EPA: 3×10^{-5} HI: 2 *Cancer risk drivers*: Vinyl chloride and Aroclors 1254 and 1260 in soil *HI risk drivers*: Without PCBs in soil, HI is 1	• PCBs in soil: – Defined extent and limited detections (1 in 164 samples) – Risk within risk management range – Not likely to impact groundwater based on fate and transport characteristics • PAHs in soil are addressed as part of the PAH Areas. • VOCs in groundwater: – Vinyl chloride – reported concentrations from grab groundwater samples above the MCL around Building 13 and at one location southwest of Building 66 – Benzene – no further action recommended based on limited impact (1 of 65 samples at 1.1 µg/L) slightly above MCL of 1 µg/L – 1,2-DCA – low concentrations in the eastern portion of AOC 23 are likely associated with the adjacent IR Site 3 and CAA-3A • TPH in soil and groundwater: – Recommended for review under the Alameda Point TPH Program; TPH concentrations reported in soil and groundwater most notably beneath Building 399, which is adjacent to CAA-3A • Metals at concentrations above background that contribute to HI values above 1 are largely due to iron in soil and iron, manganese, and vanadium in groundwater. These metals have HQs of 1 or less, and their health effects are not considered additive with other chemicals. These metals are believed to be naturally occurring in soil. In groundwater, they are believed to result from dissolution of the metals in soil due to reducing conditions. • PCBs and PAHs in groundwater: – Likely an artifact of sampling	• Conduct FS for vinyl chloride in groundwater. • Include well installation and sampling to confirm that concentrations are above the MCL. • Review TPH in soil and groundwater under the TPH Program.

Table ES-1 (continued)

Study Area/Type of Risk Evaluation	Study Focus	Nature and Extent [a]	Risk Evaluation Results [b]	Conclusions	CERCLA Recommendations
AOC 23 *Baseline HHRA* (continued)		• Comparison of results in the southern portion of AOC 23 to surface water PSCs does not indicate a concern. Vinyl chloride (2.7 µg/L) was reported in one sample collected approximately 150 feet from surface water and is above the PSC of 2.4 µg/L. TPH-d (940 J µg/L) was reported in one sample collected over 300 feet from surface water and is above the PSC of 640 µg/L.			
AOC 24 *Tier 1*	OWS per regulatory agencies' request	*Chemicals above PSCs and background in soil* – arsenic (1 of 4 samples) and iron (2 of 3 samples) • Arsenic concentrations are consistent with background. The maximum concentration of arsenic of 11.2 mg/kg is slightly above background concentration of 9.14 mg/kg but below the maximum of 15.6 mg/kg. This sample was co-located with iron above background suggesting that the arsenic is naturally occurring. The other three samples had arsenic concentrations below background. *Chemicals above PSCs and background in groundwater* – TPH-d (1 of 1 sample; the laboratory noted that the TPH represents a wide range of hydrocarbons and is not indicative of diesel); iron and manganese are each above background in 1 of 1 sample	***Exposure Group 1 (all pathways)*** Cancer: 9×10^{-4} HI: 11 *Without metals below background* [d]: Cancer: 2×10^{-4} HI: 10 *Cancer risk driver*: Arsenic in soil *HI risk drivers*: Iron and manganese in groundwater ***Exposure Group 2 (soil pathways and VOCs in groundwater to indoor air)*** Cancer: 2×10^{-4} HI: 4 *Without metals below background* [d]: Cancer: 2×10^{-4} (1×10^{-9} without arsenic in soil) HI: 3	• Metals in soil: – Considered naturally occurring – Health effects for these COPCs not additive, and iron is not a concern due to its low toxicity • Risk based on maximum concentrations. • TPH in groundwater – TPH-d was reported at 110 µg/L, which is slightly above the PSC of 100 µg/L. • Metals in groundwater: – The result of dissolution of naturally occurring metals in soil due to reducing conditions in groundwater	No further action.
AOC 25 *Tier 1*	Metals in groundwater; proximity to IR Site 4 with known metals contamination in groundwater	*Chemicals above PSCs and background in soil* – arsenic (1 of 11 samples), iron (3 of 15 samples), lead (1 of 30 samples), TPH-d (1 of 11 samples), and TPH-mo (9 of 11 samples) • Arsenic (9.6 mg/kg) was reported close to background concentration of 9.14 mg/kg and below the maximum in background of 15.6 mg/kg, and is consistent with background. • TPH in soil in the southern portion of AOC 25 is limited in extent and does not appear to be providing a significant, if any, source of soluble constituents to groundwater. *Chemicals above PSCs and background in groundwater* – arsenic (1 of 15 samples), cadmium (1 of 15 samples), thallium (1 of 14 samples), TPH-d (3 of 12 samples), TPH-mo (1 of 12 samples), iron (3 of 15 samples), manganese (1 of 15 samples), and vanadium (1 of 15 samples) • Arsenic, iron, and manganese concentrations in groundwater are likely due to dissolution of metals from reducing conditions in groundwater. • Cadmium and thallium concentrations were reported in an older grab groundwater sample that was likely not filtered. Cadmium and thallium were not reported in filtered RI samples. • TPH concentrations reported above PSCs in the northern portion of AOC 25 are close to CAA-3 and likely associated with this CAA.	***Exposure Group 1 (all pathways)*** Cancer: 3×10^{-3} HI: 35 *Without metals below background* [d]: Cancer: 3×10^{-3} HI: 34 *Without arsenic in groundwater*: Cancer: 1×10^{-6} *HI risk drivers*: Thallium, iron, and manganese in groundwater ***Exposure Group 2 (soil pathways and VOCs in groundwater to indoor air)*** Cancer: 2×10^{-4} HI: 6 *Without metals below background* [d]: Cancer: 1×10^{-6} HI: 5 *HI risk drivers*: Iron and cadmium in soil	• Risk based on maximum concentrations. • Arsenic, iron, lead, and vanadium in soil: – Arsenic considered consistent with background – Iron and vanadium considered naturally occurring, and iron is not a concern due to its low toxicity – Lead reported in only 1 of 30 samples and does not represent a widespread concern. Also, the maximum concentration is below the site-specific PRG for lead. • Arsenic, iron, manganese, and vanadium in groundwater are likely the result of dissolution of metals due to reducing conditions in groundwater. • Cadmium and thallium were reported in only one older grab groundwater sample from the SWBZ, and this sample was likely not filtered. Neither cadmium nor thallium was reported in the filtered groundwater samples collected from the FWBZ during the 2005 RI. • TPH in soil in southern portion of AOC is likely not impacting groundwater. • TPH in soil and groundwater in northern portion of AOC is likely associated with CAA-3 and recommended for review under the TPH Program.	No further action.

Table ES-1 (continued)

Study Area/Type of Risk Evaluation	Study Focus	Nature and Extent [a]	Risk Evaluation Results [b]	Conclusions	CERCLA Recommendations
EBS Parcel 205 *Baseline HHRA*	Assess whether soil and groundwater have been impacted by possible releases from NADEP GAP 73; per regulatory agencies' request	*Chemicals above PSCs and background in soil* – none *Chemicals above PSCs and background in groundwater* – TPH-d, TPH-g, JP-5, cis-1,2-DCE, and vinyl chloride (all in 1 of 2 samples)	***Exposure Group 1 (all pathways)*** U.S. EPA: 4×10^{-4} Cal/EPA: 2×10^{-3} HI: 6 *Without metals below background* [d]: U.S. EPA: 8×10^{-5} Cal/EPA: 6×10^{-5} HI: 0.9 *Cancer risk drivers*: Benzene, PCE, TCE, and vinyl chloride in groundwater ***Exposure Group 2 (soil pathways and VOCs in groundwater to indoor air)*** U.S. EPA: 4×10^{-5} Cal/EPA: 1×10^{-4} HI: 1 *Without metals below background* [d] *and PAHs in soil*: U.S. EPA: 2×10^{-5} Cal/EPA: 3×10^{-5} HI: 0.07 *Cancer risk drivers*: TCE and vinyl chloride in groundwater	• VOCs in groundwater: – Risk is within risk management range • TPH groundwater data should be evaluated along with CAA-B under the TPH Program to see if the Water Board's criteria for closure of low-risk fuel sites are met. • Because EBS Parcel 205 is adjacent to Seaplane Lagoon, saltwater intrusion from sustained pumping would likely mean groundwater is not potable. • Groundwater would not be considered a drinking water source based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.	No further action.
SWMUs	The regulatory agencies requested further evaluation of nine SWMUs (OWS 017; ASTs 016, 039, 152, 173A, -B, -C, and 392; and former UST[R]-11) as part of the IR Site 35 RI	*Chemicals above PSCs and background in soil* – TPH-mo at ASTs 173A, -B, and -C *Chemicals above PSCs and background in groundwater* – TPH-d at AST 152; TPH-d and TPH-mo at ASTs 173A, -B, and -C; and TPH-d and TPH-mo at former UST(R)-11	Not performed in accordance with the Work Plan (BEI 2006); data associated with UST(R)-11 was included in the baseline risk assessment for AOC 23	• SWMUs are adequately characterized. • Chemicals were not reported above PSCs in any of the soil or groundwater samples collected at OWS 017 and ASTs 016, 039, and 392 • TPH-d (110 µg/L) at AST 152 was only slightly above the PSC of 100 µg/L • TPH concentrations reported in groundwater (up to 240 µg/L) were not much greater than the PSC of 100 µg/L at UST(R)-11. Also, reported arsenic concentrations in groundwater were below background, and iron in soil above the PSC is considered naturally occurring.	• No further action for OWS 017 and ASTs 016, 039, 152, and 392 and UST(R)-11. • Data reported at ASTs 173A, -B, and -C should be reviewed under the TPH Program to determine whether the Water Board's criteria for closure of low-risk fuel sites are met.
PAH Areas	PAHs in soil within Transfer Parcel EDC-5 are addressed under IR Site 35 in response to regulatory agency comments on the draft Work Plan regarding residual concentrations of B(a)P equivalent concentrations above the Alameda Point site-specific residential screening value of 620 µg/kg	Over 1,500 samples have been collected at Transfer Parcel EDC-5 and analyzed for PAHs. The regulatory agencies and Navy agreed that with the additional samples collected during the RI, the number of samples was adequate to characterize the occurrence and distribution of PAHs in soil. While some individual samples had B(a)P equivalent concentrations above 620 µg/kg, average concentrations were below 620 µg/kg. Approximately 32, 33, 40, and 48 percent of the B(a)P equivalent concentrations above the PSC were reported in samples from the 0 to 2, 2 to 4, and deeper than 4 feet bgs depth intervals, respectively.	As agreed upon with U.S. EPA on November 14, 2005, baseline risks were not calculated for the PAH Areas. Results of both the pre- and post-PAH TCRA calculations show a U.S. EPA and Cal/EPA total risk associated with PAHs in soil within the risk management range of 10^{-6} to 10^{-4}, with noncancer hazard values below 1.	PAHs in soil are adequately characterized.	• Include PAHs in soil within Transfer Parcel EDC-5 with B(a)P equivalent concentrations above the PSC in the FS for IR Site 35 to consider whether remedial action is needed to reduce or manage risk.

Notes:

[a] metals reported in soil and groundwater at concentrations above background are discussed in detail in Section 4.3.3 of the main RI/FS Report; metals discussion in this table focuses primarily on concentrations above PSCs; regardless of concentration, all reported metals (except required human trace nutrients) were included in risk evaluations

[b] Tier 1 risk evaluations did not include PAHs in soil; all other chemicals, except as noted, were included in risk evaluations; chemicals were not excluded based on PSC comparison; results for Exposure Group 3 (residential use of groundwater) are presented in Tables 6-3 and 6-5; results for applicable exposure groups (Exposures Groups 1 and/or 2) are presented

[c] not calculated because COPCs in that category have not been assigned a slope factor or reference dose by U.S. EPA or Cal/EPA

[d] 95th percentile in the Alameda Point pink background data set was compared to maximum concentrations of metals at each study area, except more complex statistics were used for some metals at AOC 11/EBS Parcels 78–79 and AOC 23 (Appendix H)

Table ES-1 (continued)

Acronyms/Abbreviations:
AOC – area of concern
AST – aboveground storage tank
B(a)P – benzo(a)pyrene
bgs – below ground surface
CAA – corrective action area
Cal/EPA – California Environmental Protection Agency
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
COPC – chemical of potential concern
DCA – dichloroethane
DCE – dichloroethene
DDD – dichlorodiphenyldichloroethane
DDT – dichlorodiphenyltrichloroethane
EBS – environmental baseline survey
EDC – economic development conveyance
EPC – exposure point concentration
FS – feasibility study
FWBZ – first water-bearing zone
GAP – generator accumulation point
HI – hazard index
HHRA – human-health risk assessment
HQ – hazard quotient
IR – Installation Restoration (Program)
JP-5 – jet propellant grade 5
µg/kg – micrograms per kilogram
µg/L – micrograms per liter
MCL – maximum contaminant level
mg/kg – milligrams per kilogram
NADEP – Naval Aviation Depot
NAS – Naval Air Station
OWS – oil/water separator
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PCE – tetrachloroethene
PRG – preliminary remediation goal
PSC – preliminary screening criterion
RI – remedial investigation
SWBZ – second water-bearing zone
SWMU – solid waste management unit
SWRCB – (California) State Water Resources Control Board
TCRA – time-critical removal action
TCE – trichloroethene
TDS – total dissolved solid
TPH – total petroleum hydrocarbons
TPH-d – diesel-range TPH
TPH-g – gasoline-range TPH
TPH-mo – motor oil–range TPH
U.S. EPA – United States Environmental Protection Agency
UST – underground storage tank
VOC – volatile organic compound
Water Board – San Francisco Bay Regional Water Quality Control Board

Review Qualifier:
J – estimated value

Table ES-2
Identification of Remedial Alternatives for Soil

Alternative Name	AOC 3 Alternative Number	AOC 10/12 Alternative Number	PAH Alternative Number
no further action	AOC 3-1	AOC 10/12-1	PAH-1
cover and/or ICs	AOC 3-2	AOC 10/12-2	PAH-2
excavation and off-site disposal	AOC 3-3	AOC 10/12-3	PAH-3a* PAH-3b* PAH-4a* PAH-4b*

Note:
* descriptions of the four excavation and off-site disposal alternatives for PAHs are as follows:
  PAH-3a: excavation in unpaved areas to 2 feet bgs and ICs
  PAH-3b: excavation to 2 feet bgs and ICs
  PAH-4a: excavation in unpaved areas to 4 feet bgs and ICs
  PAH-4b: excavation to 4 feet bgs

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
IC – institutional control
PAH – polynuclear aromatic hydrocarbon

Table ES-3
Identification of Remedial Alternatives for Groundwater

Alternative Name	AOC 1 Alternative Number	AOC 23 Alternative Number
no action	AOC 1-1	AOC 23-1
MNA and ICs	AOC 1-2	AOC 23-2
source removal, enhanced aerobic ISB, and ICs	AOC 1-3	NA
enhanced aerobic or anaerobic ISB and ICs	AOC 1-4	AOC 23-3
ISCO	AOC 1-5	AOC 23-4

Acronyms/Abbreviations:
AOC – area of concern
IC – institutional control
ISB – *in situ* bioremediation
ISCO – *in situ* chemical oxidation
MNA – monitored natural attenuation
NA – not applicable to this AOC

Table ES-4
Comparative Analysis Summary for Soil Remedial Alternatives

NCP Criteria	ALTERNATIVE											
	AOC 3-1 No Action	AOC 3-2 Soil Cover and ICs	AOC 3-3 Excavation and Off-Site Disposal	AOC 10/12-1 No Further Action	AOC 10/12-2 Limited Excavation, Cover, and ICs	AOC 10/12-3 Excavation and Off-Site Disposal	PAH-1 No Further Action	PAH-2 ICs	PAH-3a Excavation in Unpaved Areas to 2 Feet bgs and ICs	PAH-3b Excavation to 2 Feet bgs and ICs	PAH-4a Excavation in Unpaved Areas to 4 Feet bgs and ICs	PAH-4b Excavation to 4 Feet bgs
Overall protectiveness	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Compliance with ARARs	NE	Yes	Yes	NA	Yes	Yes	NA	Yes	Yes	Yes	Yes	Yes
Long-term effectiveness and permanence	NE	◑	●	○	◑	●	○	◑	◑	◑	●	●
Reduction of toxicity, mobility, or volume through treatment	NE	○	◑	○	◑	◑	○	○	○	○	○	○
Short-term effectiveness	NE	◑	●	○	◑	●	○	◑	◑	◑	◑	○
Implementability	NE	◑	●	●	◑	●	●	●	◑	◑	◑	◑
Cost* ($M)	NE	◑ 0.37	◑ 0.40	● 0	○ 0.61	◑ 0.55	● 0	◑ 0.24	◑ 0.39	◑ 0.55	○ 2.0	○ 2.5

Note:
* based on net present value

Acronyms/Abbreviations:
AOC – area of concern
ARAR – applicable or relevant and appropriate requirement
bgs – below ground surface
IC – institutional control
M – millions
NA – not applicable
NCP – National Oil and Hazardous Substances Pollution Contingency Plan
NE – not evaluated; alternative did not meet threshold criteria and thus was not evaluated against the balancing criteria
PAH – polynuclear aromatic hydrocarbon

Relative Performance:
○ = low
◑ = medium
● = high

Table ES-5
Comparative Analysis Summary for Groundwater Remedial Alternatives

NCP Criteria	ALTERNATIVE						
	AOC 1-1 No Action	AOC 1-2 MNA and ICs	AOC 1-3 Source Removal, Enhanced Aerobic ISB, and ICs	AOC 1-5 ISCO	AOC 23-1 No Action	AOC 23-2 MNA and ICs	AOC 23-4 ISCO
Overall protectiveness	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Compliance with ARARs	NA	Yes	Yes	Yes	NA	Yes	Yes
Long-term effectiveness and permanence	○	◑	●	●	○	◑	●
Reduction of toxicity, mobility, or volume through treatment	○	◑	●	●	○	◑	●
Short-term effectiveness	◑	◑	◑	◑	○	◑	◑
Implementability	●	●	◑	◑	●	●	◑
Cost ($M)	● 0	◑ 0.44	○ 0.88	◑ 0.50	● 0	◑ 0.50	○ 0.85
State acceptance	To be evaluated after agency comments						
Community acceptance	To be evaluated after the public comment period						

Note:
* based on net present value

Acronyms/Abbreviations:
AOC – area of concern
ARAR – applicable or relevant and appropriate requirement
IC – institutional control
ISB – *in situ* bioremediation
ISCO – *in situ* chemical oxidation
M – millions
MNA – monitored natural attenuation
NA – not applicable
NCP – National Oil and Hazardous Substances Pollution Contingency Plan

Relative Performance:
○ = low
◑ = medium
● = high

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V SOLID WASTE MANAGEMENT UNITS

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X ACRONYMS AND ABBREVIATIONS FOR ATTACHMENTS

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ACRONYMS/ABBREVIATIONS

AOC	area of concern
ARAR	applicable or relevant and appropriate requirement
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
AVGAS	aviation gasoline
BAAQMD	Bay Area Air Quality Management District
B(a)P	benzo(a)pyrene
Basin Plan	San Francisco Bay Basin Water Quality Control Plan
bcy	bank cubic yard
BEI	Bechtel Environmental, Inc.
BGMP	basewide groundwater monitoring program
bgs	below ground surface
BRAC	Base Realignment and Closure
BSU	Bay Sediment Unit
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAA	corrective action area
Cal. Code Regs.	*California Code of Regulations*
Cal/EPA	California Environmental Protection Agency
CAM	California Administrative Manual
CCC	criterion continuous concentration
CD	compact disk
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R.	*Code of Federal Regulations*
CHHSL	California Human Health Screening Level
CLEAN	Comprehensive Long-Term Environmental Action Navy
cm/sec	centimeters per second
COC	chemical of concern
COPC	chemical of potential concern
CSF	cancer slope factor
CSM	conceptual site model
CTO	contract task order
CTR	California Toxics Rule
DA	decision area
DCA	dichloroethane
DCE	dichloroethene
DDD	dichlorodiphenyldichloroethane
DDT	dichlorodiphenyltrichloroethane
DERP	Defense Environmental Restoration Program

DGI	data gap investigation
DMP	data management plan
DNAPL	dense nonaqueous-phase liquid
DO	dissolved oxygen
DoD	Department of Defense
DQO	data quality objective
DSM	deep-soil mixing
DTSC	(Cal/EPA) Department of Toxic Substances Control
EBS	environmental baseline survey
EBMUD	East Bay Municipal Utilities District
EDC	economic development conveyance
EE/CA	engineering evaluation/cost analysis
Eh	electrical potential
EPC	exposure point concentration
ERH	electrical resistive heating
ERV	ecological reference value
ESL	environmental screening level
°F	degrees Fahrenheit
FFA	Federal Facility Agreement
f_{oc}	fraction organic carbon
FS	feasibility study
FSP	field sampling plan
FWBZ	first water-bearing zone
gpd	gallons per day
GAP	generator accumulation point
HHCO	human-health consumption of organisms only
HHRA	human-health risk assessment
HI	hazard index
HQ	hazard quotient
HRC	Hydrogen Release Compound
IC	institutional control
IDW	investigation-derived waste
IR	Installation Restoration (Program)
IRIS	Integrated Risk Information System
ISB	*in situ* bioremediation
ISCO	*in situ* chemical oxidation
IWTP	industrial waste treatment plant
JP-5	jet propellant grade 5

K_d	distribution coefficient
K_{oc}	organic carbon partition coefficient
LBP	lead-based paint
LDR	land-disposal restriction
LeadSpread	DTSC Lead Risk Assessment Spreadsheet
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MDL	method detection limit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MNA	monitored natural attenuation
MOA	memorandum of agreement
MSL	mean sea level
MUN	municipal and domestic supply
NADEP	Naval Aviation Depot
NAPL	nonaqueous-phase liquid
NAS	Naval Air Station
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOM	natural organic matter
NRHP	National Register of Historic Places
NRWQC	National Recommended Water Quality Criteria
NTCRA	non-time-critical removal action
O&M	operation and maintenance
ORC	Oxygen Release Compound
ORP	oxidation-reduction potential
OU	operable unit
OWS	oil/water separator
PAH	polynuclear aromatic hydrocarbon
PBC	public benefit conveyance
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PE	Professional Engineer
PEP	parcel evaluation plan
PG	Professional Geologist
POTW	publicly owned treatment works
PRC	preliminary remediation criterion
PRG	preliminary remediation goal

PSC	preliminary screening criterion
pt.	part
PWC	(Navy) Public Works Center
QAPP	quality assurance project plan
RAB	Restoration Advisory Board
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
redox	oxidation-reduction
Res.	resolution
RfD	reference dose
RG	remediation goal
RI	remedial investigation
RME	reasonable maximum exposure
ROD	record of decision
§	section
SAP	sampling and analysis plan
SARA	Superfund Amendments and Reauthorization Act of 1986
SCAPS	Site Characterization and Analysis Penetrometer System
SDWA	Safe Drinking Water Act
SI	site inspection
SIM	selected ion monitoring
SQL	sample quantitation limit
S/S	solidification/stabilization
STLC	soluble threshold limit concentration
subpart	subpt.
SVOC	semivolatile organic compound
SWBZ	second water-bearing zone
SWMU	solid waste management unit
SWRCB	(California) State Water Resources Control Board
TAL	target analyte list
TCE	trichloroethene
TCLP	toxicity characteristic leaching procedure
TCRA	time-critical removal action
TDS	total dissolved solids
tit.	title
TPH	total petroleum hydrocarbons
TQL	target quantitation limit
TSD	treatment, storage, and disposal
TTLC	total threshold limit concentration

UCL	upper confidence limit
UIC	underground injection control
U.S.C.	*United States Code*
U.S. EPA	United States Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compound
Water Board	San Francisco Bay Regional Water Quality Control Board
WQO	water quality objective
XRF	X-ray fluorescence

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Section 1
INTRODUCTION

This report presents the results of the remedial investigation (RI) and feasibility study (FS) conducted at Installation Restoration (IR) Program Site 35, Areas of Concern (AOCs) in Transfer Parcel Economic Development Conveyance (EDC)-5, Alameda Point (formerly Naval Air Station [NAS] Alameda), Alameda, California. The locations of Alameda Point and IR Site 35 are presented on Figures 1-1 and 1-2, respectively. IR Site 35 consists of 23 study areas within Transfer Parcel EDC-5 as follows:

- 19 AOCs, 17 of which required additional sampling (AOCs 1, 2, 3, 5, 6, 8, 9, 10, 12, 13, 17, 18, 20, 21, 23, 24, and 25) and 2 of which had sufficient data to perform baseline human-health risk evaluations (AOCs 4 and 7)
- 2 data gap areas: AOC 11/Environmental Baseline Survey (EBS) Parcels 78–79 (a study area combining EBS Parcels 78 and 79 with AOC 11) and EBS Parcel 205
- 1 solid waste management unit (SWMU) study area (including seven aboveground storage tanks [ASTs], one oil/water separator [OWS], and one underground storage tank [UST])
- 1 polynuclear aromatic hydrocarbon (PAH) area (includes former AOCs 14, 15, and 16 and other locations with PAHs across Transfer Parcel EDC-5)

Bechtel Environmental, Inc., (BEI) prepared this RI/FS Report for the Base Realignment and Closure (BRAC) Program Management Office West under Contract Task Order-0077 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) 3 Program, Contract No. N68711-95-D-7526.

Field activities were performed for the RI portion of this RI/FS Report in accordance with the final Work Plan for IR Site 35 (BEI 2006), using the following guidance:

- Guidance for the Data Quality Objective (DQO) Process (U.S. EPA 2000d)
- Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods (U.S. EPA 2005)
- United States Environmental Protection Agency (U.S. EPA) Requirements for Quality Assurance Project Plans (QAPPs) for Environmental Data Operations (U.S. EPA 2001)
- Guidance for Conducting RIs and FSs under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (U.S. EPA 1988a)
- Risk Assessment Guidance for Superfund Part A (U.S. EPA 1989) and Part B (U.S. EPA 1991b)

The scope of the Work Plan was developed through a collaborative effort between the Navy and the regulatory agencies, including four planning meetings held between May and July 2005. Additionally, the Navy participated in conference calls with the U.S. EPA on November 14, 2005, and with the California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC) on November 17 and 21, 2005, to discuss comments on the draft version of the Work Plan (DON 2005). The San Francisco Bay Regional Water Quality Control

Board (Water Board) also participated in the call on November 21. Based on discussions during these telephone calls, verbal agreement on the overall RI sampling approach was reached, and sample collection began on November 29, 2005, prior to the finalization of the Work Plan in March 2006 (BEI 2006).

1.1 PROJECT PURPOSE

The Navy will ultimately transfer land at Alameda Point for redevelopment. In order to transfer base property, the Navy must conform to the requirements of CERCLA Section 120(h) for closing military bases. Transfer Parcel EDC-5 may be identified for early transfer; to facilitate this early transfer, the RI/FS process for IR Site 35 is being performed on an accelerated schedule. The results of the RI/FS are presented in this combined report.

The purposes of the RI portion of this RI/FS Report are to characterize the nature and extent of contamination in soil and groundwater at IR Site 35 and to assess risk to human health. Analytical results also provide a basis on which to evaluate the types of response actions to be considered in the FS portion of this RI/FS Report and to support the property transfer process.

The purpose of the FS portion of this RI/FS Report is to develop and evaluate remedial action alternatives at IR Site 35. These alternatives address human-health risks from soil and groundwater that contain contaminants at concentrations above applicable regulatory requirements.

1.2 SCOPE

Field activities, including the collection and analysis of soil, groundwater, and storm sewer sediment samples, were conducted to meet the RI objectives. Analytical data from both current and historical environmental samples were used to interpret the nature and extent of contamination at IR Site 35. Data from adjacent IR sites were also reviewed to assess whether contaminants present at IR Site 35 may be a result of activities previously conducted at nearby sites.

Area-specific human-health risk assessments (HHRAs) were conducted to evaluate potential risk to human health. As agreed upon by the Navy and regulatory agencies, no ecological assessment of terrestrial receptors was conducted because of the lack of suitable habitat and the absence of threatened, endangered, or special-status species at IR Site 35. Groundwater results for study areas adjacent to or near surface water were compared to the applicable regulatory criteria for aquatic receptors.

The FS methodology is summarized below and further detailed in the FS portion of this RI/FS Report. It includes the following steps (U.S. EPA 1988).

- Establish remedial action objectives (RAOs).
  - Identify applicable or relevant and appropriate requirements (ARARs).
  - Establish response objectives for environmental media of concern (soil, groundwater, and surface water).

- Identify general response actions, including no action, to meet RAOs for each medium of concern.
- Identify volumes or areas of environmental media for which remedial response actions may be needed.
- Identify remedial technologies and representative process options under each general response action based on technical considerations.
- Screen remedial technologies and process options on the basis of effectiveness, implementability, and cost.
- Assemble the retained technologies and process options into remedial alternatives representing a range of treatment and containment combinations.
- Screen assembled alternatives, considering effectiveness, implementability, and cost.
- Evaluate retained remedial alternatives in detail against the following nine criteria specified in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP):
  - overall protection of human health and the environment
  - compliance with ARARs
  - long-term effectiveness and permanence
  - reduction of toxicity, mobility, or volume through treatment
  - short-term effectiveness
  - implementability
  - cost
  - state acceptance
  - community acceptance
- Perform a comparative evaluation of remedial alternatives.

The FS portion of this RI/FS Report does not identify or recommend a preferred remedial alternative. Comments made during public (including the Restoration Advisory Board) and regulatory agency reviews will be evaluated and considered during the remedy selection process. As required by the NCP and U.S. EPA guidance (U.S. EPA 1988), public agency comments will be addressed in a proposed plan as well as in the record of decision (ROD).

1.3 REPORT ORGANIZATION

This combined RI/FS Report has three major components. The RI portion provides an overview of the RI approach and results for IR Site 35, and provides a summary of the findings for each of the 23 study areas. The FS portion addresses the study areas that were determined to require further study. The final component of the report, Attachments A

to W, includes a detailed analysis of each study area, including a description of site history, summary of investigations and results, including the RI activities, nature and extent of contamination, fate and transport of the contaminants, and a summary of risk assessment and recommendations.

Sections 1 and 2 of this combined RI/FS Report provide background information about IR Site 35. The RI portion of the report is presented in Sections 3 through 7, and the FS portion is presented in Sections 8 through 11. Specifically, this RI/FS Report is organized into the following sections and appendices:

- Section 1 discusses the purpose and organization of the report; describes the site, previous operations, and the regulatory framework; and summarizes previous investigations and future use of the site.
- Section 2 describes the physical and environmental setting of Alameda Point and IR Site 35.
- Section 3 discusses the RI approach and scope, including DQOs, the RI sampling program, deviations from the Work Plan (BEI 2006), and data comparison criteria.
- Section 4 presents results of the RI sampling, describes the nature and extent of soil and groundwater contamination at the site, and presents background metals analysis.
- Section 5 discusses the fate and transport of chemicals of interest.
- Section 6 summarizes the results of the Tier 1 evaluations and baseline HHRAs.
- Section 7 provides RI conclusions and recommendations.
- Section 8 presents the RAOs for the FS portion of this report.
- Section 9 describes the identification and screening of remedial technologies.
- Section 10 presents the development and screening of remedial alternatives.
- Section 11 provides a detailed analysis of remedial alternatives.
- Section 12 lists references.
- Appendix A presents historical aerial photographs of IR Site 35 and surrounding areas.
- Appendix B presents historical data tables (on compact disk [CD]).
- Appendix C describes field methodology (on CD).
- Appendix D presents boring logs (on CD).
- Appendix E contains geotechnical data (on CD).
- Appendix F presents the data quality assessment and validation results (on CD).
- Appendix G contains RI analytical data tables (on CD).

- Appendix H provides comparison of site-specific metal concentrations in soil and groundwater to Alameda Point background concentrations (on CD).
- Appendix I presents the HHRA performed prior to the time-critical removal action (TCRA) (on CD).
- Appendix J presents the RI HHRA. Attachments J1 through J8 are presented on CD.
- Appendix K presents the ARARs for IR Site 35.
- Appendix L contains the cost development summaries for the FS portion of this report.
- Appendix M contains the responses to regulatory agency comments.
- Appendix N contains the Memorandum of Agreement (MOA) between the Navy and DTSC (on CD).
- Appendix O contains the Navy statement of principles and procedures for land-use controls (on CD).
- Attachments A through W contain detailed information about each of the 23 study areas at IR Site 35. Attachment X lists acronyms and abbreviations used in the attachments. Attachment Y lists references used in the attachments.

1.4 BACKGROUND

The following subsections provide background information for Alameda Point and IR Site 35 on relevant environmental regulations; the history of NAS Alameda, IR Site 35, and surrounding sites; and previous environmental investigations in the area.

1.4.1 Regulatory Framework

CERCLA and the Superfund Amendments and Reauthorization Act (SARA) established a series of federal programs to identify, characterize, and clean up or control contamination from hazardous waste disposal and spill sites. One of these programs, the Defense Environmental Restoration Program (DERP), is codified in SARA Section 21 (Title 10 *United States Code* Section 2701). DERP specifies Navy and Marine Corps personnel responsibilities, describes IR Program procedures, and assures consistency with regulatory guidelines for evaluation of hazardous waste site conditions.

The IR Program was established by the Navy to comply with federal requirements regarding cleanup of hazardous waste sites. The task of the program is to reduce the risk to human health and the environment from past waste disposal operations and hazardous materials spills at U.S. Navy and Marine Corps facilities in a cost-effective manner. These federal requirements are outlined in CERCLA, as amended by SARA and its implementing regulation, the NCP.

The former NAS Alameda (CA2170023236), now known as Alameda Point, was added to the U.S. EPA National Priorities List in July 1999. Therefore, U.S. EPA and Navy RI

protocols have been followed in conducting the fieldwork and preparing this RI/FS Report for IR Site 35. The RI/FS process involves determining the nature and extent of potential contamination, assessing any risks posed by the potential contaminants, and analyzing options for their cleanup. The NCP, promulgated in the *Code of Federal Regulations* (C.F.R.) at Title 40 C.F.R. Section (§) 300, provides the RI/FS protocols.

RI activities documented in this report were conducted concurrently with base closure activities at Alameda Point. In September 1993, the United States Congress and BRAC Commission designated NAS Alameda for closure.

The Navy's Total Petroleum Hydrocarbons (TPH) Program and Resource Conservation and Recovery Act (RCRA) program are being conducted separately from CERCLA activities at Alameda Point. These programs address petroleum fuel sites and RCRA sites, respectively.

1.4.2 Base Description and History

In 1930, the U.S. Army acquired the original base property from the City of Alameda and began construction activities in 1931. In 1936, the Navy acquired title to the land from the Army and began building an air station in response to the military buildup in Europe before World War II. Construction of the base included several iterations of filling tidelands, marshlands, and sloughs with dredge materials from San Francisco Bay. NAS Alameda was operated as an active naval facility from 1940 to 1997.

Operations conducted by the Navy at Alameda Point included aircraft, engine, gun, and avionics maintenance; engine overhaul and repair; fueling activities; and plating, stripping, and painting activities (including radium-dial painting). The Navy Public Works Center (PWC) also operated two power plants, a transportation shop, and a pesticide shop at Alameda Point. Historical aviation and jet engine test activities at Alameda Point were supported by a network of fuel delivery pipelines that transported aviation and other fuels to various areas of Alameda Point (IT 2001a). In addition, the base operated a deepwater port capable of berthing aircraft carriers. The port was used primarily for minor carrier maintenance and ship overhaul. The following tenants also used Alameda Point during its tenure as an active military base:

- Construction Battalion Unit 416
- Commander Naval Air Force, U.S. Pacific Fleet Material Representative
- Defense Property Disposal Office
- Navy Disease Vector Ecology Control Center
- Alameda Detachment, Explosive Ordnance Disposal Group One
- Marine Air Group 42
- Naval Air Reserve Unit
- Naval Regional Dental Center Branch Clinic

- Naval Regional Medical Center Branch Clinic
- Pacific Fleet Audio-Visual Facility Component
- Shore Intermediate Maintenance Activity
- Supervisor of Shipbuilding, Conversion, and Repair

1.4.3 Site Description

IR Site 35 consists of 23 study areas within Transfer Parcel EDC-5 that occupy a total land mass of approximately 75 acres and are distributed across the northeastern portion of Alameda Point (Figure 1-3). These areas were identified for further evaluation by the Navy and regulatory agencies subsequent to completion of the Site Inspection (SI) Report for Transfer Parcel EDC-5 (BEI 2005b). IR Site 35 is generally bounded by Oakland Inner Harbor on the north, Main Street on the east, Transfer Parcel EDC-10 and Seaplane Lagoon on the south, and Transfer Parcels EDC-7, EDC-9, EDC-15, and Public Benefit Conveyance (PBC)-1A on the west. Most of the Operable Unit (OU)-2B sites (IR Sites 3, 4, and 21), all of the OU-2C sites (IR Sites 5, 10, and 12), and IR Sites 6, 7, 8, 26, and 28 are adjacent to IR Site 35. Ten corrective action areas (CAAs) are also adjacent to, or overlapping with, portions of IR Site 35. These CAAs include CAA-3A, -3B, -3C, -5A, -5B, -5C, -7, -8, and former fuel line CAA-B. Soil and/or groundwater at IR Site 35 may be impacted from the adjacent OU-2B sites and IR Sites 5, 6, and 7.

IR Site 35 consists of open space (grassy, gravel, or paved areas with no buildings present), residences, and commercial/industrial buildings. Historical uses of the site by the Navy were industrial, residential, and recreational. These uses included living quarters, medical facilities, maintenance facilities, water towers, air terminal offices, educational buildings, parking, grounds maintenance, an engineering laboratory, electrical substations, hobby shops, dog training and kenneling facilities, a plant nursery (with reported mixing and storage of pesticides), material storage areas, communications towers, hazardous materials storage, chemical storage, fuel storage tanks, and OWSs. Table 1-1 lists the historical uses of IR Site 35 by study area. Current and future uses of IR Site 35 include light industrial, commercial, residential, and open space.

Historical aerial photographs (Appendix A) of IR Site 35 show that the land was predominantly undeveloped before the 1940s. By 1940, the site was being used for industrial military activities; by 1947, the site was paved and looks much as it does today.

1.4.4 Site Background

Twenty-five AOCs were identified for further evaluation in the SI Report for Transfer Parcel EDC-5 (BEI 2005b). Subsequent to the publication of the SI Report, the list of areas requiring further evaluation was expanded and refined by the Navy and regulatory agencies in planning meetings and in the comment/response process on the draft version of the Work Plan for IR Site 35 (BEI 2006). As a result of these meetings and comments, it was agreed that the following 23 study areas (Figure 1-3) would be subject to further sampling and evaluation during the RI at IR Site 35:

- 19 AOCs:
  - AOCs 1, 2, 3, 5, 6, 8, 9, 10, 12, 13, 17, 18, 20, 21, 23, 24, and 25 required additional sampling and analysis.
  - AOCs 4 and 7 had sufficient data to perform baseline human-health risk evaluations and make decisions.
  - AOC 11 was combined with data gap areas EBS Parcels 78 and 79 (discussed below).
  - AOCs 14, 15, and 16 were incorporated into the PAH Areas because they had been identified solely on the basis of the presence of PAHs, and are part of the current PAH study area discussed below.
  - AOCs 19 and 22 were removed from IR Site 35 and included with adjacent IR Site 6 and CAA-B, respectively, and are no longer study areas for IR Site 35.
- 2 data gap areas:
  - EBS Parcels 78 and 79 were combined with AOC 11, based on their previous use and geographic proximity, to become study area AOC 11/ EBS Parcels 78–79.
  - EBS Parcel 205
- 1 SWMU study area, including the following subareas:
  - ASTs 016, 039, 152, 173A, 173B, 173C, and 392
  - OWS 017
  - UST(R)-11, also known as Tank 393, located in AOC 23
- 1 study area referred to as the PAH Areas. The Navy agreed to further assessment of residual PAHs in soil in Transfer Parcel EDC-5. This included PAHs at residual benzo(a)pyrene (B[a]P) equivalent concentrations above the Alameda Point screening level of 620 micrograms per kilogram (µg/kg) (DON 2001b, Cal/EPA 2006) for eight PAHs classified as carcinogenic: benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, B(a)P, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and naphthalene. PAH Areas also include those areas with TPH concentrations above environmental screening level (ESLs) (RWQCB 2005). No additional samples were collected in the PAH Areas that fall outside the boundaries of the AOCs. Although these PAH Areas were identified for inclusion in the FS, the agencies agreed that baseline risks would not be calculated for these areas, as discussed with U.S. EPA on November 14, 2005.

The focus of the investigation for each of these study areas is listed in Table 1-2.

1.5 PREVIOUS INVESTIGATIONS

The following 23 environmental reports present the results of studies conducted within the boundaries of IR Site 35:

1. Data Summary Report, RI /FS Phases 2B and 3 (PRC Environmental and Montgomery 1992)
2. EBS/Community Environmental Response Facilitation Act Report (ERM-West 1994a)
3. Parcel Evaluation Plans (PEPs) (ERM-West 1994b)
4. RI/FS Data Transmittal Memorandum for Sites 4, 5, 8, 10A, 12, and 14 (PRC Environmental and Montgomery 1996)
5. Data Summary Report, Quarterly Groundwater Monitoring, November 1997–August 1998 (TtEMI and Uribe 1998)
6. Fuel Pipeline Oversight and Sampling Report (TtEMI 2000b)
7. EBS Data Evaluation Summary (IT 2001a)
8. Field Summary Report for the OU-5 Addendum Activities (Parcels 98, 99, 100, 103, 178, and the North Village Housing Area) (IT 2001b)
9. Storm Sewer Study Report, TPH Addendum (TtEMI 2001a)
10. Summary Report, Data Gap Investigation (DGI) at CAAs and Other Locations at Alameda Point (TtEMI 2001b)
11. Summary of Background Concentrations in Soil and Groundwater, Alameda Point (TtEMI 2001c)
12. Engineering Evaluation/Cost Analysis (EE/CA) for Water Tower and Antenna Sites, Lead Removal Action (TtEMI 2002a)
13. Data Summary Report, Supplemental RI Data Gap Sampling for OUs 1 and 2 (TtEMI 2002b)
14. Underground Fuel Line Abandonment Report (IT 2002)
15. Site Closure Report for Parcels 79, 98, 105, 106, and 107 Non-Time-Critical Removal Action (Shaw 2003b)
16. Field Activity Report, Assessment of PAH Contamination at Selected CERCLA Sites and EBS Parcels (BEI 2004b)
17. Project Close-Out Report, CERCLA TCRA at West Housing Area (FWEC 2004)
18. Removal Action Site Closure Report, Revision 1, TCRA for Building 195, Pesticide Shed Demolition and Soil Removal (Shaw 2004a)
19. Work Plan, Basewide Groundwater Monitoring Program (BGMP) (Shaw 2004b)
20. RI Report, Sites 6, 7, 8, and 16, Alameda Point (TtEMI 2004)
21. SWMU Evaluation Report for Transfer Parcel EDC-5 (SulTech 2005a)
22. PAH Field Activity Summary (BEI 2005a) (included as Appendix D of the SI Report for Transfer Parcel EDC-5)
23. SI Report for Transfer Parcel EDC-5 (BEI 2005b)

The scopes of the investigations conducted at IR Site 35 are described in the subsections below. Figure 1-4 shows sampling locations from previous investigations in AOCs, in data gap areas, and near SWMUs at IR Site 35. PAH Areas and previous sampling locations where data for semivolatile organic compounds (SVOCs) (including PAHs) were collected are discussed further in Sections 4.1.3 and 4.2.3. Information from these investigations, including historical operations as well as analytical results from soil and groundwater sampling, is presented for each study area at IR Site 35 in Attachments A through W. Table 1-3 shows the numbers of samples collected during previous investigations by analyte group at the study areas in IR Site 35. The SI Report (BEI 2005b) presents detailed summaries of investigations and analytical data applicable to Transfer Parcel EDC-5, organized by EBS parcel.

1.5.1 Phases 2B and 3 Investigation

In 1991, soil and groundwater samples were collected and analyzed during an investigation conducted to assess whether contamination exists at IR Site 6, which is surrounded by Transfer Parcel EDC-5 (PRC Environmental and Montgomery 1992) and adjacent to AOC 23. During this investigation, a small number of soil samples were also collected and analyzed outside IR Site 6, but within the boundaries of AOC 23.

1.5.2 Environmental Baseline Survey

The EBS program was initiated at Alameda Point in 1993 to facilitate property transfer. Initially, the entire property at Alameda Point was divided into 214 EBS parcels. Subsequently, six of these parcels were determined to be located on the property of the Fleet and Industrial Supply Center Alameda Annex, leaving 208 EBS parcels at Alameda Point. A portion of the Todd Shipyards was later added to the Alameda EBS program, resulting in a total of 209 EBS parcels. Subsequent to the completion of the EBS, 53 EBS parcels were divided into subparcels and given alphanumeric identifiers (e.g., a portion of EBS Parcel 61 became EBS Parcel 61A). Some of these subparcels are now included within the boundaries of IR sites, and some are considered buffer zone areas to IR sites (i.e., portions of nonimpacted property that will not be transferred because they are immediately adjacent to impacted property). Figure 1-4 shows the EBS parcels located within the boundaries of Transfer Parcel EDC-5.

The EBS investigation was implemented in two phases. Phase 1 provided an assessment of the environmental impacts due to base operations and included site visits, employee interviews, historical research, and an inventory of all property on a parcel-by-parcel basis (ERM-West 1994a).

Based on the results of the Phase 1 analysis, Phase 2 was conducted to further examine the potential environmental impacts at Alameda Point; this phase included the collection and analyses of environmental samples. Phase 2 was conducted in three subphases: 2A, 2B, and 2C (IT 2001a). Activities conducted during these subphases were as follows:

- Phase 2A – collection and analysis of soil samples from selected parcels
- Phase 2B – collection and analysis of groundwater samples and additional soil samples from selected parcels
- Phase 2C – collection and analysis of additional soil and groundwater samples from selected parcels

1.5.3 Parcel Evaluation Plans

In 1994 and 1995, Environmental Resources Management–West, Inc., prepared PEPs as supplements to the original EBS (ERM-West 1994b). The PEPs were prepared for each EBS parcel and included EBS findings (e.g., a summary of the historical use of the parcels and results of the EBS inspection) and a proposed sampling plan to address potential contamination.

1.5.4 Follow-On Remedial Investigation Sampling

Two follow-on RIs occurred within the boundaries of IR Site 35, one in 1994 (PRC Environmental and Montgomery 1996) and one in 1998 (TtEMI and Uribe 1998). The purpose of these investigations was to provide additional lithologic, chemical, and hydrogeologic information for selected IR sites at Alameda Point. The goal of these investigations was to characterize the nature and extent of soil and groundwater contamination for the preparation of an RI/FS Report. During these investigations, soil and groundwater samples were collected and analyzed from locations in IR Site 35 adjacent to IR Sites 3, 6, and 21.

1.5.5 Background Metals Evaluation

A basewide soil background assessment for metals was conducted at Alameda Point in support of site characterization and remediation efforts under CERCLA (TtEMI 2001c, 2004). This study divided Alameda Point into three geologically similar areas based on differing fill deposition dates. The three areas and their designated colors were: 1) the runway area and central portion (pink area), 2) the southeastern portion (blue area), and 3) the far western portion of Alameda Point (yellow area) (TtEMI 2001c). IR Site 35 is located in the central portion of Alameda Point and is included in the "pink" background data set shown on Figure H-1 in Appendix H. Of the background soil samples collected from locations within the central portion of Alameda Point, three soil borings were located within the boundaries of IR Site 35.

1.5.6 Fuel Line Investigations

Underground pipelines that historically distributed jet propellant grade 5 (JP-5) and other fuels from locations near Seaplane Lagoon to various locations at Alameda Point were removed (34,500 linear feet) or abandoned in place (24,100 linear feet) between June 1998 and February 1999 (TtEMI 2000b). TPH concentrations reported in confirmation samples collected from soil and groundwater following fuel line removal and abandonment were

above preliminary remediation criteria (PRC) screening levels established by the Navy for petroleum-contaminated sites at Alameda Point (DON 2001a). The former fuel line areas were designated Former Fuel Line CAA-B (Figure 1-3).

Portions of CAA-B are in or adjacent to the following IR Site 35 study areas: AOCs 11, 12, 18, 20, 21, and 23, and EBS Parcels 78, 79, and 205. The dense network of fuel lines in CAA-B is in the tarmac area and the lateral pipelines (or pipeline network) extend northward from that area into Transfer Parcel EDC-5.

Suspected fuel lines within IR Site 35 boundaries were investigated as part of a fuel line abandonment and removal project conducted for the Navy by International Technology Corporation from October 2001 through April 2002 (IT 2002). Locations of these suspected fuel line segments were in AOC 23 (near EBS Parcels 110, 123, and 124) and along West Tower Avenue bordering AOC 19. Geophysical surveys, exploratory potholes, and a review of historical documents (including base utility drawings) did not detect any fuel lines in these areas. The Closure Report (IT 2002) for the fuel line abandonment project concluded that results of investigations strongly suggest these fuel lines did not exist. Furthermore, no further action was recommended for CAA-B because it met the criteria for low-risk fuel site closure requirements set forth by the Water Board (TtEMI 2003b).

1.5.7 Data Gap Investigations

Two separate DGIs included the collection and analysis of samples in IR Site 35. A corrective action DGI was conducted at Alameda Point in 2000 (TtEMI 2001b), and a series of separate DGIs was conducted within the boundaries of OUs 1 and 2 in 2001 (TtEMI 2002b).

1.5.7.1 CORRECTIVE ACTION DATA GAP INVESTIGATION

This investigation was conducted at Alameda Point in 2000 and included the collection and analysis of additional samples at one of the EBS parcels located within the boundaries of IR Site 35 (TtEMI 2001b). Soil samples were collected and analyzed from one boring in EBS Parcel 125 to investigate the potential presence of petroleum-related contaminants from historical engine-testing activities. Concentrations of petroleum-related compounds reported above detection limits did not exceed screening levels established for the study.

1.5.7.2 OPERABLE UNITS 1 AND 2 DATA GAP INVESTIGATION

The OUs 1 and 2 DGIs had three objectives: 1) delineation of contaminant plumes in groundwater, 2) characterization of inorganic constituents in soil and groundwater, and 3) investigation of a storm sewer exposure pathway (TtEMI 2002b).

To further define volatile organic compound (VOC) and TPH plumes at IR sites in OUs 1 and 2, groundwater samples were collected and analyzed from monitoring wells and direct-push borings (TtEMI 2002b). Analytical results indicated the presence of

shallow groundwater contamination migrating to Transfer Parcel EDC-5 from two adjacent areas. Contaminated groundwater originating from OU-2B (IR Sites 3, 4, 11, and 21) may have impacted groundwater in the southern portion of AOC 23 and in the western portion of AOC 25 with TPH, trichloroethene (TCE), vinyl chloride, tetrachloroethene (PCE), 1,1-dichloroethane (DCA), 1,2-DCA, 1,1-dichloroethene (DCE), 1,2-DCE (total), 1,4-dichlorobenzene, 1,1,2-trichloroethane (TCA), and benzene. In addition, contaminated groundwater originating from IR Site 6 may have impacted the western and northwestern area of AOC 23 with TPH and chlorinated VOCs (primarily cis-1,2-DCE and vinyl chloride).

A DGI was conducted to further investigate the lateral extent of lead in soil and groundwater in an area identified during the EBS in the northern portion of IR Site 3 (TtEMI 2002b). Analytical results indicated that lead contamination in soil and groundwater in this area extends north of the IR Site 3 boundary into the area between AOC 23 and AOC 24.

1.5.8 Storm Sewer Investigations

Storm sewer investigations at IR Site 35 are discussed in Section 1.6.4.1.

1.5.9 Operable Unit 5 Addendum Sampling

Samples were collected in IR Site 35 as part of the OU-5 Addendum activities conducted in 2001 in support of the OU-5 RI (IT 2001b). Samples of fill soil were collected at AOCs 7 and 14 in IR Site 35 and analyzed for PAHs. B(a)P equivalent concentrations were calculated and compared to the Alameda Point–specific residential soil screening criterion of 620 µg/kg as established during the PAH technical meeting between the Navy, regulatory agencies, and the City of Alameda in May 2001 (DON 2001b, Cal/EPA 2006).

1.5.10 Basewide Groundwater Monitoring Program

A BGMP was implemented in 2002 and is ongoing at Alameda Point (Shaw 2004b). The monitoring program includes quarterly and semiannual sampling of selected groundwater wells at IR Site 35 conducted to inventory, assess, and evaluate the adequacy of the current monitoring well network as well as to evaluate groundwater quality at Alameda Point. Three monitoring wells located within IR Site 35 (13-MW-03, MBG-3, and M03-11) are included in the BGMP and sampled either quarterly or semiannually. The extent of groundwater plumes at sites adjacent to IR Site 35 are shown on Figure 1-5, as interpreted in the summer 2005 BGMP Report (ITSI 2005). As shown on Figure 1-5, contaminants in groundwater from the IR Site 5 Group may extend to AOC 17 and possibly AOCs 18 and 20. Contaminants in groundwater at IR Site 3, IR Site 6, and CAA-3 may extend to AOC 23. Analytical results from data gathered during the BGMP activities are discussed in detail for each IR Site 35 study area in Attachments A through W.

1.5.11 Polynuclear Aromatic Hydrocarbon Studies at Alameda Point

In 2002 and 2003, BEI conducted two separate PAH-related investigations that included the collection and analysis of soil samples within the boundaries of IR Site 35. Results of the 2002 PAH study (BEI 2005a) were included as Appendix D of the SI Report for Transfer Parcel EDC-5 (BEI 2005b). Results of the 2003 PAH sampling investigation were included in the Field Activity Report, Assessment of PAH Contamination at Selected CERCLA Sites and EBS Parcels (BEI 2004b).

The 2002 PAH study was designed to characterize PAH concentrations in fill soil at transfer parcels with no known historical releases. Soil samples were collected at four depths from each location (0 to 0.5 foot, 0.5 foot to 2 feet, 2 to 4 feet, and 4 to 8 feet below ground surface [bgs]) in Transfer Parcel EDC-5. Many of these sampling locations were located at what are now AOCs in IR Site 35. Based on findings of the 2002 PAH study (BEI 2005a), soil removals were subsequently conducted at IR Site 35, as discussed further in Section 1.5.13 of this RI/FS Report.

The 2003 PAH study was conducted at 19 IR sites and 3 EBS parcels at Alameda Point (BEI 2004b). The purpose of the investigation was to collect sufficient data to identify possible PAH contamination in soil at these IR sites and EBS parcels. B(a)P equivalent concentrations for PAHs were calculated and compared to the Alameda Point B(a)P equivalent concentration screening level of 620 µg/kg (DON 2001b, Cal/EPA 2006). Reported concentrations of PAHs in soil samples were above screening criteria at AOCs 2, 4, 6, 7, 13, 14, 15, 16, 17, and 23, as well as in some areas in Transfer Parcel EDC-5 that are outside these AOCs. Areas recommended for further evaluation in the SI Report included those areas where a cancer risk above 10^{-5} was associated with PAHs.

Some areas that were not carried forward as AOCs (those areas where a cancer risk associated with PAHs was at or below 10^{-5}) contained individual samples with B(a)P equivalent concentrations above 620 µg/kg.

1.5.12 Lead Removal Action

Because lead-based paint (LBP) may have been used historically, the DTSC collected soil samples near two former water towers (Structure 033 in AOC 12 and Structure 088) in EBS Parcels 106 and 107 in May 1999. Concentrations of lead exceeding the residential soil preliminary remediation goal (PRG) were reported. Subsequently, in July and August 2001, an investigation was conducted to determine the extent of lead contamination in soil surrounding these two water towers and a third water tower (Structure 061), also located in EBS Parcel 107 (AOC 12), as well as two radio antenna towers (Structures 036A and 036B) located in EBS Parcels 79 and 98 (AOC 10), respectively (TtEMI 2002a). Adjacent EBS Parcel 105 was also investigated at this time because it was unpaved and lead concentrations exceeding the residential soil PRG had been reported nearby. Structure 033 was located in AOC 12, and Structure 036B was located in AOC 10; both areas are within IR Site 35.

An EE/CA (TtEMI 2002a) completed in 2002 presented a framework for evaluating the best remedial technologies to address LBP on the former water tanks and antenna towers and lead-impacted soil near these structures. During the EE/CA, a site-specific human-health removal action objective was developed for lead using the DTSC Lead Risk Assessment Spreadsheet Version 7 model. This removal action objective (199 milligrams per kilogram [mg/kg]) was compared to the reported concentrations of lead; concentrations of lead in 678 samples exceeded the removal action objective.

Based on these results, a non-time-critical removal action (NTCRA) for lead was conducted between November 2002 and July 2003 in which 1,620 cubic yards of soil was removed (Shaw 2003b). Lead concentrations in all of the removal action confirmation samples were below the removal action objective of 199 mg/kg. However, results from previous investigation samples collected through hardscape and outside the excavation areas indicated lead concentrations above 199 mg/kg at AOCs 10 and 12.

1.5.13 Polynuclear Aromatic Hydrocarbon Removal Action

PAHs were reported at concentrations above the Alameda Point–specific residential soil screening criterion (620 µg/kg) in soil samples collected from portions of IR Site 35 during the 2002 PAH study. This prompted the Navy to conduct a TCRA for soil with reported B(a)P equivalent concentrations above 1,000 µg/kg in the top 2 feet of soil in an area referred to as the West Housing Area (FWEC 2004). Soil removals in the West Housing Area were conducted using a grid pattern at EBS Parcels 62, 96, 97 (AOC 4); 80 (AOC 9); 98 (AOCs 5 and 7); and 103 (AOCs 13 and 14). TCRA activities resulted in the removal of 7,542 tons of nonhazardous soil and 68 tons of non-RCRA hazardous soil which was properly disposed of. PAHs reported in the excavated sampling locations are not considered in the RI/FS. Clean fill material was placed and compacted to backfill the area with a minimum of two feet of soil cover.

Soil samples collected from six locations had B(a)P equivalent concentrations above the TCRA cleanup goal (1,000 µg/kg) after the removal action. Soil from these locations was not removed because the location was either covered with asphalt or located in a nonresidential area.

1.5.14 Site Inspection Report, Transfer Parcel EDC-5

An SI was conducted in 2005 at Alameda Point to evaluate current environmental conditions at Transfer Parcel EDC-5 (BEI 2005b). Historical uses of the 74 EBS parcels were evaluated. Where past use indicated the potential for adverse environmental conditions, analytical data and human-health risk were assessed to determine whether further evaluation of the parcels should be recommended.

Analytical results were obtained from 19 environmental studies previously conducted in portions of Transfer Parcel EDC-5. In coordination with representatives of U.S. EPA and DTSC, selected analytical data from these studies were compared during the SI to the lower of either U.S. EPA PRGs or California-modified PRGs for soil and tap water

(U.S. EPA 2004b). Concentrations of metals in soil were also compared to background values established for Alameda Point (TtEMI 2001c). Human-health risks were then calculated for the 46 EBS parcels and 18 decision areas (DAs) for which data were available. DAs were developed because a significant portion of the housing at the transfer parcel was located in a single, large EBS parcel. This large parcel (and others, as appropriate) was subdivided for the purposes of risk assessment, thus assuring that estimates of potential human-health risks were conservative rather than diluting potential exposure risks by having an overly large exposure area.

To calculate cancer risk, separate target risk levels were assessed for PAHs and non-PAH chemicals in soil. The cumulative target risk level for PAHs in soil of 10^{-5} was calculated using B(a)P equivalent concentrations, as established during the PAH technical meeting between the Navy, regulatory agencies, and the City of Alameda in May 2001. At this meeting, the Alameda Point site-specific residential soil PAH screening criterion of 620 µg/kg was established (DON 2001b, Cal/EPA 2006). Risks associated with PAHs in soil calculated in the SI Report (BEI 2005b) are discussed in Section 6 of this RI/FS Report. The cumulative target risk level for non-PAH chemicals in soil and for all chemical classes in groundwater was 10^{-6}. The target risk level for noncancer adverse health effects is a hazard quotient (HQ) of 1 for individual chemicals of potential concern (COPCs) and a cumulative hazard index (HI) of 1 for all chemicals. Levels of lead were evaluated using the California-modified residential PRG for lead in soil and the California-modified action level for lead in groundwater.

The recommendations for further evaluation or no further evaluation for the EBS parcels and DAs presented in the SI Report were based on the historical uses of the EBS parcels, the results of the data evaluation, and the results of the human-health risk evaluation. Due to the absence of threatened or endangered species and negligible exposure potential for other special-status species at Transfer Parcel EDC-5, ecological risk was not a factor in determining the recommendations for this transfer parcel, and no further ecological investigation was recommended.

Twenty-five areas recommended for further evaluation were identified as AOCs. Subsequent to issuing the SI Report, the Navy and regulatory agencies expanded and refined the list of areas requiring further investigation such that 23 study areas would be subject to further sampling and evaluation during the RI at IR Site 35 (Section 1.4.4).

1.5.15 Solid Waste Management Unit Report for Transfer Parcel EDC-5

A summary of previous assessments and investigations of the SWMUs located in Transfer Parcel EDC-5 (including some located in AOCs within IR Site 35) was prepared by SulTech (2005a) and included as Attachment A of the SI Report (BEI 2005b). This SWMU Report for Transfer Parcel EDC-5 recommended further action under CERCLA for two of the SWMUs (OWS 63B in AOC 1 and OWS 067 in AOC 23) located in IR Site 35. Additional findings of the SWMU Report are discussed in detail for each investigation study area in Attachments A through W.

1.6 INVESTIGATIONS AT NEARBY AREAS

Five other investigations and activities in the immediate vicinity of IR Site 35 have provided data relevant to the site. These investigations are described in the subsections that follow.

1.6.1 Pesticide Removal Action

During the EBS Phase 2A sampling activities, pesticides and polychlorinated biphenyls (PCBs) at concentrations exceeding residential soil PRGs were reported near Building 195 in EBS Parcel 98, south of AOC 8. This building had previously been used as a pesticide and fertilizer storage shed where small batches of pesticides and fertilizers were mixed. In addition, lead at concentrations exceeding the residential soil PRG associated with LBP were identified in the surrounding soil at Building 195. Based on the analytical results and the potential for these constituents to pose a threat to human health, a TCRA was conducted (Shaw 2004a). Between February and March 2002, 203 cubic yards of soil was removed (to a maximum depth of 2 feet bgs). The results of confirmation sampling indicated that PCBs and lead were present at concentrations below their respective cleanup levels; pesticides were not reported at concentrations above detection limits. As a result, no additional action was recommended for the vicinity of Building 195 in EBS Parcel 98 (Shaw 2004a). The following cleanup levels were used during the TCRA:

- pesticides – U.S. EPA PRGs for residential soil (U.S. EPA 2002b)
- PCBs – 1 mg/kg
- lead – 209 mg/kg

1.6.2 Installation Restoration Program Sites

Eleven IR sites are adjacent to the AOCs in IR Site 35 (Figure 1-5). RI activities have been underway at each of these sites for several years. As a result, chemical contamination at each of these 11 IR sites is relatively well characterized. It is possible that known contaminated groundwater plumes present at IR Sites 4, 5, 6, 7, 10, and 21 are migrating onto portions of IR Site 35. A brief description of the historical activities and chemicals of concern (COCs) at each of these sites is provided below.

1.6.2.1 IR SITE 3

IR Site 3 is adjacent to AOCs 23, 24, and 25 and is known as the abandoned fuel storage area. IR Site 3 was formerly the location of five 100,000-gallon concrete and steel USTs (USTs 97A-97E) that were used to store aviation gasoline (AVGAS) and associated pipelines used to receive and distribute fuel. It is estimated that as much as 365,000 gallons of AVGAS may have leaked from the tanks and fuel distribution pipelines in the 1960s and 1970s. In addition, a nearby underground fuel pipeline burst in 1972, releasing more AVGAS into the soil. AVGAS has been found in utility ducts, storm drains, and soil samples collected in and around IR Site 3. A plating shop, a zinc smelter, various shops, a degreaser, and a nondestructive testing laboratory were also historically operated

on-site. COCs identified in soil at IR Site 3 during the OU-2B RI (SulTech 2005c) include Aroclor 1260, benzene, lead, and PAHs. Relatively low concentrations of VOCs (e.g., 1,2-DCA) have also been reported in some wells. In addition, lead and TPH groundwater plumes are located on-site.

1.6.2.2 IR SITE 4

IR Site 4 is adjacent to AOC 25 and is known as the aircraft engine facility. IR Site 4 was operated as an aircraft engine and air frame overhaul facility. Historical operations on-site included a spray booth, degreasers, abrasive blasting, finishing, solvent and chemical cleaning, dip tanks, and electrophonetic coating processes. ASTs 360A through 360E; fuel pipelines; and USTs 163-1, 372-1, and 372-2 were also present on-site. COCs in soil identified during the OU-2B RI (SulTech 2005c) include N-nitroso-di-n-propylamine, 3,3-dichlorobenzidine, Aroclor 1254, cadmium, TCE, and PAHs. The primary COCs (above the risk management range) in groundwater in the OU-2B-wide groundwater plume located beneath IR Site 4 (as well as IR Sites 3, 11, and 21) were identified in the RI report (SulTech 2005c) as the VOCs TCE and vinyl chloride, resulting from the breakdown of dense nonaqueous-phase liquid (DNAPL) at these sites. Secondary COCs (within the risk management range) in the plume were identified as the VOCs PCE, 1,1-DCA, 1,2-DCA, 1,1-DCE, 1,2-DCE (total), 1,4-dichlorobenzene, 1,1,2-TCA, and benzene; the PAHs benz(a)anthracene and B(a)P; the SVOC naphthalene; and the metals hexavalent chromium, iron, and manganese (SulTech 2005c).

1.6.2.3 IR SITE 5

IR Site 5 is adjacent to AOC 17 and is known as the engine rework facility. Historical operations at the site included cleaning, reworking, and manufacturing metal parts; plating activities; painting operations; dry cleaning operations; ordnance storage; ammunition overhaul and rework; various shops; a power plant; an engineering laboratory; and radioluminescent painting of aircraft dials. The site also contained 17 USTs, 15 ASTs, and fuel pipelines. In addition to the operations listed above, potential contaminant sources include leaking floor drain lines and broken storm sewer lines. Radiological decontamination of appropriate buildings was conducted. COCs identified during the OU-2C RI (SulTech 2005b) include arsenic, thallium, PCE, TCE, N-nitroso-di-n-propylamine, and lead in soil at IR Site 5. A large, OU-2C-wide groundwater plume containing various chlorinated hydrocarbons and their breakdown products, metals, and TPH is located beneath IR Site 5 (as well as IR Sites 10 and 12). The highest concentrations are beneath and east of Building 5 within IR Site 5. TPH is present throughout OU-2C but is primarily located near closed or removed fuel oil pipelines and former USTs. Remediation activities are ongoing at IR Site 5 for the cleanup of VOCs and DNAPL in the groundwater plume (BEI 2007). Most of the radiological contaminants in the storm drains have been removed; however, remediation of the remaining radiological constituents in the storm drains is ongoing (SulTech 2005b).

The Navy is currently preparing a work plan (BEI 2007) for supplemental sampling to complete the RI at OU-2C, including IR Site 5.

1.6.2.4 IR SITE 6

IR Site 6 is adjacent to AOC 23 and housed the Aircraft Intermediate Maintenance Department. IR Site 6 was used to house seaplanes and to repair aircraft components. Historical operations on-site included welding, painting, various shops, an avionics laboratory, a solvent dip tank, paint stripping, parts cleaning, and an X-ray machine. A washdown area was present on-site and likely received rinsewater containing solvents. The IR Site 6 RI Report (TtEMI 2004) reported arsenic and PAHs as the primary COCs in soil, but arsenic was likely indicative of background conditions. Groundwater COCs at IR Site 6 include arsenic, manganese, bis(2-chloroethyl)ether, and the VOCs PCE, TCE, and vinyl chloride. Furthermore, the RI Report concluded that there is no continuing source of VOCs at IR Site 6. The preferred soil remediation measure presented in the Proposed Plan for OU-1, IR Sites 6, 7, 8, and 16, includes sampling, limited excavation, and off-site disposal; the preferred remedy for groundwater at IR Site 6 includes *in situ* chemical oxidation (ISCO), accelerated bioremediation, monitored natural attenuation (MNA), and short-term institutional controls (ICs) (DON 2006a). AOC 19 was removed from IR Site 35 and will be addressed as part of IR Site 6.

1.6.2.5 IR SITE 7

IR Site 7, known as the Naval Exchange Service Center, is adjacent to AOC 15. The site contains petroleum-related chemicals. Former Building 68-3 was constructed at the site in 1942 to house an incinerator surrounded by a grassy open space (TtEMI 2004). After Building 68-3 was demolished in 1961, Building 459, an automotive service station, was constructed on the same location. A blue, crystalline, metallic debris layer thought to be incinerator debris or building debris from demolition was identified in 2002 in shallow soil near the footprint of former Building 68-3. This layer ranges in depth from approximately 18 to 24 inches bgs and is approximately 8 to 12 inches thick (TtEMI 2004). Approximately 1,320 cubic feet of this debris layer was removed and disposed off-site in 2003 (Shaw 2003b). The boundaries of IR Site 7 are coincident with the boundaries of CAA-7. A brief summary of historical operations and COCs at IR Site 7/CAA-7 is presented in Section 1.6.3.4.

1.6.2.6 IR SITE 8

IR Site 8 is adjacent to AOCs 9 and 11 and is known as the pesticide storage area (Building 114). The site was operated as the weed and pest control center for the base by the PWC. Historical operations at Building 114 included pesticide storage and mixing, paint stripping, public works maintenance and storage, sandblasting, carpentry, equipment cleaning, and painting. A washdown area (WD-114) and an oil/water separator (OWS 114) were also associated with Building 114. The primary source of contamination on-site was likely the disposal of wastes in sinks and floor drains that flowed through leaking sewer lines. The RI Report for IR Site 8 (TtEMI 2004) identified

Aroclor 1260, arsenic, B(a)P, and lead as the primary COCs in soil, and benzene and TCE as the primary COCs in groundwater. Concentrations of benzene and TCE in groundwater had decreased to below maximum contaminant levels (MCLs) as of 2003 and the RI concluded that there appeared to be no continuing source. However, groundwater sampling conducted in June 2006 under the BGMP reported a benzene concentration of 16 micrograms per liter (µg/L) at location M08-01 (ITSI 2006). This concentration exceeds the MCL (1.0 µg/L) and is comparable to the maximum concentration (20 µg/L) reported at this location in 1994.

The boundaries of IR Site 8 and CAA-8 are nearly coincident. Historical operations and sampling at CAA-8 are discussed in Section 1.6.3.5.

1.6.2.7 IR SITE 10

IR Site 10 is adjacent to AOC 20 and is known as the missile rework facility. Historical operations at the missile rework facility building included missile and aircraft repair and maintenance, paint stripping, construction of fiberglass airplane components, airplane parts cleaning and degreasing, silk screening, photographic development, and radioluminescent painting of aircraft dial faces. One UST was also historically located on-site. Radiological decontamination of appropriate buildings has been conducted. Arsenic is the primary COC in the soil at IR Site 10; however, the OU-2C RI Report (SulTech 2005b) determined that the presence of arsenic may be attributed to naturally occurring background conditions. TPH in soil is being investigated further under the TPH Program. TPH is also present in groundwater; however, the contamination is predominantly located in the northern portion of the site.

1.6.2.8 IR SITE 12

IR Site 12 is adjacent to AOC 17 and was historically the site of the power plant facility which included operations pertaining to the generation of steam and air compression. Six USTs and 12 ASTs were historically located on the site. The OU-2C RI Report (SulTech 2005b) identified arsenic and iron as the primary COCs in the soil at IR Site 12; however, the RI also concluded that the presence of these metals may be attributed to naturally occurring background conditions.

1.6.2.9 IR SITE 21

IR Site 21 is adjacent to AOC 23 and is known as the ship-fitting and repair facility because it was the location of a ship and aircraft maintenance shop. Historical operations on-site included a spray paint booth, solvent and chemical cleaning and degreasing, abrasive blasting, welding, jet engine container overhaul, turbine engine testing, and smelting. USTs 398-1, 398-2, 162-1, 162-2; AST 113; and fuel pipelines were also historically present on-site.

COCs identified during the OU-2B RI (SulTech 2005c) included arsenic, carbazole, and iron in soil at IR Site 21. The OU-2B RI Report documented VOCs (1,1-DCE, 1,2-DCE [total], PCE, 1,1,1-TCA, TCE, and vinyl chloride) in groundwater at the northeastern

corner of Building 398 (adjacent to AOC 23). All VOCs except vinyl chloride were reported at concentrations below their respective preliminary screening criteria (PSCs). PCE and TCE were reported at concentrations below their PSCs in a groundwater sample from monitoring well 398-MW1, which is located within AOC 23 (SulTech 2005c). The OU-2B RI Report also concluded that TCE and vinyl chloride present in a large, commingled, OU-wide groundwater plume were the primary risk drivers in groundwater. It is possible that the VOC groundwater plumes have continued to migrate beneath IR Site 35 in the southern portion of AOC 23; however, the interpreted extent of VOCs associated with IR Site 21 (as presented in recent Alameda Point BGMP reports) do not extend north to AOC 23 (Figure 1-5).

1.6.2.10 IR SITE 26

IR Site 26, known as the Western Hangar Zone, is not immediately adjacent to any AOC; however, AOC 1 is located less than 125 feet east of the northern portion of the site. Historical operations at the site included the parking, maneuvering, washdown, fueling, and maintenance of aircraft, as well as support activities such as paint spraying, mixing, storage, and use of solvents, adhesives, detergents, alcohol, and sealers. Fuel pipelines and 10 ASTs were historically located on the site. Discussions here are limited to COCs in the northern portion of IR Site 26 (in the vicinity of Building 20), the only portion of the site that is adjacent to IR Site 35. During the RI for IR Site 26 (BEI 2003), the chlorinated VOCs benzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and naphthalene were reported in groundwater near the southeastern corner of Building 20. However, the extent of VOCs in groundwater at IR Site 26 is defined within the boundaries of the site. A ROD for IR Site 26 (DON 2006b) has been finalized, with the selection of no further remedial action for soil and ISCO as the remedial action for groundwater.

1.6.2.11 IR SITE 28

IR Site 28 is adjacent to AOC 4 and is known as the Todd Shipyards area. The site was used for various shipyard activities including shipbuilding and ship repair. A surface impoundment that likely received surface runoff or bilgewater discharged from docked ships was also historically located on-site. Railroad tracks and spurs historically crossed the site. Wreckage of burned railroad ties, tracks, trestles, and railcars from a fire in 1902 likely remains beneath the fill material at IR Site 28. Most of the contaminated soil at IR Site 28 is located in the northern portion of the site. During the RI for IR Site 28 (BEI 2004a), it was determined that only PAH compounds, arsenic, and iron were present in the southern portion of the site at concentrations exceeding soil PRGs. Primary COCs in groundwater at IR Site 28 include arsenic, copper, nickel, and zinc. However, metals concentrations in groundwater, primarily arsenic concentrations of 250 to 470 µg/L in upgradient well 28MW04, have not been bounded at the southern margin of IR Site 28. Groundwater data from well MBG-1, which is located approximately 500 feet upgradient of IR Site 28 and within IR Site 35, indicates arsenic concentrations below background levels. IR Site 28 is downgradient of IR Site 35.

1.6.3 Petroleum Hydrocarbon Corrective Action Areas

Ten CAA sites are near and/or overlap the AOCs in IR Site 35. CAA sites are shown on Figure 1-3. Characterization and removal activities have been ongoing at each of these sites under the Navy's TPH Program for several years. As a result, chemical contamination at each of the ten CAA sites has been well characterized. Historical samples collected at CAA sites and analyzed only for petroleum-related constituents are not shown on figures or included in extent of contamination discussions for IR Site 35. A brief description of the historical activities and petroleum-related COCs at each of these sites is discussed below.

1.6.3.1 CAA-3A

CAA-3A overlaps the southeastern boundary of AOC 23. Historical operations at CAA-3A included auxiliary power units (Building 398), a cooling air turbine shop, and aircraft engine test cells. Historically, USTs 398-1 and 398-2, as well as three ASTs, were located in CAA-3A. CAA-3A is characterized by soil and groundwater contaminated with TPH and low concentrations of chlorinated VOCs (TtEMI 2003b).

1.6.3.2 CAA-3B

CAA-3B is located near the southeastern boundary of AOC 23. Historical operations at CAA-3B included a fuel truck loading station (Building 109) and an aircraft truck facility (Structure 430). CAA-3B is characterized by soil and groundwater contaminated with benzene and TPH (TtEMI 2003b). AOC 22 was removed from IR Site 35 and will be addressed as part of CAA-B.

1.6.3.3 CAA-3C

CAA-3C overlaps the western boundary of AOC 25. CAA-3C formerly contained USTs 97a through 97e, all of which were used for the storage of AVGAS. CAA-3C is characterized by soil and groundwater contaminated with benzene, TPH, and lead. Chlorinated VOCs are also present in groundwater (TtEMI 2003b).

1.6.3.4 CAA-7

CAA-7 and IR Site 7 have coincident boundaries and are located adjacent to AOC 15. Historical facilities at CAA-7 included an incinerator (former Building 68-3), an automobile service station (Building 459), and maintenance and equipment storage (Building 506). A layer of metallic debris found in shallow soil near the former incinerator was partially removed in 2003. USTs 459-1 through 459-8 and UST 506-1 were also located within CAA-7. The IR Site 7 RI reported that the primary COCs at IR Site 7 were benzene, xylene, PAHs, arsenic, cadmium, and lead in soil, and PAHs, arsenic, and thallium in groundwater (TtEMI 2004). The groundwater plumes for thallium and PAHs have been defined and do not appear to be migrating off-site.

1.6.3.5 CAA-8

CAA-8 occupies approximately the same area as IR Site 8; it is adjacent to the southern boundary of AOC 9 and the western boundary of AOC 11. Historical operations in CAA-8 included a center for weed and pest control (Building 114), a washdown area (WD-114) with an oil-water separator (OWS-114), maintenance facilities, and storage facilities (Buildings 114 and 191). CAA-8 was identified as a corrective action site under the TPH Program because of its proximity to fuel line CAA-B. However, no investigations were conducted at this site under the TPH Program; it was recommended for transfer to CERCLA in 2003 (TtEMI 2003a). Soil and groundwater were sampled for TPH-associated constituents (TPH fractions; benzene, toluene, ethylbenzene, and xylenes [BTEX]; and lead) at various locations at IR Site 8 during the RI for OU-1. The RI Report for OU-1 reported that lead in soil was recommended for further action under CERCLA; groundwater was not considered significantly impacted by TPH, and it was determined that CAA-8 would not be further addressed under the TPH Program (TtEMI 2004).

1.6.3.6 FORMER FUEL LINE CAA-B

Former fuel line CAA-B consists of three east-west parallel fuel lines and multiple lateral pipelines and crossings that conjoin a series of fueling pits. Portions of the southernmost two parallel fuel lines and their ancillary branch lines adjoin or across AOCs 11, 12, 18, 19, 20, 21, 22, and 23 as well as EBS Parcels 78, 79, and 205.

All fuel lines associated with bulk storage and distribution of military aviation fuel at the former NAS Alameda have been removed or cleaned and closed in place. Approximately 34,500 linear feet of underground fuel pipeline was removed during the removal and closure operations. This removal included excavation and removal of any contaminated soil above the groundwater table to a maximum radius of 5 feet from the pipelines. Approximately 24,100 linear feet of underground pipelines was closed in place in the paved areas of Alameda Point (TtEMI 2000b).

The objectives of the pipeline removal actions were not to address all soil and groundwater contamination encountered. Limited removal of contaminated material (overexcavation) was performed and contamination in the remaining soil and groundwater was documented (TtEMI 2000b). Because former fuel line CAA-B is so large, three separate investigations focused on portions of CAA-B, as described in the subsections below. As mentioned, no further action was recommended for CAA-B because it met the low-risk fuel site closure requirements set forth by the Water Board (TtEMI 2003b).

Portion of Former Fuel Line CAA-B Located South of AOC 11/ EBS Parcels 78–79, and Western Portion of AOC 12

Approximately 5,000 linear feet of inactive underground fuel pipeline was removed from the site. Activities associated with and prior to pipeline removal included pothole excavation and field screening sampling, Site Characterization and Analysis Penetrometer

System (SCAPS) investigation, pipeline excavation and removal, and site restoration. Analytical results from soil and groundwater samples collected during field screening and pipeline removal activities indicated several areas of localized TPH contamination (TtEMI 2000b).

Portion of Former Fuel Line CAA-B Intersecting AOC 23

Approximately 2,300 linear feet of inactive underground fuel pipeline was removed from the site. Activities associated with and prior to pipeline removal included pothole excavation and field screening sampling, SCAPS investigation, pipeline excavation and removal, and site restoration. Analytical results from soil and groundwater samples collected during field screening and pipeline removal activities indicated no TPH soil contamination.

Portion of Former Fuel Line CAA-B Located in or Near AOCs 18, 20, 21, and EBS Parcel 205

Approximately 22,500 feet of inactive fuel pipeline was closed in place. This area was formerly a tarmac for aircraft staging and an aircraft maintenance area adjacent to the north side of Seaplane Lagoon. Activities associated with and prior to the pipeline closure included SCAPS investigation, pothole excavation, product removal, pipeline cleaning, videotaping of fuel pipelines, grouting of fuel pipelines, backfilling potholes, and site restoration. Analytical results from soil samples collected during pipeline closure activities indicated no widespread TPH soil contamination. Analytical results from groundwater samples collected during pipeline closure indicated widespread unconfined groundwater contamination (IT 2002).

1.6.4 Sewer Line Investigations

Three sewer systems are present within the boundaries of IR Site 35: storm sewer lines, sanitary sewer lines, and industrial wastewater sewer lines. A series of investigations have been conducted to investigate whether the storm sewer lines and pipeline backfill potentially could have been acting as preferred conduits for the infiltration and transport of contaminants. Additionally, during the EBS, samples collected along all three sewer systems were targeted for both soil and groundwater sampling. The following subsections summarize data from previous investigations that indicate sewer lines are not a source or a preferred conduit for infiltration and transport of contaminants at IR Site 35.

1.6.4.1 STORM SEWER LINES

The storm drain system at Alameda Point was constructed between the 1930s and the 1960s and consists of approximately 194,000 linear feet of pipeline. The system includes 35 subsystems, all of which discharge to San Francisco Bay (either directly, or indirectly through Oakland Inner Harbor or Seaplane Lagoon). The storm drain system was initially constructed by the Navy to collect surface runoff from streets, runways, tarmac, landscaped areas, and building roof drains. Prior to 1972, the storm drain system was also used for collection and discharge of industrial wastewater. After 1972, an industrial

wastewater sewer system was installed and industrial wastewater was collected and discharged to an industrial wastewater treatment plant (IT 1997). Storm drain lines are located at 1 to 13 feet bgs; most of the storm drain system is below the water table in the first water-bearing zone (FWBZ) (TtEMI 2000b).

Storm drains in Transfer Parcel EDC-5 flow to one of three outfalls along Oakland Inner Harbor (Outfalls B, D, and E) to the north, or to one of four outfalls along Seaplane Lagoon (Outfalls F, FF, G, and H) to the south. Outfall B drains AOCs 1 and 2; Outfall D drains AOCs 3 and 9, AST 016, and OWS 017; Outfall E drains AOCs 4, 5, 6, 7, 8, and 10; Outfall F and Outfall FF drain EBS Parcel 205 and AOC 20; Outfalls G and H drain all the remaining AOCs in IR Site 35 (AOCs 15, 16, 24, and 25) (Figure 1-5).

Storm sewer lines could potentially have contributed to the migration of contaminants into IR Site 35 in two ways:

- discharge of industrial wastewater (prior to 1975, when industrial wastewater lines were completed) from IR sites upstream of IR Site 35 into leaking sewer lines in IR Site 35, thereby potentially impacting soil and/or groundwater
- preferential migration pathways for sewer lines that transect groundwater plumes, thereby potentially allowing contaminants to be transported away from the source area

These two possibilities are considered and dismissed as possible pathways for contaminant migration at IR Site 35 in the detailed discussions below.

Historical Discharge of Industrial Wastewater Directly Into Storm Sewer Lines

Reviews of the information on submerged (below the groundwater table) and nonsubmerged storm sewer lines within the boundaries of IR Site 35 are presented in two reports: the Storm Sewer Summary Report (TtEMI 2000b) and the Final Field Sampling Plan (FSP), Supplemental RI, Data Gap Sampling for OUs 1 and 2 (TtEMI 2001b). Data in these reports indicate that most storm sewer lines at and downflow from contaminated industrial sites adjacent to IR Site 35 (specifically, IR Sites 3, 5, 6, 7, 8, 12, and 21) are located below the groundwater table. If storm sewer lines are submerged below the groundwater table, infiltration of groundwater into the storm sewer line would be expected, rather than exfiltration of water into the storm sewer line. Only such hypothetical exfiltration storm sewer lines could reasonably be postulated to result in contamination of soil and/or groundwater at the portions of IR Site 35 located downflow from contaminated sites.

In order to assess whether storm sewer line segments were located above or below the groundwater table, the 2000 Storm Sewer Summary Report (TtEMI 2000b) compared storm sewer line invert elevations to groundwater elevations measured in wells located within 100 feet of the storm sewer line segment. As shown on Figure 3-1 from the TtEMI 2000 report (included in Appendix B), storm sewer lines at industrial sites adjacent to IR Site 35 are located below the groundwater table, except for a few short line segments exiting buildings. The 2000 study focused on storm sewer lines at IR sites;

therefore, storm sewer lines within Transfer Parcel EDC-5 that were not located in IR sites were not characterized as above or below the water table. Because of the (unpressurized) gravity-flow design of the storm sewer lines, it is assumed that invert elevations would decrease downflow from measured elevations (i.e., storm sewer line sections downflow from submerged sections are likely also to be submerged below the groundwater table). A video survey of the interior of the storm sewer lines (TtEMI 2001b) in which groundwater was observed infiltrating at points along some of these lines provided direct evidence of this scenario.

Potential Preferential Migration of Contaminants from Groundwater Plumes

IR Sites 5, 6, 7, and 8 are the only areas where storm sewer lines traverse groundwater plumes located upflow from IR Site 35 (Figure 1-5). Storm sewer lines crossing IR Site 21 that intersect AOC 23 do not appear to intersect the current extent of the VOC plume at IR Site 21 (Figure 1-5). Additionally, storm sewer lines at AOC 25 traverse a portion of the IR Site 3 Group groundwater plumes; however, the lines flow away from IR Site 35. The storm sewer segments that traverse groundwater plumes upflow from IR Site 35 include the following (shown on Figure 3-1 from the TtEMI 2001a report):

- three segments of the storm sewer line that flow to Outfall G traversing a source area or the periphery of the IR Site 5 groundwater plume and IR Site 35:
  - 15G to 11GA (source area east of Building 5)
  - 6G-18-1B to 6G-18
  - 5G-6A to 5G-5
- a fourth segment (4G-3 to slightly beyond 4G-1) of the storm sewer line that flows to Outfall G, traversing the IR Site 6 plume and Transfer Parcel EDC-5
- a fifth segment (11GA to slightly beyond 10G) of the storm sewer line that flows to Outfall G, likely traversing a benzene plume at IR Site 8 and IR Site 35
- two segments of the storm sewer line that flows to Outfall H, traversing the IR Site 7 plume and Transfer Parcel EDC-5:
  - 6G-13A,B,C,D to 6G-12
  - 6G-15A,B,C to 6G-11A

With the possible exception of the portion of the storm sewer line originating in the DNAPL source area at northeastern portion of Building 5 at IR Site 5 and crossing the benzene plume at IR Site 8, there is little potential for contaminants to be transported downflow to IR Site 35 via the storm sewer lines for the following four primary reasons.

1. The portions of the storm sewer lines that traverse groundwater plumes are in areas marginally impacted by chemicals in groundwater (concentrations near or below MCLs). This is based on results of the basewide groundwater monitoring report of spring 2006 (ITSI 2006) and is illustrated on Figure 1-5.
   - The distribution of VOCs at the IR Site 5 plume is represented by the 5 µg/L isoconcentration contour in the BGMP report of spring 2006

(ITSI 2006). Based on these results, concentrations of 1,1-DCA (and the approximate concentration of other VOCs) in the vicinity of these storm sewer lines at the southeastern margin of IR Site 5 range from less than the laboratory detection limit of 0.5 µg/L to approximately 5 µg/L.

- The primary VOCs reported at IR Site 6 were cis-1,2-DCE and vinyl chloride, with maximum concentrations reported at 8.1 and 1.8 µg/L, respectively. Other reported VOC concentrations were below MCLs (ITSI 2005).
- The primary VOC reported at IR Site 7 was methyl tert-butyl ether, with the maximum concentration reported at 17 µg/L. Other reported VOC concentrations were below MCLs (ITSI 2005).

2. Because most storm sewer lines in IR Site 35 are submerged, it is unlikely that exfiltration of chemicals from groundwater plumes could have resulted in contamination of soil and/or groundwater in portions of IR Site 35 located downflow from the adjacent industrial IR sites.
3. Transport of impacted groundwater by influx into storm sewer pipelines is possible but not significant. During the video survey, infiltration of groundwater was observed along the interior of some sections of the storm sewers near the groundwater plumes at IR Sites 5 and 6 (TtEMI 2001b). However, transport of impacted groundwater through the storm sewer pipelines is considered insignificant, based on analysis of groundwater samples collected from manholes, catch basins, and outfalls downflow from these damaged sections, because reported concentrations were below screening levels. The other storm sewer segments that traverse groundwater plumes at IR Sites 6 and 7 are in good condition and no evidence of infiltration was observed during the video survey (TtEMI 2001a, Figure 3-1).
4. Transport of contaminants through storm sewer bedding material is considered unlikely, based on geotechnical testing (TtEMI 2002b). Storm sewer bedding material at IR sites adjacent to IR Site 35 were found to be similar to, or less permeable than, the surrounding fill material. Therefore, storm sewer bedding materials are not considered preferential pathways for migration of contaminated groundwater through Transfer Parcel EDC-5 from the plumes at IR Sites 5, 6, and 7.

Infiltration Investigation

Sampling of storm sewer manholes, catch basins, and outfalls was conducted at 22 locations distributed among IR Sites 5, 6, 9, 11, 14, 15, 16, 21, and 23 (TtEMI 2002b). The purpose of this investigation was to determine whether contaminated groundwater from IR sites was infiltrating into storm sewer lines and being discharged to surface waters at outfalls. Water samples were analyzed for TPH and VOCs. Both TPH and VOCs were reported at concentrations exceeding detection limits, but concentrations did not exceed ecological reference values (ERVs) or MCLs. (ERVs were developed in the final FSP and QAPP, Supplemental RI, Data Gap Sampling for OUs 1 and 2, Alameda Point [TtEMI 2001b]).

Based on the low concentrations of VOCs and TPH found in these storm sewer water samples collected in IR Sites 5, 6, and 7, it is unlikely that infiltration to storm sewers is providing a preferential pathway for transport of significant concentrations of groundwater contaminants from plumes at IR Sites 5, 6, and 7 to IR Site 35. Therefore, potential infiltration of groundwater contamination into storm sewer lines from groundwater plumes at IR Sites 5, 6 and 7 is not considered a concern for IR Site 35. Table 1-4 summarizes the results of sampling for the storm sewer infiltration study of lines crossing IR Site 35.

Bedding Materials

An investigation of storm sewer bedding materials was conducted at 15 sampling points distributed among IR Sites 4, 5, 6, 9, 13, 16, 21, and 23 (TtEMI 2002b). The purpose of this investigation was to determine whether bedding materials had higher permeabilities than the surrounding site soils and whether groundwater chemical constituents were present at concentrations exceeding their respective MCLs, ambient water quality criteria, and/or ERVs. Bedding materials in IR Site 4 at only two locations were found to have higher permeability than site soils. This IR site does not contain storm sewer lines that intersect IR Site 35.

The bedding materials for storm sewers at IR Sites 5 and 6 were not found to be a preferential pathway for migration of contaminated groundwater to IR Site 35 from the plumes at these sites (Table 1-5). Potential groundwater contamination along storm sewer lines downgradient from IR Sites 5 and 6 is not considered a concern for IR Site 35.

Sampling Along Storm Sewer Lines

Previous investigations collected and analyzed samples from 569 locations near storm sewer lines. Twenty-eight of these 569 locations represent EBS sampling locations targeted for sampling adjacent to storm sewer lines; 219 of these 569 locations were within 10 feet of the storm sewer lines.

No systematic distribution of COCs was associated with samples collected and analyzed along the storm sewer lines.

1.6.4.2 SANITARY SEWER LINES

The sanitary sewer system at Alameda Point was installed during the initial construction of NAS Alameda in the early 1940s. Prior to 1956, NAS Alameda operated its own sanitary wastewater facility near Building 27 (located adjacent to Oakland Inner Harbor near storm drain Outfall Z). In 1956, NAS Alameda discontinued treatment of sanitary sewage and connected its sewer system to the East Bay Municipal Utility District (EBMUD) sanitary sewer collection and treatment system (Ecology and Environment, Inc. 1983). The Alameda Point sanitary sewer system discharges to the EBMUD system through a force main crossing Oakland Inner Harbor.

Given that the discharge point to the EBMUD system is west of IR Site 35, most flow within the sanitary sewer lines in IR Site 35 is toward the west and north. Previous

sewage and connected its sewer system to the East Bay Municipal Utility District (EBMUD) sanitary sewer collection and treatment system (Ecology and Environment, Inc. 1983). The Alameda Point sanitary sewer system discharges to the EBMUD system through a force main crossing Oakland Inner Harbor.

Given that the discharge point to the EBMUD system is west of IR Site 35, most flow within the sanitary sewer lines in IR Site 35 is toward the west and north. Previous investigations collected and analyzed samples from 557 locations near sanitary sewer lines. Twenty-one of these 557 locations represent EBS sampling locations targeted for sampling adjacent to sanitary sewer lines; 204 of these 557 locations were within 10 feet of the sanitary sewer lines.

No systematic distribution of COCs was associated with samples collected and analyzed along the sanitary sewer line. In addition, there was no indication of the presence of chlorinated compounds along sanitary sewer corridors.

1.6.4.3 INDUSTRIAL WASTEWATER SEWER LINES

Prior to passage of the Clean Water Act in 1972, all liquid industrial wastewater generated at Alameda Point was discharged to the storm sewer system, which in turn discharged it to Seaplane Lagoon and Oakland Inner Harbor. Between 1972 and 1975, the industrial wastewater sewer system was installed and industrial wastewater was collected and rerouted to discharge to the EBMUD wastewater collection and treatment system.

The industrial wastewater sewer system discharged to EBMUD at the northern boundary of Alameda Point near storm sewer system Outfall B. An industrial wastewater discharge permit issued from EBMUD to the Navy PWC was maintained to ensure compliance with pretreatment standards for effluent concentrations and total flow limits established for industrial operations. The PWC was responsible for operation and maintenance of the industrial pretreatment processes, including monitoring and record-keeping.

In later years of operations at NAS Alameda, all industrial wastewater generated at Alameda Point was treated at industrial waste treatment plants (IWTPs) (5, 24, 25, 32, 360, and 410) before being discharged (under EBMUD permit) through the industrial wastewater sewer system to the EBMUD wastewater collection and treatment system by way of a force main crossing Oakland Inner Harbor. Four IWTPs (IWTP 5, 24, 25, and 32) operated under the RCRA Part B Permit that was issued in April 1993. Investigation and closure of the IWTPs was handled according to specific closure plans and closure investigations for these sites (IT 2000).

The portions of the industrial wastewater sewer system that cross Transfer Parcel EDC-5 are primarily located along West Tower Avenue and Lexington Avenue. Because the discharge point to the EBMUD system is located in the northwestern portion of IR Site 35, most flow within the industrial wastewater sewer lines is toward the west and north. Previous investigations collected and analyzed samples from 48 locations near industrial wastewater sewer lines. Thirteen of these 48 locations represent EBS sampling

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Section 2
PHYSICAL SETTING

This section describes the physical setting for Alameda Point and IR Site 35. Topics discussed include climate, topography, geology, surface water drainage and tides, hydrogeology, fill history, and beneficial uses of groundwater, ecological habitats, and natural resources.

2.1 CLIMATE

The San Francisco Bay area is characterized by a Mediterranean climate with mild summer and winter temperatures. The mean annual precipitation at Alameda Island is 23 inches, with most of the precipitation generally occurring from October to April. Mean yearly low and high temperatures are 52 degrees Fahrenheit (°F) and 67 °F, respectively. The wind direction is predominantly from the west or northwest, with rare occurrences of gale-force or greater winds. Heavy fog that sometimes impairs visibility for navigation occurs on an average of 21 days per year (NWS 2001). Table 2-1 summarizes maximum and minimum monthly temperatures and average rainfall.

2.2 TOPOGRAPHY

Alameda Island lies at the base of a gently westward-sloping plain that extends from the Oakland-Berkeley Hills in the east to the shore of San Francisco Bay in the west. Alameda Island has a low topographic profile, with surface elevations varying from mean sea level (MSL) to approximately 30 feet above MSL. The topography of IR Site 35 is primarily flat and ranges from approximately 7 to 12 feet above MSL (Figure 2-1).

2.3 GEOLOGY

Alameda Island is located on the east side of San Francisco Bay. The bay occupies a depression between the Berkeley Hills to the east and Montara Mountain and other mountains to the west. The depression and hills were formed by two active faults, the San Andreas Fault, west of San Francisco Bay, and the Hayward Fault, east of San Francisco Bay. The San Andreas and Hayward Faults are approximately 12 miles west and 5 miles east of the island, respectively.

The stratigraphy beneath Alameda Island and San Francisco Bay consists of unconsolidated sediments approximately 400 to 500 feet thick at the eastern margin of the bay (Rogers and Figuers 1991).

2.3.1 Alameda Island Geology

Alameda Island sedimentary deposits consist of four units (Figures 2-1 and 2-2; Table 2-2). From oldest to youngest, these sedimentary units include the Alameda Formation, the San Antonio Formation (lower and upper units), the Merritt Sand Formation, and the Bay Sediment Unit (BSU), with fill material overlying these deposits. These sedimentary units overlie bedrock consisting of metamorphosed sandstone, siltstone, shale, graywacke, and igneous bedrock of Jurassic to Cretaceous age, representative of the Franciscan Formation (Rogers and Figuers 1991). A summary of the

sedimentary units overlying the Franciscan Formation and a description of the artificial fill material are presented in the subsections below. The history of artificial fill is shown on Figure 2-3.

Several deep borings presented on Figure 2-4 were used to prepare schematic geologic cross-sections of the Alameda Point. Figure 2-5 and Figure 2-6 present east-west and north-south geologic cross sections, respectively. These cross sections depict the primary geologic and hydrogeology features of the central portion of Alameda Point. The depth of contacts between the different stratigraphic units is interpreted based upon limited data from several sources (BEI 2005b; TtEMI 1999; Neptune and Company, Inc., International Technology Corporation, and Environ 2002). The figures show the correlation between the fill layer, each stratigraphic unit, and the corresponding water-bearing zone. The figures also show the water table and the saline water interface. A discussion of each geologic unit is presented in the following subsections.

2.3.1.1 FILL MATERIAL

Most of the sedimentary deposits at Alameda Point are overlain by fill material. Fill material thickness generally decreases from west to east across Alameda Point. Up to 40 feet of fill soil is present at the western margin of Alameda Point, where offshore areas were reclaimed to create new land. The native material comes to near surface at the eastern margin of Alameda Point, where tidal marshes and estuarine channels were reclaimed. The fill material was emplaced at Alameda Point between approximately 1903 and 1959. The fill history for all of Alameda Island is presented on Figure 2-3. The fill material is predominantly poorly graded, fine-to-medium-grained sand with minor silt and clay lenses.

2.3.1.2 MARSH CRUST

The Marsh Crust is a layer of sediment contaminated with SVOCs that was deposited across portions of Alameda Point from the late 1800s until the 1920s. SVOC contamination resulted from discharges of petroleum waste products from former manufactured gas plants and oil refiners into the San Francisco Bay marshlands (SWDIV 2001). In the eastern portion of Alameda Point, a Marsh Crust Horizon is approximately 2 to 6 inches thick. It exists just beneath the fill layer and overlies the BSU; its lateral distribution is shown on Figure 2-1. A remedial action plan/ROD has been written for the Marsh Crust and has been signed and approved by the Navy, U.S. EPA, and Cal/EPA (SWDIV 2001).

2.3.1.3 BAY SEDIMENT UNIT

The BSU, which underlies the Marsh Crust Horizon (where present), has been observed in samples from soil borings to be up to 35 feet thick. The BSU consists of an upper unit and a lower unit. The upper unit is referred to as the Young Bay Mud, an estuarine deposit consisting of stiff, dark, olive-gray clay with discontinuous silty and clayey sand layers. Where present, the upper BSU is a semiconfining unit between the FWBZ and

second water-bearing zone (SWBZ) at Alameda Point. The lower unit of estuarine deposits consists of silty sand with interbedded layers of fine sand.

2.3.1.4 MERRITT SAND FORMATION

Beneath most of Alameda Point, the Merritt Sand Formation underlies the BSU. The Merritt Sand Formation is composed of eolian deposits of a yellowish-brown, poorly graded, fine- to medium-grained sand with minor shell fragments. The Merritt Sand is approximately up to 43 feet thick beneath Alameda Point, with the thickest portion toward the southeast.

2.3.1.5 SAN ANTONIO FORMATION

The San Antonio Formation consists of an upper unit and a lower unit. The upper unit consists of alluvial deposits (interbedded layers of sand and clay). The lower unit is the Yerba Buena Mud (Old Bay Mud). It is composed of estuarine deposits and is known to be an effective and regionally continuous hydraulic barrier (aquitard) and confining layer above the underlying Alameda Formation (a regional aquifer) (TtEMI 2000a). No direct evidence of depositional interconnection between the sands of the Merritt Sand Formation and the Alameda Formation has been identified. Borehole lithologic description indicates that 55 to 90 feet of low-permeability Yerba Buena Mud underlies Alameda Point (TtEMI 2000a). The undulating contact at the top of the Yerba Buena Mud depicted on Figures 2-5 and 2-6 is interpreted to be a paleochannel (TtEMI 1999).

2.3.1.6 ALAMEDA FORMATION

The Alameda Formation, which underlies the San Antonio Formation, consists of an upper unit and a lower unit. The upper unit consists of clay-rich marine deposits, and the lower unit includes alluvial deposits. The principal regional aquifer is composed of coarse deposits of the lower portion of the Alameda Formation. The estimated thickness of the Alameda Formation is approximately 200 to 400 feet. The Alameda Formation overlies the Franciscan Formation.

2.3.2 IR Site 35 Geology

The shallow subsurface geology of IR Site 35 consists of fill material overlying the BSU. Depth to the BSU varies, generally increasing from east to west. The upper portion of the BSU consists of fine sand on Young Bay Mud and the top of the unit ranges from ground surface at former AOC 15 to approximately 17 feet bgs at EBS Parcel 205. Descriptions of the fill material and the BSU (including the Young Bay Mud) were taken from IR Site 35 boring logs (Appendix D). The fill material consists primarily of fine- to medium-grained, poorly graded sand and lesser amounts of fine-grained silty sand and fine-grained clayey sand. These sands are typically brown, yellowish-brown, or olive-brown, and may contain minor shell fragments. Laterally discontinuous layers of silt, sandy silt, and clay silt and lean clay exist within the sand units at some study areas but are more common in the eastern portion of Transfer Parcel EDC-5. These silt and clay units are typically

brown or dark brown. Some study areas include construction fill soil used as a foundation material for roads or structures. This fill material typically consists of well graded gravel with silt and sand, poorly graded gravel with clay and sand, or well graded sand with clay and gravel. Topsoil is present in some areas with organic silts and clays.

The contact between the fill soil and the BSU in the eastern portion of Alameda Point commonly includes the Marsh Crust. However, the Marsh Crust was seldom observed at IR Site 35. When observed, it was described as a thin, black, organic layer.

Underlying the fill material and the Marsh Crust (where present) is the BSU. The upper portion of the BSU consists of either fine-grained, poorly graded sand or silty sand underlain by the Young Bay Mud. The sand in the upper portion of the BSU can be distinguished from sand in the fill material by a distinct color change from yellowish-brown to dark greenish-gray. In many locations the sand is absent and fill exists directly on top of Young Bay Mud. The Young Bay Mud of the BSU is described in site boring logs as dark greenish-gray to dark gray lean clay and fat clay. It ranges from soft to stiff and from low to medium plasticity. The lean clay has varying amounts of silt and fine sand. Logs for borings and wells at IR Sites 5, 8, 10, 26, 30, and 35 and throughout Transfer Parcel EDC-5 indicate that the top of the Young Bay Mud is shallowest in the east and increases with depth to the west (especially the southwest). Underlying the Young Bay Mud is dark greenish-gray, fine-grained sand; silty sand; and clayey sand.

2.3.2.1 GEOLOGIC CROSS SECTIONS

Since IR Site 35 consists of a group of geographically discontinuous study areas spread out across Transfer Parcel EDC-5, the geology can be best represented by a series of north-south and east-west cross sections. Figure 2-7 presents the location of the cross section lines. Cross section lines are located 1,500 feet apart and extend beyond the boundaries of IR Site 35 to provide a broader perspective of site lithology and to include information about deeper geologic features. Three east-west cross sections (Figure 2-8) and four north-south cross sections (Figure 2-9) traverse many of the study areas. The geologic cross section figures were constructed from multiple sources, including:

- boring logs from the IR Site 35 investigation (Appendix D),
- the SI Report for Transfer Parcel EDC-5 (BEI 2005b), and
- RIs at IR Sites 5 and 10 (SulTech 2005b), IR Site 8 (TtEMI 2004), IR Site 26 (BEI 2003), and IR Site 30 (BEI 2005d).

Adjacent soil borings, monitoring wells, and individual study areas have been projected onto the cross sections for reference.

Figure 2-8 shows east-west cross section line C-C′ traversing the northern portion of Transfer Parcel EDC-5. This cross section shows site geology at AOCs 2, 3, 4, and 5 (projected north). The western portion of the cross section (west of AOC 3) shows a consistent lithology, including fine-grained sand and silty sand (primarily fill material) overlying the fat and lean clay (BSU). The BSU is present at depths of 8 to more than

15 feet. The eastern portion of the cross section shows a more varied lithology with a thinner unit of fill material overlying the BSU. The fill layer is 5 to 10 feet in thickness and includes organic silts and clays (topsoil), construction fill materials, and silt and clay layers on top of or within the poorly graded sand.

Figure 2-8 shows east-west cross section line D-D′ traversing the central portion of Transfer Parcel EDC-5. This cross section shows site geology at AOCs 9, 10, 11, and 15 (projected north) and EBS Parcels 78 and 79. The western portion of this cross section does not include any IR Site 35 study area; however, it does include lithology from deep borings located at IR Sites 5, 8, and 26 that can be correlated with contacts to the east. These deeper borings clearly show the contact at depth between the fill layer and the BSU. Borings D05-01 and D08-01 reported by Tetra Tech EM Inc. in the OU-2 RI report (TtEMI 1999) show the depth of the fill layer, the BSU, and the Merritt Sand. Depth to the BSU in the western portion of the cross section ranges from approximately 10 to 15 feet bgs. Site lithology in the eastern portion consists of poorly graded sand with laterally discontinuous layers of silt, clay, and gravel. The depth of the BSU ranges from 6 to 11 feet bgs.

Figure 2-8 shows east-west cross section line E-E′ traversing the southern portion of Transfer Parcel EDC-5. This cross section shows site geology at AOCs 20 (projected south), 21, 23, and 24 (projected south) and EBS Parcel 205 (projected north). The depth of the BSU was estimated in the southwestern portion of Transfer Parcel EDC-5 using a deep boring (26B12L) projected south from IR Site 26 and a deep boring (D10A-01) from IR Site 10. This cross section clearly shows the gradual increase in depth of the BSU from east to west. The BSU was encountered at depths as shallow as 4 feet bgs in the eastern portion (near the original Alameda Island) and as deep as 18 feet bgs in the western portion. Multiple borings drilled within AOC 23 consistently show the contact between the fill soil and the BSU to be between 5 and 10 feet bgs.

Figure 2-9 shows north-south cross section line F-F′ traversing the western portion of Transfer Parcel EDC-5 and IR Site 5. This cross section shows site geology at AOC 1 (projected west). It also shows the lithology in relation to Seaplane Lagoon and Oakland Inner Harbor. Depth to the BSU is 12 to 18 feet bgs. Depth to the BSU in the vicinity of AOC 1 is approximately 12 to 14 feet bgs, although the BSU was not encountered while drilling at AOC 1. The deep boring (D05-03 projected east) from IR Site 5 (TtEMI 1999) was used to show lithology at depth including contacts between the fill soil, the BSU, and the Merritt Sand.

Figure 2-9 shows north-south cross section line G-G′ traversing the western central portion of Transfer Parcel EDC-5 and IR Site 5. This cross section shows site geology at AOCs 2, 17 (projected west), and 18 (projected east) and AST 039. This section shows Oakland Inner Harbor, Seaplane Lagoon, and the contact between the fill layer and the BSU. Depth to the BSU ranges from 6 to 16 feet bgs and increases with depth toward the south. Contacts between the fill soil, the BSU, and the Merritt Sand are shown on the deep boring D08-01 (TtEMI 1999).

Figure 2-9 shows north-south cross section line H-H' traversing the eastern central portion of Transfer Parcel EDC-5. This cross section shows site geology at AOCs 4, 6, 7, 10, 12, and 23 and AST 392. This section shows Oakland Inner Harbor, Seaplane Lagoon, and the contact between the fill layer and the BSU. Depth to the BSU is ranges from 5 to approximately 11 feet bgs. This is shallower than seen on cross sections to the west. The fill soil in this area consists primarily of poorly graded sand and laterally discontinuous layers of organic and inorganic silt and clay.

Figure 2-9 shows north-south cross section line I-I' traversing the eastern portion of Transfer Parcel EDC-5. This cross section shows site geology at AOCs 5 (projected east), 15, 24, and 25 and SWMUs AST 152 and AST 173. This section also shows Oakland Inner Harbor and the contact between the fill layer and the BSU. Depth to the BSU is from slightly below the ground surface to approximately 10 feet bgs. The shallowest depth to the BSU is located in the central portion of the cross section line at AOC 15 (soil boring A15SB03). This area is the location of former tidal flats and marshlands located north of the western tip of the original Alameda Island, as seen on historical maps (United States Coast and Geodetic Survey 1859 and 1903). The depth to the BSU increases both north and south away from this area. Site lithology varies significantly on this cross section compared to others presented, as there are more laterally discontinuous layers of sand, silt, clay, and gravel, especially on the southern portion near AOCs 24 and 25, and AST 173.

The relationship between the BSU and the estuarine coastal environment is best understood by reviewing and comparing historical maps and constructed cross sections. The known estuarine coastal features are illustrated on a 1903 geodetic map (United States Coast and Geodetic Survey 1903) presented as Figure 2-10. The map shows former Alameda Island, the estuarine depositional features (bay mouth, shoreline, tidal flat [intertidal to subtidal], tidal channel, mud flat, and salt marsh) that dominated the area, and the depth of San Francisco Bay beyond the tidal flat prior to emplacement of artificial fill material that formed what is now IR Site 35. Transfer Parcel EDC-5 and IR Site 35 boundaries and cross section location lines are overlaid on the geodetic map for reference to depositional features and to aid in interpretation.

2.3.2.2 RELATIONSHIP BETWEEN GEOLOGY AND HISTORICAL FEATURES

Significant pre-fill natural depositional features (e.g., tidal channel, tidal channel bank, mud flat, and salt marsh) shown on the map existed east and west of Main Street and north and south of Oakland Inner Harbor. The eastern portion of Transfer Parcel EDC-5, below the fill layer, overlies sediment representative of those depositional settings. The estuarine setting present in 1903 in the Alameda Island area is common and can still be observed along unfilled portions of the coast of San Francisco Bay. The nearby source of the sediment deposited in this depositional environment is unknown; however, the sediment likely consists of a combination of backwater deposits from San Antonio Creek and the bay. The estuarine features previously located both north and south of Oakland

Inner Harbor were likely connected at one time and appear to have been cut by San Antonio Creek.

The upper unit of the BSU, referred to as the Young Bay Mud, consists of mud flat and salt marsh deposits represented by clay and silty layers. The lower unit of the BSU consists of tidal channel and tidal channel bank deposits represented by slightly coarser silty sand with interbedded layers of fine sand. The BSU is encountered at its shallowest depth in the east and dips to the west across Alameda Point. Geologic cross sections constructed using a combination of borehole logs and historical information support this interpretation.

The map also indicates that the area west of the tidal channel, tidal channel bank, mud flat, and salt marsh depositional setting consisted of a tidal flat (intertidal to subtidal), whose westernmost boundary represented low lower sea level. Farther to the west, the water depth in the bay is shown in fathoms. Sediment representative of the tidal flat and offshore settings would likely be composed of slightly coarser, reworked fine-grained native sediment. The unit would dip to the west from the top of the mud flats to the former tidal flat area and into the open water of the bay.

The characteristics of the depositional setting can be used to estimate the relative elevation of the top of the BSU. The tidal channel, tidal channel bank, mud flat, and salt marsh environment was at or above MSL. The tidal flat was at about MSL (plus or minus a few feet), and the offshore sediment was below MSL. The exact elevation of the tidal channel, tidal channel bank, mud flat, and salt marsh environment is unknown; however, it covered a large area and had well-developed tidal channels. The presence of the mud flat deposits is indicated by thick clay units in borings at elevations up to 8 feet above MSL.

Study areas located on top of, or directly adjacent to, the former tidal channel, tidal channel bank, mud flat, and salt marsh environment include AOCs 5, 13, 24, 25, and the eastern portion of AOC 23; former AOCs 14, 15, and 16; ASTs 152 and 173; and UST(R)-11. The presence of the former tidal channel, tidal channel bank, mud flat, and salt marsh deposits at these study areas could provide different analytical results compared to study areas outside this depositional setting. The fine-grained sediment may contain higher metals concentrations present in clay minerals, and the organics associated with the estuarine deposits could produce a reducing environment. These concepts are developed further in Section 4.3.

2.4 SURFACE WATER DRAINAGE AND TIDES

Because there are no natural streams or ponds on Alameda Island, precipitation evaporates into the atmosphere, infiltrates to groundwater, or runs off into the storm drain network and/or directly into Oakland Inner Harbor and Seaplane Lagoon. Most of the ground surface at IR Site 35 is covered with residences, commercial/industrial buildings, concrete, or asphalt, except for some unpaved areas (e.g., small sections of AOCs 1, 3 through 8, 10, 12, 13, 16, and 25). Although ponding may occur in some areas at IR Site 35, precipitation generally drains into the storm drain system that discharges to

Oakland Inner Harbor and Seaplane Lagoon. Storm drains in Transfer Parcel EDC-5 flow to one of three outfalls along Oakland Inner Harbor (Outfalls B, D, and E) to the north or to four outfalls along Seaplane Lagoon (Outfalls F, FF, G, and H) to the south (Figure 1-3). Outfall B drains AOCs 1 and 2; Outfall D drains AOCs 3 and 9, AST 016, and OWS 017; Outfall E drains AOCs 4, 5, 6, 7, 8, and 10; Outfall F and Outfall FF drain EBS Parcel 205 and AOC 20; and Outfalls G and H drain all the remaining AOCs in IR Site 35 (AOCs 15, 16, 24, and 25) (Figure 1-5).

Oakland Inner Harbor and Seaplane Lagoon are contiguous with San Francisco Bay. San Francisco Bay is an estuarine environment in which freshwater from the Sacramento and San Joaquin Rivers mixes with salt water from the Pacific Ocean. The water level in the bay is not affected seasonally but has daily tidal fluctuations of 4 to 7 feet.

No groundwater elevation study has been conducted for IR Site 35. However, studies have been conducted at nearby IR Sites 26 (west of AOC 1), IR Site 27 (south of AOC 23 and adjacent to Seaplane Lagoon), and IR Site 28 (north of AOC 4 and adjacent to Oakland Inner Harbor) to evaluate average groundwater flow direction and gradient and to assess the degree, if any, of tidal influence. Results of the study at IR Site 26 showed minimal tidal influence on IR Site 26 groundwater (BEI 2003). The maximum groundwater-level fluctuation measured in monitoring well 26SW03 was 0.04 foot. This well is located approximately 1,500 feet from Seaplane Lagoon.

Results of the tidal study at IR Site 27 showed significant tidal influence in shoreline monitoring wells adjacent to Seaplane Lagoon. Monitoring wells 15-MW1 and 15-MW2 located within 30 feet of the shoreline of Seaplane Lagoon had maximum groundwater-level fluctuations of 2.57 and 2.90 feet, respectively. Monitoring well 15-MW3, located approximately 100 feet inland from Seaplane Lagoon, showed minimal tidal influence (0.10 foot) (BEI 2005c). However, water levels at well 15-MW3 may also be influenced by the existence of a sheet pile bulkhead located between this well and Seaplane Lagoon. These data indicate a significant decrease in tidal influence over a relatively short distance inland.

The study at IR Site 28 showed significant tidal influence (2.84 feet) in shoreline monitoring well 28SW03 located adjacent to (within approximately 25 feet) Oakland Inner Harbor. Monitoring well 28SW04, located approximately 200 feet inland, showed a maximum tidal fluctuation of 0.04 feet (BEI 2004a).

Based on results of the IR Sites 26, 27, and 28 groundwater elevation studies, significant tidal influence on groundwater can be expected in areas of IR Site 35 located adjacent to Oakland Inner Harbor and Seaplane Lagoon. This would include the northern portion of AOC 4 (bordered by Oakland Inner Harbor), possibly the southern portion of AOC 23 (approximately 100 feet from Seaplane Lagoon), and EBS Parcel 205 (bordered by Seaplane Lagoon). Study areas located slightly farther inland (AOCs 2, 3, 20, 21, southern portion of AOC 4, and central portions of AOC 23) may experience minor tidal influence and groundwater fluctuation. The groundwater at remaining study areas located still farther inland is expected to have minimal or no tidal influence.

2.5 HYDROGEOLOGY

The following sections discuss the regional hydrogeology and the IR Site 35 hydrogeology.

2.5.1 Regional Hydrogeology

The regional hydrostratigraphic units underlying Alameda Point are described in the following subsections. These hydrostratigraphic units include FWBZ, the SWBZ, regional aquifers, and associated confining layers.

2.5.1.1 FIRST WATER-BEARING ZONE

The FWBZ is an unconfined aquifer composed of fill material and the upper portion of the BSU. Based on observations in borings during the RI fieldwork, depth to groundwater ranges from approximately 3 to 9 feet bgs, yet typically exists between 4 to 6 feet bgs. Groundwater elevation ranges from approximately 3 to 8 feet above MSL. The thickness of the FWBZ ranges from 2 to 13 feet.

Shallow groundwater at Alameda Point generally flows from central areas toward the shorelines. Basewide and site-specific groundwater elevation maps are provided on Figures 2-11 and 2-12, respectively.

2.5.1.2 BAY SEDIMENT UNIT

As illustrated on the cross sections (Figures 2-8 and 2-9), the Young Bay Mud/BSU is laterally continuous beneath IR Site 35. The Young Bay Mud/BSU is a semiconfining layer composed of estuarine deposits consisting of clay and silty and clayey sand. This laterally continuous layer acts as a semipermeable aquitard between the FWBZ and the SWBZ. Due to the laterally continuous nature of this aquitard, vertical communication between the FWBZ and the SWBZ is believed to be minimal in the central region of Alameda Point, where IR Site 35 is located. The top of the BSU ranges from near surface (approximately 1 foot bgs) to 18 or more feet bgs. The thickness of the BSU ranges from 10 to 20 or more feet thick.

2.5.1.3 SECOND WATER-BEARING ZONE

The SWBZ is a semiconfined aquifer composed of the lower portion of the BSU, the Merritt Sand Formation (where present), and the upper unit of the San Antonio Formation (TtEMI 2000a). The SWBZ is sometimes referred to as the Merritt Sand aquifer and yields saline water (20,000 to 35,000 milligrams per liter). The proximity of the Merritt Sand to San Francisco Bay contributes to the presence of salt water in the aquifer. The Merritt Sand aquifer, exposed in the channel and port areas, is considered to be in direct communication with the water of San Francisco Bay. This aquifer is the conduit for saltwater intrusion along Oakland Inner Harbor and Seaplane Lagoon to the lower portion of the FWBZ and the entire SWBZ beneath Alameda Point (DWR 1960, TtEMI 2000a). The top of the Merritt Sand Formation ranges from 30 to 45 feet bgs, and it is up to approximately 43 feet thick.

2.5.1.4 SAN ANTONIO AQUITARD

The San Antonio aquitard including the Yerba Buena Mud is thick and continuous throughout Alameda Point and is considered an effective hydraulic barrier between the SWBZ and the underlying Alameda Formation (TtEMI 2000a). The San Antonio aquitard is approximately 60 to 80 feet bgs and is 55 to 90 feet thick across Alameda Point (Hickenbottom and Muir 1988).

2.5.1.5 ALAMEDA AQUIFER

The Alameda aquifer is the principal regional freshwater aquifer. Depth to the top of the Alameda aquifer ranges from 180 feet bgs at Alameda Point to 220 feet beneath the surface of the sediment in Oakland Inner Harbor. The thickness of the formation is between 230 and 800 feet (Hickenbottom and Muir 1988).

2.5.2 IR Site 35 Hydrogeology

The following describes the hydrogeologic and aquifer parameters for IR Site 35 and vicinity.

2.5.2.1 HYDROSTRATIGRAPHY

The shallow hydrostratigraphic units beneath IR Site 35 have been divided into the following four hydrogeologic units (Figure 2-2):

- FWBZ – fill material
- semiconfined aquitard – Young Bay Mud of the BSU
- SWBZ – lower portion of BSU, Merritt Sand and Upper San Antonio Formation
- regional aquitard – lower San Antonio Formation, including the Yerba Buena Mud

While deeper borings were not advanced at IR Site 35, information from adjacent IR sites was used to estimate the depth of the hydrostratigraphic units. At IR Site 35, the FWBZ is unconfined, generally occurs in the fill material, and extends to depths of 5 to 18 feet bgs. This FWBZ in the fill layer is a local feature of Alameda Point and is not present regionally (TtEMI 1999). The Young Bay Mud portion of the upper BSU is a semipermeable aquitard between the FWBZ and the SWBZ and is present beneath IR Site 35. As shown on Figures 2-8 and 2-9, the thickness of the BSU at IR Site 35 is between 22 and 31 feet.

Throughout Alameda Point, the SWBZ is semiconfined and occurs within the lower BSU, the Merritt Sand Formation, and the Upper San Antonio Formation; the SWBZ at Alameda Point has a maximum thickness of 88 feet (TtEMI 1999). There is limited hydraulic connection between the FWBZ and the SWBZ, where the BSU consists of low-permeability clayey layers such as found at IR Site 35. Basewide information suggests that the SWBZ at IR Site 35 is between 45 and 60 feet thick (TtEMI 1999, 2000a; Shaw 2004a). Throughout Alameda Point, the SWBZ is subject to saltwater intrusion

due to direct connection with Oakland Inner Harbor and San Francisco Bay (TtEMI 2000a) and total dissolved solids (TDS) concentrations routinely exceed 20,000 µg/L. The SWBZ is underlain by the Yerba Buena Mud of the Lower San Antonio Formation, which forms a regional aquitard.

2.5.2.2 GROUNDWATER FLOW DIRECTION AND GRADIENT AT IR SITE 35

A groundwater elevation map of the FWBZ for summer 2005 is presented on Figure 2-12. The elevation map for spring 2004 presented in the Work Plan (BEI 2006) was used for the placement of soil borings and grab groundwater samples collected as part this RI. The elevation map for summer 2005 was developed by reinterpreting the data from the Summer 2005 Quarterly Monitoring Report (ITSI 2006) and from BEI (2003).

General groundwater flow direction is toward the shoreline. As such, a groundwater mound exists in the central portion of Transfer Parcel EDC-5 and flows radially outward toward surface water bodies located to the north, south, and west. As shown on Figure 2-12, study areas located near the central portion of the groundwater mound include AOCs 10, 11/EBS Parcels 78–79, 12, and 17. These study areas tend to have high groundwater elevations (typically more than 7 feet above MSL). Groundwater flow is typically toward the north and northwest for study areas in the northern portion of Transfer Parcel EDC-5. The groundwater gradient is gradual, at approximately 0.002 foot/foot toward Oakland Inner Harbor. Groundwater flow is typically to the south for study areas in the southern portion of Transfer Parcel EDC-5 with a steeper gradient of approximately 0.004 foot/foot toward Seaplane Lagoon.

Few monitoring wells exist within the boundaries of IR Site 35. Study area–specific information for groundwater elevations, flow direction, and gradient can be extrapolated from data collected at adjacent IR sites. These data are summarized in the Spring 2005 Alameda Basewide Annual Groundwater Monitoring Report (ITSI 2005) and the Summer 2005 Quarterly Monitoring Report (ITSI 2006). These monitoring reports evaluated groundwater conditions by IR site or by IR site group. To evaluate groundwater conditions at IR Site 35, study areas throughout IR Site 35 have been correlated with the IR sites for which data are presented in these basewide monitoring reports.

Based upon this correlation, the following conclusions can be made with regard to the study areas at IR Site 35.

- Localized groundwater flow direction in the FWBZ has been influenced by a groundwater low that is north of IR Site 7 and by apparent groundwater mounding at IR Site 3. The apparent mounding is caused by local irrigation and is centered under the grass-covered open space (oval) dividing eastbound and westbound lanes of traffic on West Atlantic Avenue.
- Horizontal hydraulic gradients are similar at adjacent IR sites to those for IR Site 35 study areas.
- The annual monitoring report (ITSI 2005) showed both upward and downward hydraulic vertical gradients at adjacent IR sites. The vertical gradient

throughout IR Site 35 is unknown and can only be extrapolated based upon adjacent site information.

- Groundwater elevations generally show a consistent seasonal pattern, with high groundwater elevations in spring and low groundwater elevation in late summer and fall.
- Groundwater elevations have increased over time since 2002. This increase is likely associated with an overall increase in precipitation during the measurement interval (ITSI 2005).

2.6 FILL HISTORY

Before 1850, the peninsula of Alameda consisted of approximately 2,200 acres of high ground (dry land) and approximately 1,000 acres of marshland. The peninsula measured approximately 4.5 by 1.5 miles and consisted of only the eastern portion of present-day Alameda Island. Alameda Peninsula became an island when the San Leandro Channel was dredged; this dredging was completed in 1902 (Lenhart 2005). As a result of fill projects conducted between 1871 and 1961, Alameda Island is now three times its original size. The general trend of fill events was to initially reclaim areas north of Atlantic Avenue and then reclaim areas west of Main Street (Figure 2-3). Currently, Alameda Island consists of approximately 6,912 acres of dry land (Valeska, pers. com. 2001).

In 1930, the U.S. Army acquired the western portion of Alameda Island, now referred to as Alameda Point, and began construction activities in 1931. In 1936, the Navy acquired the land from the U.S. Army and began building NAS Alameda. The U.S. Army and Navy construction activities both involved filling tidelands, marshes, and sloughs between Oakland Inner Harbor and the western edge of Alameda Island. The fill material largely consisted of dredge spoils from the surrounding San Francisco Bay and Oakland Inner Harbor. After 1941, the Navy acquired additional land, extending the western edge of the base.

The development of IR Site 35 through multiple fill episodes to its present shoreline is traceable through historical aerial photographs (Appendix A). The northeastern portion of IR Site 35 was created by filling tidal flats between 1859 and 1930, before Navy occupancy. Between 1930 and 1936, an additional portion of the site was reclaimed in conjunction with the construction of the Alameda Municipal Airport and the expansion of Benton Field. The final fill activity in IR Site 35 occurred between 1936 and 1945, when approximately 1.5 million cubic yards of sand was pumped from San Francisco Bay to fill large portions of NAS Alameda (Merlin 1977, Vigness 1952).

2.7 GROUNDWATER USE AND POTENTIAL BENEFICIAL USES

Groundwater beneath Alameda Point (including IR Site 35) is not currently used for drinking water, irrigation, or industrial supply. Drinking water is supplied to Alameda Point by the EBMUD. The U.S. EPA and California State Water Resources Control

Board (SWRCB) have developed classification categories for groundwater to describe potential use.

U.S. EPA classifies groundwater in one of three categories (Class I, II, or III) based on ecological importance, replaceability, and vulnerability considerations. Class I groundwater is irreplaceable groundwater that is currently used by a substantial population, or groundwater that supports a vital habitat. Groundwater that is currently being used or that might be used as a source of drinking water in the future is considered to be Class II. Groundwater that cannot be used for drinking water due to insufficient quality (e.g., high salinity or widespread, naturally occurring contamination) or quantity is considered to be Class III. U.S. EPA guidelines define Class III groundwater as groundwater with TDS concentrations above 10,000 milligrams per liter (mg/L) and a yield of less than 150 gallons per day (U.S. EPA 1986). Class III groundwater can also be classified on the basis of economic or technological treatability tests as well as on quality or quantity (only one set of criteria is needed, not both).

The California SWRCB Source of Drinking Water Policy Resolution (Res.) 88-63 (SWRCB 1988) defines sources of drinking water and states exemption criteria as groundwater with TDS concentrations above 3,000 mg/L and with a sustainable yield of less than 200 gallons per day.

Beneficial groundwater use at Alameda Point was evaluated in the final Determination of the Beneficial Uses of Groundwater Report, prepared in 2000 (TtEMI 2000a). No Class I groundwater was identified at Alameda Point. Most of the FWBZ at Alameda Point was considered to be Class II groundwater and a potential, although unlikely, source of drinking water. The SWBZ at Alameda Point was considered a Class III aquifer because TDS concentrations exceed 10,000 mg/L. Additionally, shallow groundwater near shorelines at Alameda Point typically contained TDS at concentrations greater than 10,000 mg/L.

IR Site 35 is within the central and southeastern regions of Alameda Point and based on the beneficial use report, groundwater in the FWBZ is considered Class II groundwater. However, the beneficial use evaluation also states that for purposes of CERCLA cleanup decisions, FWBZ groundwater in the central region of Alameda Point, where the majority of the IR Site 35 study areas are located, is unlikely to be used as a potential drinking water source, when considering the following factors (TtEMI 2000a):

- safe yield and maximum pumping rates that are inadequate to support common uses of water as well as multiple domestic users
- existing saltwater intrusion at the base of the FWBZ that would be accelerated by groundwater extraction
- absence of supply wells currently within or downgradient of contaminated groundwater
- state and county limitations that exist on well construction because of a thin, vulnerable aquifer

Additionally, the BRAC Cleanup Team has concurred with cleanup levels above MCLs in some areas of the central region of Alameda Point on the condition that any contaminated groundwater beneath IR sites (IR Sites 5, 6, 7, 8, 10, 12, and 25 are specifically mentioned in the beneficial use report) is remediated to levels such that the threats posed by such exposures as inhalation (groundwater vapors into buildings), dermal contact, and those associated with irrigation use are eliminated, and any significant ongoing degradation of the groundwater from contaminant migration is prevented.

SWRCB currently classifies groundwater beneath Alameda Point as potentially suitable for municipal or domestic supply. However, in a letter dated July 21, 2003, the Navy received concurrence from the California Regional Water Quality Control Board that groundwater in the FWBZ and SWBZ west of Saratoga Street at Alameda Point meets the exemption criteria in the SWRCB Res. 88-63 (SWRCB 1988) and California Regional Water Quality Control Board Res. 89-39 (RWQCB 2003). Hence, groundwater west of Saratoga Street is not considered a potential drinking water source for purposes of CERCLA cleanup decisions. AOCs 1, 2, 18, 20, and 21; EBS Parcel 205; AST 039; and portions of AOCs 3 and 17 are located west of Saratoga Street.

Two study areas at IR Site 35, AOC 25 and the southern portion of AOC 23 (i.e., EBS Parcels 125 and 126), are located in the southeastern groundwater region of Alameda Point, as identified in the beneficial use report (TtEMI 2000a). The southeastern region is considered a potential drinking water source (Class II groundwater) for CERCLA cleanup decisions, with off-base wells located within 1 mile of Alameda Point.

While it is considered unlikely that groundwater beneath IR Site 35 would be used as a drinking water source, inland groundwater east of Saratoga Street (currently Class II groundwater) may be considered a potential drinking water source for CERCLA decision-making purposes unless saltwater intrusion and/or low yield make development of a sustainable water supply infeasible. TDS data and observations of groundwater yield (described in the following paragraphs) suggest that some inland areas within IR Site 35 east of Saratoga Street may meet Class III criteria; however, groundwater in inland areas east of Saratoga Street is assumed for the purposes of this RI/FS Report to exhibit Class II characteristics and qualify as a potential drinking water source for CERCLA decision-making purposes. This is discussed in Section 8.3.2.2, as it pertains to groundwater ARARs.

Several trends are noted when the average TDS concentrations are viewed spatially by study area across the site. Because of the wide ranges of TDS detected across individual AOCs, averages are used to outline the general trends of TDS concentrations at IR Site 35. Ranges and averages for TDS values are presented in Table 2-3.

Higher average concentrations of TDS (i.e., above 8,000 mg/L; range of approximately 3,000 to 18,000 mg/L) exist at AOCs 2 and 5 in the northern portion of the site near Oakland Inner Harbor. Higher average concentrations (i.e., above 6,000 mg/L; range of approximately 400 to 20,000 mg/L) also exist in the southeastern portion of the site at AOC 25 and near ASTs 173A, 173B, and 173C.

AOC 23 covers a relatively large area and its many wells show a wide range of TDS concentrations. Moderate average TDS concentrations (i.e., average between 1,000 and 5,000 mg/L; range of approximately 400 to 22,000 mg/L) exist in AOC 23 and in the central and western portions of the site, including AOCs 1, 9, 11, 17, and 24; ASTs 152 and 392; OWS 017; and UST(R)-11.

The lowest average TDS concentrations (i.e., below 1,000 mg/L; range of approximately 200 to 1,000 mg/L) typically exist in the southwestern portion of the site in the vicinity of AOCs 18, 20, and 21; EBS Parcel 205; and AST 039. AST 016, located in the central portion of the site, also had low TDS concentrations.

TDS concentrations are influenced by several variables, including the depth to the freshwater/saline water interface, tidal fluctuations and saltwater intrusion, local and regional discharge and recharge, and natural and man-made physical barriers that may restrict groundwater flow. High TDS concentrations observed in shallow groundwater located along the northern portion of the site appears to be a result of significant influence by the saltwater intrusion from Oakland Inner Harbor. In contrast, shallow groundwater located in the southwestern portion of the site near Seaplane Lagoon has little or no saltwater intrusion. This is likely due to a vertical retaining wall or sheet pile barrier driven into the sediment along the shoreline of Seaplane Lagoon. This physical barrier limits saltwater intrusion and may cause infiltrated freshwater (from rainwater and irrigation) to accumulate north of the retaining structure.

Local TDS concentrations can also be influenced by groundwater pumping from construction or remediation projects and from discharge by irrigation, leaky water lines or sewer lines, and other discharge/recharge scenarios. Some of these conditions are known to exist at Alameda Point. The depth of the freshwater/saline water interface may be located within the lower portion of the fill layer in study areas located adjacent to the shorelines; however, it is more likely to be located beneath the upper clay layer of the BSU throughout most of IR Site 35.

Groundwater yield is expected to be variable across IR Site 35, based upon review of study area–specific boring logs and geotechnical data. Geotechnical results indicate that effective porosity ranges from 0.32 to 0.61 and saturated hydraulic conductivity ranges from 1.7×10^{-7} in lean clay to 2.1×10^{-3} in poorly graded sand–silty sand. Recharge is likely to increase in the western portion of the site as the saturated thickness of the fill material increases and the lithology is less variable. The shallow saturated zone in the eastern portion of the site combined with more fine-grained sediments is not expected to yield much water. Groundwater sampling of open borings during the RI supports these assumptions. Yield at several borings was very low, requiring 5 hours or more (and up to 2 days) for groundwater to recharge so that sufficient sample volume could be obtained. This occurred at borings located at AOCs 5, 24, and 25, and in selected borings at AOC 23. It is generally considered unlikely that groundwater yield at most of the study areas at IR Site 35 could be sustained at a sufficient rate to support municipal or domestic drinking water supply. However, as discussed above, groundwater in inland areas east of Saratoga Street is assumed for the purposes of the RI/FS Report to exhibit Class II

characteristics with sufficient yield to qualify as a potential drinking water source for CERCLA decision-making purposes.

2.8 ECOLOGICAL HABITATS AND NATURAL RESOURCES

The following subsections describe ecological habitats, potentially sensitive habitats, and special-status species at IR Site 35. The ecological information presented in these subsections is based on a review of previously prepared environmental documents (City of Oakland 2002; LSA 2001, 2002; Parsons 2001; USACE and Port of Oakland 2000; USACE 1998; WRT 2002).

2.8.1 Ecological Habitats

The northern portion of IR Site 35 has been designated as an urban habitat (Figure 2-13). The vegetation in urban habitat areas is characterized by ornamental species and other nonnative species in landscaped lawns and parks. The lawns and parks provide nesting sites and foraging areas for typical urban wildlife, including the western scrub jay, the house finch, the American robin, and the California ground squirrel. Other wildlife potentially present in the northern portion of IR Site 35 include raptors and other foraging predators, bats inhabiting abandoned buildings, and feral cats (LSA 2001). Urban habitat generally supports few wildlife species due to human disturbances and limited vegetation.

The southern portion of IR Site 35 is considered an intensively developed area (Figure 2-13) and is characterized as a barren habitat. The intensively developed southern portion of IR Site 35 has little to no vegetation; it consists primarily of buildings, roads, and parking lots. Typical urban wildlife may also be found in a barren habitat, usually as a result of moving between other preferred habitats.

2.8.2 Potentially Sensitive Habitats

An annual roosting site of monarch butterflies (*Danaus plexippus*), a potentially sensitive habitat located in a park-like area between Barber's Point Road and Pearl Harbor Road, is approximately 250 feet southwest of AOC 5 (LSA 2001; Figure 2-13). The monarch butterfly is considered a regionally important species and is protected under the California Environmental Quality Act. Monarch butterflies may use a grove of Monterey pine, stone pine, and eucalyptus trees as an autumnal roost during annual migration to overwintering sites (areas where the butterflies hibernate throughout the winter). Monarch butterflies cluster in the same areas (and often the same trees) each fall, and during the fall migration may roost for a few weeks or months as they pass through the area. Removal or alteration of groves providing an autumnal roost may disrupt the life cycle of a particular group of monarch butterflies (LSA 2001). Since the monarch butterflies do little other than travel during the migration period, it is unlikely that any site characteristics will affect the butterflies except for providing pine and eucalyptus trees for roosting.

There are no wetlands located in IR Site 35 (LSA 2001).

2.8.3 Special-Status Species

A list of special-status species known or suspected to occur at Alameda Point is shown in Table 2-4. No special-status species are known or suspected to occur at IR Site 35 except for the special-status bats that are suspected to roost in abandoned buildings and forage in the adjacent areas of grassland or scrub habitat. Therefore, the bats would likely have no direct contact with soil or groundwater in IR Site 35.

Special-status birds may occasionally be observed at the urban or barren habitats of IR Site 35. However, IR Site 35 offers little value to wildlife and likely serves only as a corridor between other preferred habitats.

2.8.4 Ecological Summary

Only barren habitat and urban habitat currently exist at IR Site 35. No ponds, streams, or wetlands are located at the site. Due to the absence of threatened or endangered species and negligible exposure potential for other special-status species at IR Site 35, no further ecological investigation was recommended in the SI Report (BEI 2005b) and the Work Plan (BEI 2006); therefore, no terrestrial ecological assessment was performed during the RI. Groundwater results for study areas adjacent to or in the vicinity of surface water are compared to surface water screening criteria in Section 3.

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Section 3
INVESTIGATION APPROACH AND SCOPE

This section presents a brief description of the DQOs for the RI, the scope and methods of the RI, the deviations from the Work Plan (BEI 2006), and data quality and validation methods. This section also presents the PSCs and the Alameda Point background metals concentrations used to evaluate the nature and extent of contamination at IR Site 35.

Historical information, the results of previous investigations, and data collected during the RI are combined in this section to develop a complete description of IR Site 35 environmental issues. Aerial photographs (Appendix A) were reviewed and visual inspections were conducted as part of these investigations. Relevant analytical data collected during previous investigations and all of the RI data are presented in Appendices B, E, F, and G.

3.1 DATA QUALITY OBJECTIVES

DQOs for this RI were developed in accordance with the seven-step process presented in U.S. EPA guidance (U.S. EPA 2000c). The DQOs for the RI were described in the Work Plan (BEI 2006) and are reproduced for reference in Tables 3-1 through 3-3.

The DQO process describes the problems and the temporal, spatial, and resource boundaries for the RI; defines the decisions to be made during the project; and identifies data and other inputs required for decision-making. These objectives, in turn, prescribe the sampling and analytical methods and quality assurance procedures to be followed during the investigation.

The principal DQO of this investigation is to assure that the data collected are of sufficient quantity and quality to meet the intended uses. The data collected and used to support decision-making must pass the validation process and satisfy the DQOs. The DQOs outline procedures for the collection and assessment of data that are within acceptable tolerances of precision, accuracy, and completeness and that provide adequate representativeness and comparability.

3.2 REMEDIAL INVESTIGATION SAMPLING LOCATIONS, ANALYSES, AND RATIONALE

The selection of sampling locations and analytical methodologies for the RI at IR Site 35 was based on historical site activities, previous SI results, the nature of the potential contaminants, and regulatory agency comments. Except at EBS Parcels 78–79, sampling locations were selected using a judgmental sampling approach. At EBS Parcels 78–79, sampling locations were placed in an unbiased modified grid because releases to soil or groundwater were not known to have occurred (except for LBP in soil that was addressed as part of an NTCRA). The basis and methodology for determining the number of boring locations and associated samples collected at these locations were outlined in the Sampling and Analysis Plan (SAP), Attachment A to the Work Plan (BEI 2006). Figure 3-1 presents sampling locations for soil and groundwater, as well as storm drain sampling locations for the RI at IR Site 35.

The vertical boundary for the RI at IR Site 35 was 5 to 10 feet below the water table and within the FWBZ. As shown in cross sections provided on Figures 2-8 and 2-9, the FWBZ in the vicinity of IR Site 35 is separated from the SWBZ by a laterally continuous lean clay layer (Young Bay Mud aquitard) located at the top of the BSU. Hydraulic communication between the two water-bearing zones is not likely; therefore, characterization of water quality in the SWBZ beneath IR Site 35 is not included in the DQOs.

Analytical methods were selected on the basis of historical activities and chemicals identified during previous investigations at the site. VOCs, TPH, SVOCs, PAHs, pesticides, PCBs, and metals were identified as chemicals needing further assessment in both soil and groundwater, and lead was similarly identified for sediment. The analytical methods used for each sampling medium were selected to characterize these chemicals at IR Site 35 and to achieve detection limits below levels of regulatory criteria. A detailed discussion of analytical methodologies, including a comparison of analytical methods, target method detection limits, and project-specific threshold levels, was provided in the SAP. The RI sampling program is summarized in Table 3-4, which also states the rationales for the selected analyses.

3.2.1 Sampling Activities

A total of 137 borings were advanced during the RI field activities in November and December 2005. A total of 353 soil samples were collected from 127 of the 137 borings. Ten borings were sampled for groundwater only. Borings were generally drilled between 8 and 12 feet bgs; however, some borings were as shallow as 4 feet bgs and some as deep as 14 feet bgs. A total of 121 grab groundwater samples, including 33 duplicate samples, were collected from temporary wellpoints with slotted polyvinyl chloride casings placed in the soil borings. A groundwater sample was collected from existing monitoring well 398-MW1. Two sediment samples were collected from two storm sewer manholes. Soil boring, monitoring well, and storm drain sampling locations are shown on Figure 3-1. Boring logs for RI sampling activities are included in Appendix D. Analytical results reported for the RI samples are included in Appendices E and G.

3.2.1.1 SOIL SAMPLING

The soil samples were submitted to an off-site analytical laboratory for chemical analyses, which included the following:

- VOCs, using U.S. EPA Methods 5035A and 8260B
- purgeable-range TPH (gasoline range), using U.S. EPA Methods 5035A and 8015-M
- extractable-range TPH (fuel fingerprint), using U.S. EPA Method 8015B-M with silica gel cleanup to identify TPH in the JP-5, diesel, and motor oil ranges
- SVOCs (non-PAHs), using U.S. EPA Method 8270C

- PAHs, using U.S. EPA Method 8270C with selected ion monitoring (SIM) to achieve low-level detection limits
- pesticides, using U.S. EPA Method 8081A
- PCBs, using U.S. EPA Method 8082
- target analyte list (TAL) metals, using U.S. EPA Method 6010B/7000 Series
- hexavalent chromium, using U.S. EPA Method 7196A
- mercury, using U.S. EPA Method 7471A

Analytical results for the soil samples are discussed in Section 4.

A geotechnical laboratory performed the following additional analyses on 11 soil samples:

- air permeability and conductivity, using American Petroleum Institute Recommended Practice 40
- density and moisture, using American Society for Testing and Materials (ASTM) D2937 and D2216
- effective porosity, using the SWRCB method
- liquid limits, using ASTM D4318-00
- hydraulic conductivity, using ASTM D5084-90
- total organic carbon, using the Walkley-Black method

Geotechnical laboratory results are included in Appendix E and summarized in Table 3-5.

Soil types of the geotechnical samples of fill material (11 samples) were primarily classified as silty sand and/or poorly sorted sand. Two samples of Young Bay Mud were classified as lean clay; a third was identified as a clayey sand.

Geotechnical results for soil samples are summarized as follows.

- Liquid limit results indicated that 10 of the 14 samples were nonplastic. Liquid limits of the remaining four samples ranged from 17 to 47, plastic limits ranged from 12 to 23, and plasticity indices ranged from 3 to 24.
- Dry densities of the geotechnical samples ranged from 66.2 to 114.4 pounds per cubic foot, and moisture contents ranged from 6.3 to 54.1 percent.
- Effective confined pressures ranged from 3 to 3.6 pounds per square inch.
- Saturated hydraulic conductivities ranged from 5.4×10^{-8} to 2.1×10^{-3} centimeters per second (cm/sec).
- Effective air permeabilities ranged from 0.152 to 711.52 millidarcy, and air conductivities ranged from 9.9×10^{-9} to 4.7×10^{-5} cm/sec.
- Effective porosities, which were reported as equivalent to total porosities, ranged from 0.319 to 0.607.
- Total organic carbon results ranged from 0.16 to 4.50 percent.

3.2.1.2 GROUNDWATER SAMPLING

The 121 groundwater samples were submitted to an off-site analytical laboratory for chemical and water quality parameter analyses, which included the following:

- VOCs, using U.S. EPA Method 8260B
- purgeable-range TPH (as gasoline), using U.S. EPA Method 8015-M
- extractable-range TPH (fuel fingerprint), using U.S. EPA Method 8015B-M with silica gel cleanup
- SVOCs (non-PAHs), using U.S. EPA Method 8270C
- PAHs, using U.S. EPA Method 8270C SIM (low-level detection limits)
- pesticides, using U.S. EPA Method 8081A
- PCBs, using U.S. EPA Method 8082
- TAL metals, using U.S. EPA Method 6010B/7000 Series
- hexavalent chromium, using U.S. EPA Method 7196A
- mercury, using U.S. EPA Method 1631 (low-level detection limits for groundwater samples collected in areas adjacent to or near the shoreline)
- TDS, using U.S. EPA Method 160.1

Analytical results of the groundwater sampling program are presented in Section 4.

3.2.1.3 MONITORING WELL SAMPLING

The groundwater monitoring well sample was submitted to an off-site analytical laboratory for chemical and water quality parameter analyses, which included the following:

- VOCs, using U.S. EPA Method 8260B
- TAL metals, using U.S. EPA Method 6010B/7000 Series
- mercury, using U.S. EPA Method 1631 (low-level detection limits)
- TDS, using U.S. EPA Method 160.1

Analytical results reported for the monitoring well sample are discussed in Section 4.

3.2.1.4 SEDIMENT SAMPLING

The two sediment samples were submitted to an off-site analytical laboratory for lead analysis, using U.S. EPA Method 6010B with inductively coupled argon plasma. Analytical results reported for these samples are presented in Section 4.

3.2.2 Summary of RI Sampling Activities

RI field activities at IR Site 35 were conducted from November 2005 through early February 2006. Field activities were performed in accordance with the Work Plan

(BEI 2006), which included as separate attachments the SAP (including the FSP and QAPP), Data Management Plan (DMP), Investigation-Derived Waste (IDW) Management Plan, Site-Specific Safety and Health Plan Supplement, and HHRA Work Plan. Deviations from the Work Plan are discussed in Section 3.3.

The following RI activities were conducted at IR Site 35:

- use of standard operating procedures
- planning and notification
- land survey
- utility clearance
- field instrumentation and calibration
- direct-push drilling
- soil sampling
- grab groundwater sampling
- monitoring well sampling
- sediment sampling
- equipment decontamination
- borehole abandonment
- field documentation
- IDW management and disposal
- demobilization

These activities are described in detail in Appendix C.

3.3 DEVIATIONS FROM THE WORK PLAN

Minimal deviations from the Work Plan (BEI 2006) were made during the field investigation. With concurrence from the regulatory agencies, RI sampling began as soon as agreement was reached between the Navy and the agencies on the scope of the investigation. Fieldwork was initiated before the Work Plan was finalized.

Soil boring location A23SB39 inside Building 66 in AOC 23 was measured manually by BEI, instead of using the global positioning system by the land survey subcontractor, because the building was closed and locked when the surveyors were on-site.

Some analyses were not performed as outlined in the Work Plan due to limiting field conditions. For example, some boreholes had low groundwater yield due to clayey soil. When the available sample volume was limited, sample analysis was prioritized. These analyses were selected based upon sample results from historical data and historical site use. Soil borings A05SB02, A23SB22, and A23SB39 had limited sample volume. As a result, the following analyses were not performed:

- A05SB02 – SVOCs and pesticides/PCBs in groundwater
- A23SB22 – pesticides/PCBs and TDS in groundwater
- A23SB39 – fuels, SVOCs, and pesticides/PCBs in soil and groundwater

Analyses needed for complete evaluation (in addition to those outlined in the Work Plan) were added to some soil and groundwater samples as follows:

- A23SB26 – SVOCs and pesticides/PCBs in soil
- A23SB28 – SVOCs and pesticides/PCBs in soil
- A23SB04 – fuels and pesticides/PCBs in groundwater

3.4 DATA QUALITY

The following subsections discuss data evaluation, data validation, and detection limits.

3.4.1 Data Evaluation and Data Validation

Quality assurance objectives and details regarding data management, verification, and validation were provided in the SAP, Attachment A to the Work Plan (BEI 2006). Data management and database protocols were described in detail in the DMP, Attachment B to the Work Plan (BEI 2006). Data collected by previous contractors were integrated with RI-generated data to compile the data set used to complete the RI for IR Site 35.

A variety of field and laboratory data were collected during the RI. To assess data quality, validation and verification activities were conducted to assure that the analytical data were adequate to meet the established DQOs. Overall, results indicate that 99.93 percent of the data collected from IR Site 35 were usable. Due to difficulties in calibration and low recovery in matrix spike samples, 35 results reported as not detected (out of 48,231 data entries) were flagged as unusable ("R"-flagged) during the data validation process. No reported results above detection limits were "R"-flagged. No other analytical data were qualified as unusable. Appendix F contains a detailed description of data quality assessment activities.

3.4.2 Detection Limits

Each analytical method used during the RI was chosen because it has a method detection limit (MDL) at or below the level of concern. For each analyte, the Work Plan provided a target quantitation limit (TQL) that the laboratory was to achieve to provide analytical results at or below regulatory comparison criteria (BEI 2006). These TQLs included residential soil PRGs for soil samples, MCLs for groundwater samples, and ESLs for TPH compounds in both soil and groundwater samples. The TQL was generally equal to or greater than the MDL. The TQLs were set above MDLs to simplify comparisons between results from individual samples by minimizing influences from matrix effects (e.g., water content, high-level analytes).

The MDL is developed in detail in the description of an analytical method and is defined as the concentration of an analyte that produces a signal with a 99 percent probability that the concentration is above that of a blank. A blank is a sample that does not contain measurable concentrations of the analyte of concern. Tested by statistical performance, calibration samples, and laboratory control samples, MDLs represent the best measurement of instrument sensitivity and the basis for establishing quantitation limits.

Laboratory results are reported according to rules that provide established certainty of detection and quantitation limits. The result for an analyte is flagged with a "U" if the analyte was not detected (i.e., was not present at a concentration above the limit of measurement). The associated numerical value is the sample quantitation limit (SQL) that is based on the MDL as adjusted for sample characteristics (e.g., dilutions or percent moisture) and laboratory judgment. If an analyte is present at a concentration between the MDL and the TQL, the analytical result is flagged with a "J," indicating an estimated quantity. If an analyte is not present at a concentration between the MDL and the TQL, the analytical result is flagged with a "UJ," indicating that the SQL is an estimated quantity. Qualifying the result as an estimated concentration reflects increased certainty in the reported value.

Over 99 percent of RI data and historical data had MDLs lower than primary screening criteria. Of the 32,625 RI data records for soil samples, only four samples of arsenic have MDLs above the PRG, but they are all below background. Of the 11,931 RI data records for groundwater samples, 69 samples of motor oil, 10 of arsenic, 4 of cadmium, and 10 of thallium have MDLs above MCLs or ESLs for corresponding analytes. Most of the metal exceedances are below background for groundwater. Groundwater samples from the RI were also compared with surface water criteria (2,566 data records). Ten arsenic and six mercury data records have MDLs above these criteria, while only one arsenic data record has MDLs above background. Detection limits for individual analytes by samples are presented in Appendix G.

Three tables in Appendix G offer an evaluation of reporting limits and comparison criteria as follows: Table G4-1 presents a summary of analytes with one or more detection limits exceeding TQLs or U.S. EPA (or California) residential soil PRGs; Table G4-2 provides a summary of analytes with one or more detection limits exceeding TQLs or MCLs; and Table G4-3 presents a summary of analytes with one or more detection limits exceeding surface water values, including National Recommended Water Quality Criteria (NRWQC) or California Toxics Rule (CTR) criteria for salt water aquatic organisms. In the tables cited above, the Water Board's ESLs were applied to TPH as criteria for soil, groundwater, and surface water samples.

3.5 PRELIMINARY SCREENING CRITERIA AND ALAMEDA POINT BACKGROUND METALS CONCENTRATIONS

PSCs were used in assessing the nature and extent of contamination at IR Site 35; they were not used as comparison criteria to eliminate chemicals from further analysis in the HHRA. PSCs for IR Site 35 were agreed upon by the Navy and agencies and included in

the Work Plan (BEI 2006). PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being assessed. For example, groundwater concentrations from all study areas were compared to MCLs, whether or not the groundwater was considered a potential drinking water source in that area. Groundwater concentrations in areas near surface water bodies were also compared to surface water PSCs even though surface water criteria are not applicable to groundwater. COPCs identified in the human-health risk evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs. PSCs pertinent to IR Site 35 are presented are in Tables 3-6 through 3-9 and include the following:

- Soil
  - residential PRGs (U.S. EPA 2004b), except for the following PAHs classified as carcinogens, which are compared to the Alameda Point B(a)P equivalent concentration screening level of 620 µg/kg (DON 2001b, Cal/EPA 2006): benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, B(a)P, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, naphthalene
  - lead removal action objective of 199 mg/kg for study areas subject to NTCRA for LBP
  - ESLs for TPH – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)
- Groundwater
  - MCLs and advisory level for lead (U.S. EPA 2002b, DHS 2006)
  - ESLs for TPH – water (groundwater is a current or potential source of drinking water) (RWQCB 2005)
  - for study areas adjacent to or near Oakland Inner Harbor or Seaplane Lagoon, groundwater concentrations were also compared to the following surface water criteria:
    - CTR (40 C.F.R. § 131.38) for saltwater aquatic organisms (saltwater criterion continuous concentration [CCC]) and human-health consumption of organisms only (HHCO) (U.S. EPA 2000a)
    - NRWQC for saltwater aquatic organisms (saltwater CCC) and HHCO (U.S. EPA 2002b, 2006)
    - ESLs for TPH – surface water bodies (marine) (RWQCB 2005)

In addition to the above PSCs, metals concentrations in soil and groundwater were compared to the following background concentrations to help discriminate between site-related and naturally occurring metals:

- Alameda Point background soil concentrations based on the background data set in which three land categories (pink, yellow, and blue) have been

established based on similarities of fill history and iron and manganese content (95th percentile of the pink data set; Appendix E of the RI Report for OU-1 Sites 6, 7, 8, and 16) (TtEMI 2001c, 2004); the pink data set is used for IR Site 35

- Alameda Point background groundwater concentrations (95th percentile; Appendix E of the RI Report for OU-1 Sites 6, 7, 8, and 16) (TtEMI 2001c, 2004)

For ease of discussion in this report, the Alameda Point 95th percentile concentrations for metals in soil (pink background data set) and in groundwater are referred to as "background."

The presence of metals at concentrations above ESLs and PRGs does not necessarily indicate a health concern. ESLs and PRGs are screening levels. The results of the HHRA along with other factors are used to make risk management decisions.

According to Navy policy (Naval Facilities Engineering Command 1998, 2002), the Navy does not conduct remedial actions on sites to address the presence of metals at concentrations below background. This concept is supported by U.S. EPA (2002a). Background concentrations of metals in soil and groundwater for Alameda Point are presented in Table 3-10.

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Section 4

NATURE AND EXTENT OF CONTAMINATION

The interpretation of the nature and extent of contamination at IR Site 35 is presented in this section. The discussion is based on analytical results from previous investigations and results from the RI. Chemical concentrations and the spatial distributions of organic compounds with concentrations above PSCs are described for soil and groundwater in Sections 4.1 and 4.2, respectively. Metals in soil and groundwater are discussed in Section 4.3, which summarizes the statistical evaluation of selected metals in soil at IR Site 35 and the behavior of metals in groundwater. Metals in soil and groundwater with concentrations above background are also discussed, and metals with concentrations above PSCs are emphasized. A summary of the nature and extent of contamination for organic chemicals and metals is presented in Section 4.4.

Evaluations of the nature and extent of contamination for each study area are presented in Attachments A through W to this RI/FS Report. Individual locations where soil or groundwater samples were reported to have concentrations of contaminants above PSCs are shown on Figures 4-1 through 4-5. Figures 4-6 through 4-18 present metals concentrations above background (figures are for soil only). Tables 4-1 through 4-4 list soil locations where concentrations of VOCs, TPH, and PAHs are above PSCs; for PAHs, Table 4-5 also provides average B(a)P equivalent concentrations by DA. Table 4-6 lists soil locations where concentrations of pesticides and PCBs are above PSCs; Table 4-7 lists soil locations where metals concentrations are above PSCs. Tables 4-8 through 4-12 list groundwater locations where concentrations of contaminants are above PSCs. Complete analytical results for historical and RI samples are presented in Appendices B and G, respectively. Details of the statistical analyses of metals concentrations in soil concentrations are presented in Appendix H.

4.1 ORGANIC COMPOUNDS IN SOIL

Analytical soil sampling results for organic chemicals present at concentrations above PSCs are summarized below for each class of organic chemicals investigated at IR Site 35. Individual locations where chemical concentrations were present at concentrations above PSCs are listed by analyte and study area in Tables 4-1 through 4-4 and 4-6.

4.1.1 Volatile Organic Compounds

VOCs in soil at IR Site 35 were reported above PSCs only at AOC 23 (Table 4-1). The reported VOCs (benzene and vinyl chloride) were above PSCs in only 2 of 157 soil samples at AOC 23 (Figure 4-1).

Soil associated with the benzene concentration of 27,000 µg/kg reported in a historical sample (071M-004M) at EBS Parcel 71 was likely removed during subsequent fuel pipeline closure activities for CAA-B; this concentration was above the PSC (residential PRG of 640 µg/kg). RI sampling (RI boring A23SB05) near this location did not confirm the previous concentration of benzene reported in the historical EBS sample collected at 7.5 to 8.5 feet bgs. Benzene was reported at concentrations below laboratory detection limits in all soil and groundwater samples collected from the RI boring. No visual signs of hydrocarbon impacts were observed in the pipeline backfill during RI drilling.

Vinyl chloride was reported in soil at a concentration above the PSC (residential PRG of 79 µg/kg) in one RI soil sample (A23SB22), located southeast of Building 13 and southwest of Building 98, and collected at 5 to 6 feet bgs from EBS Parcel 123. In shallower soil samples from the same boring, vinyl chloride was either not reported or was below the PSC. The lateral extent of vinyl chloride in soil appears to be limited, since it was not reported above laboratory detection limits in other soil samples analyzed for VOCs beneath and around adjacent Building 13 (124-0005, -0005M, -0006M, -0008M, and 071M-020) and Building 98 (123-016M, -017M, -0001, -0001M, -0015, -0015M, and 03G036). As discussed in Section 4.2.1, vinyl chloride was also reported in groundwater at concentrations above the PSC in the same general area (around Building 13, north and northwest of this boring), but not in the same boring.

4.1.2 Total Petroleum Hydrocarbons

TPH concentrations were reported in soil above PSCs at AOCs 17, 21, 23, and 25; EBS Parcels 78–79; and ASTs 173A, 173B, and 173C (Table 4-2 and Figure 4-2). Positive interferences associated with U.S. EPA Method 8015-M are described in a Water Board memorandum dated February 16, 1999; these interferences can result in substantially higher reported TPH concentrations than are actually present. This memorandum describes sample preparation methods that can help reduce these biases, such as silica gel cleanup. Further explanation of this procedure is included in Section 5.2.1.2, Transformation Processes. Silica gel cleanup was performed by the laboratory for all RI samples to reduce the potential for positive interferences. Samples analyzed for TPH in previous investigations likely did not undergo silica gel cleanup; therefore, results of these samples may overstate actual TPH concentrations. Nevertheless, the RI uses all TPH data collected during the RI and previous investigations.

At AOC 17, motor oil–range and diesel-range TPH was reported at concentrations above PSCs (ESLs of 500 mg/kg for motor oil and 100 mg/kg for diesel) in EBS samples 185I-001 (motor oil at 920 J mg/kg) and 185I-002 (diesel at 2,540 J mg/kg), respectively, both collected at 9 to 9.5 feet bgs. (The "J" qualifier indicates the value is estimated.) It appears that the TPH remaining in soil is likely weathered and does not provide a source of soluble constituents to groundwater, since TPH was not reported above detection limits in groundwater samples collected at AOC 17. The only fuel-related compound reported in groundwater samples was a trace concentration of toluene (0.29 J µg/L). Weathering of TPH compounds is a process that involves volatilization, oxidization, and biodegradation; these processes can significantly reduce toxicity compared to fresh petroleum mixtures. TPH in soil appears to be limited in extent, and TPH-related compounds do not drive risk.

At AOC 21, diesel-range and gasoline-range TPH was reported at concentrations above PSCs (ESL of 100 mg/kg for both) in sample 23-0052. Maximum concentrations of 5,200 J (diesel-range) and 850 J (gasoline-range) mg/kg were reported in the sample collected at 1 to 2 feet bgs within CAA-B. The lateral and vertical extent of TPH was defined during RI sampling.

At AOC 23, TPH that was reported at concentrations above PSCs in soil samples was mostly in the diesel range and motor oil range, with some concentrations in the gasoline range; locations were distributed across the study area with no apparent pattern. Most notably, motor oil–range TPH was reported in soil sample 126-0001M at 27,000 mg/kg in the upper 0.5 foot bgs beneath Building 399 in EBS Parcel 126. Diesel-range TPH was also reported in this sample at 1,900 mg/kg. Building 399 borders CAA-3A, located immediately east of AOC 23. Reported TPH concentrations from recent RI samples are generally lower than reported historical concentrations. Two of the samples with reported TPH concentrations above PSCs (071-0002 collected at 3 to 3.5 feet bgs and 071M-004M collected at 7.5 to 8.5 feet bgs) were located in CAA-B; soil associated with these samples was likely removed during subsequent fuel pipeline closure activities for CAA-B. No visual signs of hydrocarbon impacts were observed in the pipeline backfill during RI drilling of boring A023SB05, located adjacent to previous boring 071M-004M.

At AOC 25, diesel-range TPH was reported above the PSC (ESL of 100 mg/kg) in soil sample 130M-001M (210 mg/kg) at 8 to 9 feet bgs. Motor oil–range TPH was also reported above the PSC (ESL of 500 mg/kg) in this sample (1,100 mg/kg at 8 to 9 feet bgs) as well as in sample 132-0004M (12,000 mg/kg at 0 to 0.5 foot bgs) and in the 0- to 5-foot sample from boring S03-DGS-DP05 (1,800 mg/kg). Motor oil–range TPH was not reported in the duplicate soil sample from 132-0004M or in the deeper sample from S03-DGS-DP05 at 4.5 to 5 feet bgs. Diesel-range and motor oil–range TPH in soil in the northern portion of AOC 25 is likely associated with the CAA-3C area located to the west. The motor oil–range TPH reported in the surface soil sample in the southern portion appears to be limited in extent. Additionally, the lack of appreciable fuel-related volatile constituents (BTEX) reported in soil and groundwater indicates that the TPH present in subsurface soil has been subject to weathering and is not a significant source of soluble constituents to groundwater or air.

At EBS Parcels 78–79, diesel-range TPH was reported at concentrations of 150, 460, and 390 mg/kg in the surface samples from borings D78SB01, D79SB02, and D79SB03, respectively. These concentrations were above the PSC (ESL of 100 mg/kg), and appear to be randomly distributed across the parcels. In soil samples from borings D79SB02 and D79SB03, TPH is vertically defined with deeper soil samples. Diesel-range TPH in soil appears to be limited in extent. Additionally, the lack of appreciable fuel-related volatile constituents reported in soil and the low concentrations reported in groundwater indicate that the TPH present in the subsurface at AOC 11/EBS Parcels 78–79 has been subject to weathering and is not a significant source of soluble or volatile constituents to groundwater or air.

In the SWMU areas, motor oil–range TPH was reported at concentrations of 570 J, 730 J, and 3,000 mg/kg, above the PSCs (ESL of 500 mg/kg) in the three surface soil samples (0.5 to 1 foot bgs) collected in the vicinity of ASTs 173A, 173B, and 173C during the EBS. TPH was not reported in soil at concentrations above the PSCs at the other SWMUs investigated.

4.1.3 Semivolatile Organic Compounds

Sampling locations for SVOCs including PAHs are presented on Figure 4-3. This figure shows PSC exceedances for B(a)P equivalent concentrations (Alameda Point–specific residential soil level of 620 µg/kg). There were no PSC exceedances for non-PAH SVOCs.

PAHs in soil in Transfer Parcel EDC-5 are addressed under IR Site 35, in response to regulatory agency comments on the draft Work Plan (BEI 2006). AOCs 14, 15, and 16 were identified solely because of the presence of PAHs and were incorporated into the PAH Areas. Because of the large size of Transfer Parcel EDC-5, 18 subareas, referred to as DAs, were designated within the transfer parcel to facilitate risk assessment. Tables 4-3 and 4-4 present the locations where the B(a)P equivalent concentrations in soil exceed the PSC for the study areas and DAs, respectively. Table 4-5 presents the average B(a)P equivalent concentrations by DA.

While some individual samples had B(a)P equivalent concentrations above 620 µg/kg, average concentrations were below 620 µg/kg (Table 4-5). Average concentrations ranged from 6 to 506 µg/kg. B(a)P equivalent concentrations above the PSC of 620 µg/kg were reported in samples collected at 176 different boring locations throughout IR Site 35 (Table 4-3). A total of 216 samples from varying depths at those 176 locations had reported B(a)P equivalent concentrations above the PSC. B(a)P equivalent concentrations were between 0.62 and 1,000 µg/kg in 57 soil borings from the shallow 0- to 2-foot-bgs interval. The B(a)P equivalent concentrations were below 1,000 µg/kg because the TCRA removed the top 2 feet of soil, which is where the higher concentrations were previously located.

B(a)P equivalents above the PSC were reported in samples from 71 soil borings from the intermediate 2- to 4-foot-bgs interval, and from 84 soil borings from depths greater than 4 feet bgs. In general, B(a)P equivalent concentrations increased with depth. The PAH TCRA removed PAHs with B(a)P equivalent concentrations greater than 1,000 µg/kg in the top 2 feet of soil in the West Housing Area.

4.1.4 Pesticides and Polychlorinated Biphenyls

Pesticides were reported in soil at concentrations above PSCs at AOCs 3 and 13, and PCBs were reported in soil at concentrations above PSCs at AOCs 2, 6, 7, 8, and 23 (Table 4-6 and Figure 4-4). Reported pesticide mixing may have occurred at AOC 3 (IT 2001a).

4.1.4.1 PESTICIDES

At AOC 3, heptachlor was reported at a concentration of 18,000 J µg/kg in the soil sample from A03SB02 at a depth of 1.5 to 2 feet bgs; this concentration was above the PSC (residential PRG of 110 µg/kg). Heptachlor was not reported above the detection limit in the deeper soil sample (3.5 to 4 feet bgs) from this boring or in 14 other soil samples from six nearby borings (A03SB01, A03SB03 through A03SB06, and 091-0001RE). However, since there are no sampling locations west of boring A03SB02,

the western extent of heptachlor has not been defined. Because heptachlor was not reported above laboratory detection limits in deeper soil samples, or in those collected to the north, east, and south, it is likely that the extent is limited. The distribution of heptachlor in soil at AOC 3 suggests a localized release, likely to have occurred as a spill during pesticide mixing. The distribution and concentrations of heptachlor were not what would be expected from routine application of this pesticide. Dieldrin was reported in one unvalidated EBS soil sample; however, it was not reported in a validated reanalysis of the sample, and may not have been present.

At AOC 13, dieldrin was reported at a concentration of 50 J µg/kg in sample 103-0023 collected from 0.5 to 1 foot bgs. Samples from borings 103-0002 and 103-0020 had reported concentrations of 4,4'-dichlorodiphenyltrichloroethane (DDT) (2,200 J µg/kg at 0.5 to 1 foot bgs and 2,600 J µg/kg at 7 to 7.5 feet bgs). 4,4'-Dichlorodiphenyldichloroethane (DDD) was also reported in a sample from boring 103-0020 at a concentration of 5,300 J µg/kg. The PSCs (residential soil PRGs) for 4,4'-DDT, 4,4'-DDD, and dieldrin are 1,700, 2,400, and 30 µg/kg, respectively. Reported analytical results of ten samples collected in the vicinity of these four exceedances were below PSCs or below laboratory detection limits. Except for the deeper reported concentrations of 4,4'-DDD and 4,4'-DDT in sample 103-0020, the vertical and lateral extent of pesticide contamination has been defined.

4.1.4.2 POLYCHLORINATED BIPHENYLS

At AOC 2, reported concentrations of Aroclor 1260 (590 J and 670 J µg/kg, at 7 to 8 feet bgs and 2.5 to 4 feet bgs, from A02SB03 and A02SB04, respectively) were above the PSC (residential PRG of 220 µg/kg). Aroclor 1260 was not reported in soil from nearby and adjacent locations (061S-005, 061-0002, 061-0001, A02SB01, and A02SB02), suggesting the extent is limited.

At AOC 6, Aroclor 1260 was reported at a concentration of 430 J µg/kg at 0.5 foot bgs in a soil sample from boring A06SB03. This concentration was above the PSC. This sample was collected from an area where PCB-containing oil sprayed out to the west from an electrical transformer at a substation housed in the structure. Although cleanup was performed and contaminated material removed, no confirmation samples were collected. Borings A065B01, A065B02, and A065B04 through A065B06 had concentrations below PSCs and laterally defined the extent of Aroclor 1260 from the northeast to the southeast. The western extent of Aroclor 1260 is not defined to below PSCs; however, concentrations would be expected to be lower to the west of boring A06SB03 because the outer limit of the spray would decrease away from the electrical substation at AOC 6. RI samples defined the vertical extent of Aroclor 1260 to below the PSC.

At AOC 7, Aroclor 1254 was reported at concentrations above the PSC in soil samples collected at 1.5 to 2 feet bgs from boring BB30 (300 µg/kg) and at 1 to 1.5 feet bgs from boring CC27 (320 µg/kg). Aroclor 1254 was not reported at concentrations above

laboratory detection limits in samples from ten other borings in the area; therefore, the extent of Aroclor 1254 is likely limited.

At AOC 8, Aroclor 1254 was reported at a concentration of 300 µg/kg at 0.5 to 1 foot bgs from sample 098-006. This reported concentration was above the PSC. Seven additional borings in the area did not have reported concentrations of Aroclor 1254 above the detection limit and completely define the extent of PCBs in soil at AOC 8.

At AOC 23, Aroclor 1260 was the only PCB reported at a concentration above the PSC. Aroclor 1260 was reported at 500 J µg/kg in soil sample 123-0022 collected at 0 to 0.5 foot bgs. However, Aroclor 1260 was reported at 5 J µg/kg in duplicate sample 123-0044. Samples from surrounding areas in previous investigations and the RI defined this possible exceedance both laterally and vertically.

4.2 ORGANIC COMPOUNDS IN GROUNDWATER

This subsection discusses analytical results for organic chemicals present in groundwater at concentrations above PSCs for each class of organic compounds investigated at IR Site 35. Individual locations where reported chemical concentrations in groundwater were above PSCs are listed by analyte and study area in Tables 4-8 through 4-12 and are shown on Figures 4-1 through 4-4.

4.2.1 Volatile Organic Compounds

Table 4-8 and Figure 4-1 show the locations where reported concentrations of VOCs in groundwater were above PSCs. VOCs in groundwater were reported above PSCs at AOC 23 and EBS Parcel 205.

There is no PSC for naphthalene in groundwater. Naphthalene was reported above detection limits in groundwater at AOC 1 and at low concentrations at AOCs 18 and 23.

VOCs were not reported above PSCs at AOC 1, although naphthalene was reported at a concentration of 1,200 µg/L in one grab groundwater sample from boring A01SB03, adjacent to OWS 63A. The reported naphthalene concentration in a saturated soil sample from this boring was below the soil PSC. This soil sample concentration likely reflects the naphthalene concentration in groundwater from this boring. While the extent of naphthalene in groundwater at AOC 1 has not been completely defined (in the upgradient direction), it was not reported above detection limits in two other groundwater samples (from borings A01SB01 or A01SB02 located generally downgradient), suggesting that the extent of naphthalene in groundwater is limited.

At AOC 23, benzene, 1,2-DCA, and vinyl chloride were reported at concentrations above PSCs. Benzene was reported in one grab groundwater sample (A23SB03) at 1.1 µg/L, slightly above the PSC (MCL of 1 µg/L). Two concentrations of 1,2-DCA in groundwater were reported above the PSC in the southeastern portion of AOC 23 (samples collected from locations 398-MW1 and A23SB37). These concentrations were likely associated with the VOCs reported in groundwater at Building 398 (located in

CAA-3A within IR Site 21). During the 2001 data gap investigation at the CAAs (TtEMI 2001b), VOCs (1,1-DCA, 1,2-DCA, PCE, and TCE) were reported in groundwater sampled at Building 398 (adjacent to AOC 23). All VOCs were reported at concentrations below their respective PSCs. During the data gap investigation, PCE and TCE were reported at concentrations below their PSCs in a groundwater sample collected from monitoring well 398-MW1, which is located on the west side of Building 398 and within AOC 23. The EBS documented storage of approximately 5,000 gallons of halogenated and nonhalogenated solvents in Building 398 (IT 2001a). A less likely source for the 1,1-DCA found at AOC 23 during the IR Site 35 RI activities is the VOC plume located beneath Building 162 in the southern portion of IR Site 21 and approximately 200 feet south of AOC 23.

Vinyl chloride (up to 2.8 µg/L) was reported above the PSC (MCL of 0.5 µg/L) in four borings: three around Building 13 (A23SB18, A23SB20, and A23SB31), and the fourth in the southern portion of AOC 23, southwest of Building 66 (S21-DGS-DP20). The reported concentration (2.7 µg/L) in the sample collected southwest of Building 66 was also compared to surface water PSCs because of its proximity to Seaplane Lagoon. This reported concentration was slightly above the surface water PSC (2.4 µg/L). It is unlikely that vinyl chloride would migrate approximately 150 feet in groundwater and result in a surface water concentration above the PSC. IR Site 21 is south of this location; however, the interpreted extent of VOCs associated with IR Site 21, as presented in recent Alameda Point basewide groundwater monitoring reports, does not extend north to AOC 23 (Figure 1-5).

At EBS Parcel 205, two VOCs (cis-1,2-DCE and vinyl chloride) were reported in the sample from boring D205SB02 at concentrations (8.3 and 1.8 µg/L, respectively) above PSCs (MCLs of 6 µg/L for cis-1,2-DCE and 0.5 µg/L for vinyl chloride). However, it is unlikely that groundwater would be used as a drinking water source because this area (west of Saratoga Street) is where the Water Board has concurred with the Navy's conclusion that groundwater meets state exemption criteria for use as a drinking water source. Additionally, if sustained pumping were to occur, saltwater intrusion would likely result since EBS Parcel 205 is adjacent to Seaplane Lagoon. VOC concentrations in groundwater were below associated PSCs for surface water.

4.2.2 Total Petroleum Hydrocarbons

TPH was reported in groundwater at AOCs 20, 21, 23, 24, and 25; ASTs 152 and 173 (area of ASTs 173A, 173B, and 173C); EBS Parcel 205; and UST(R)-11 (Table 4-9 and Figure 4-2) at concentrations above the PSC (100 µg/L).

At AOC 20, two TPH constituents were reported in the grab groundwater sample from boring A20SB02 collected at 5 to 10 feet bgs. TPH in the diesel range and JP-5 range was reported at concentrations of 3,200 and 2,600 µg/L, respectively, above the PSCs (ESL of 100 µg/L). TPH results were also compared to surface water criteria because the study area is near Seaplane Lagoon; TPH concentrations were reported above the surface

water PSC (ESL of 640 µg/L). However, the sampling locations are more than 200 feet from Seaplane Lagoon and therefore may not exceed criteria in surface water. TPH was not reported above laboratory detection limits in the other groundwater samples at AOC 20 collected west of A23SB03. CAA-B is immediately south of AOC 20.

At AOC 21, TPH was reported in two groundwater samples (023-0054 and 023-0061) collected during the EBS. Sample 023-0054 had diesel-range and gasoline-range TPH concentrations of 520 J and 190 J µg/L, respectively. Sample 023-0061 had diesel-range TPH at a concentration of 620 J µg/L. All of three of these concentrations were above the PSC (ESL of 100 µg/L for diesel and gasoline). TPH was below laboratory detection limits in RI groundwater samples collected generally downgradient of the exceedances. AOC 21 results were also compared to surface water criteria and were below the surface water PSC (ESL of 640 µg/L). These samples were located next to or within CAA-B.

At AOC 23, diesel-range and motor oil–range TPH was reported in groundwater samples at concentrations above PSCs (ESLs of 100 µg/L for both) across the area. There was no apparent pattern to the distribution of TPH. Concentrations in groundwater above PSCs ranged from 110 J µg/L (diesel-range TPH) to 940 J µg/L (diesel-range TPH). Diesel-range TPH was also present above the surface water PSC in one sample (S21-DGS-DP20) at a concentration of 940 µg/L. Two samples with reported TPH concentrations above PSCs (071M-011 and 071M-013) are within CAA-B.

At AOC 24, diesel-range TPH was reported in the groundwater sample from boring A24SB01 near OWS 118 at a concentration of 110 µg/L, which was slightly above the PSC (ESL of 100 µg/L). However, the laboratory noted that the results do not resemble the diesel standard.

At AOC 25, diesel-range TPH was reported in groundwater samples from wells M03-11 and MBG-3, and boring S03-DGS-DP05 (220, 380, and 760 µg/L, respectively) at concentrations above the PSC (ESL of 100 µg/L). Motor oil–range TPH was reported in a groundwater sample from well MBG-3 at a concentration (270 J µg/L) above the PSC (ESL of 100 µg/L). Diesel-range and motor oil–range TPH in groundwater in the northern portion of AOC 25 is likely associated with the CAA located to the west. The diesel-range and motor–oil range TPH reported in the groundwater in the southern area of AOC 25 may have resulted from positive interferences in the analytical method, if the samples did not undergo silica gel cleanup. The reported concentrations were slightly above PSCs and were not consistently reported in samples from the monitoring wells.

At EBS Parcel 205, diesel-range and JP-5–range TPH was reported at concentrations of 220 and 170 µg/L, respectively, in the sample from boring D205SB02. Reported TPH concentrations were below surface water screening criteria (640 µg/L for diesel or motor oil; 3,700 µg/L for gasoline), but above the groundwater PSC (ESL of 100 µg/L). The boring with these concentrations was located within CAA-B.

At the SWMUs, diesel-range TPH was reported in groundwater from boring S152SB01 near AST 152, at a concentration of 110 µg/L, slightly above the PSC. Diesel-range and

motor oil–range TPH was reported at concentrations of 540 and 840 µg/L, respectively, in groundwater samples from boring S173SB01 near AST 173. All three of these TPH concentrations were above the PSC for either diesel- range or motor oil–range TPH (ESL of 100 µg/L for both). Diesel-range TPH was reported above the PSC at two locations near former UST(R)-11 (123-0041 and 123-0043) at 200 and 240 µg/L, respectively, and motor oil–range TPH was reported at 200 µg/L at 123-0041.

4.2.3 Semivolatile Organic Compounds

Only one SVOC was reported in a grab groundwater sample at a concentration above the PSC (Table 4-10 and Figure 4-3). B(a)P was reported in 1 of 45 groundwater samples from AOC 23 (3 J µg/L from 071M-013) above the PSC (MCL of 0.2 µg/L), and was likely an artifact of sampling (associated with suspended material due to turbidity) rather than representing a dissolved concentration. B(a)P would not be expected to dissolve in groundwater because of its low solubility and tendency to sorb to clay-size particles and organic matter in soil.

4.2.4 Pesticides and Polychlorinated Biphenyls

No groundwater samples at IR Site 35 had reported concentrations of pesticides or PCBs above PSCs. However, low concentrations of PCBs and pesticides reported in two groundwater samples at AOC 23 and AOC 11/EBS Parcels 78–79 drive risk (Section 6). These concentrations were reported in grab groundwater samples collected from soil borings. It is not uncommon for grab groundwater samples to have suspended material (turbidity) entrained and analyzed with the sample, which could result in undissolved concentrations being reported. PCBs were reported in 1 of 12 groundwater samples at AOC 11/EBS Parcels 78–79 and in 1 of 37 groundwater samples at AOC 23. These concentrations are likely artifacts of sampling (associated with suspended material due to turbidity) rather than representing dissolved concentrations of pesticides or PCBs in groundwater. Pesticides and PCBs would not be expected to dissolve in groundwater at these study areas because of their low solubility and a tendency to sorb to organic matter in soil. Thirteen pesticides and the PCB Aroclor 1260 were reported in one groundwater sample at EBS Parcel 79; concentrations were below PSCs for those analytes with established MCLs. Concentrations of Aroclors 1016 and 1260 were below the PSC (MCL of 0.5 µg/L) in one groundwater sample collected at AOC 23.

4.3 METALS IN SOIL AND GROUNDWATER

This subsection discusses metals in soil and groundwater samples collected from study areas at IR Site 35. Section 4.3.1 presents a sitewide evaluation of frequently reported metals in soil. It includes a discussion of aluminum and iron using simple linear correlation analysis and of outlier metals concentrations. Section 4.3.2 presents a discussion of the behavior of iron and manganese in groundwater and discusses evidence and possible causes of subsurface reducing conditions at IR Site 35. Section 4.3.3

presents the analytical results for metals in soil and groundwater samples by study area. Metals discussed had concentrations above background as well as above PSCs.

Metals in soil and groundwater with concentrations above the PSCs are shown on Figure 4-5. Selected metals present at concentrations above background in soil and groundwater across IR Site 35 are illustrated on Figures 4-6 and Figure 4-7, respectively. The distributions of all metals in soil at concentrations above background at individual study areas are shown on Figures 4-8 through 4-18. Tables 4-13 through 4-15 provide supporting documentation for reducing groundwater conditions, a correlation analysis, and metals commonly found in rocks and soils, respectively. Appendix H presents probability plots for 12 frequently detected metals as well as histograms and other visualizations of the data for arsenic, iron, manganese, and vanadium. Area-specific statistics were performed for AOC 11/EBS Parcels 78–79 and AOC 23, which are also presented in Appendix H.

4.3.1 Sitewide Metals in Soil

Review of data for metals in soil at IR Site 35 showed that several metals, including iron and manganese, were reported at concentrations above background. Seven of the 15 study areas (AOCs 5, 10, 11/EBS Parcels 78–79, 12, 23, 24, and 25) with metals data have 9 to 20 metals reported at concentrations above background. Iron and manganese were reported at concentrations above background in eight and six of the study areas, respectively. Iron and manganese are major components of soil and common rocks; metals reported in common rock assemblages, Bay Area soils, and bay sediment samples are shown in Table 4-15. PRC Environmental Management, Inc., evaluated iron and manganese to establish the three groupings (often referred to as the pink, yellow, and blue areas) of background data for Alameda Point because these metals are not likely to be associated with historical Navy activities (PRC 1997).

Figure 4-6 illustrates the sitewide spatial distributions of iron and manganese present in soil at concentrations above background. Arsenic and vanadium are also shown on this figure because they were highly correlated with iron and manganese, as discussed in Section 4.3.1.1. The distribution of these four metals shown on Figure 4-6 does not suggest a release.

The apparently random distribution of most metals and the frequency of high iron concentrations suggest that these metals concentrations may be naturally occurring and their presence not necessarily indicative of releases from Navy activities. The following subsections present results of a correlation analysis and outlier evaluation to help differentiate naturally occurring concentrations from those that may be associated with previous site activities.

4.3.1.1 CORRELATION ANALYSIS

Simple linear correlation is a statistical procedure that describes the tendency for changes in the concentrations of one metal to be reflected in changes in the other metals in the same sample. A demonstration that multiple metals are highly correlated can be used as

evidence that the concentrations are ambient in natural minerals (Schropp and Windom 1988). Correlation analysis was performed with IR Site 35 data to help assess whether metals concentrations at the site may be reflective of naturally occurring assemblages of metals (e.g., common rock-forming minerals and soil components like clay or natural organic materials) rather than of anthropogenic releases. Metals concentrations in soil that are significantly correlated with aluminum and iron are likely to be naturally occurring rather than the result of anthropogenic activity (Schropp and Windom 1988, Zheng et al. 2002). Aluminum and iron were used as the basis for the correlation of trace metals in accordance with DTSC's comments on the draft RI/FS Report. Aluminum and iron oxides are among the most common minerals in soil. Because trace metals (e.g., arsenic) are often found associated with mineral oxides, the naturally occurring metals in natural soils can be strongly correlated to the presence of aluminum and iron (Zheng et al. 2002). Correlation analysis may also be used to help identify samples with metals concentrations that do not follow patterns for naturally occurring metals. However, because soil is a mixture of minerals, the absence of correlation may or may not be indicative of a release.

Results of the correlation analysis are presented in Table 4-14. Pearson's correlation coefficients (r values) above 0.7 (r^2 above 0.5) are considered statistically significant for this evaluation. Aluminum and iron have the highest significant r value of 0.91. The other metals that have significant positive correlation with iron include arsenic (r = 0.70), cobalt (r = 0.76), copper (r = 0.80), manganese (r = 0.79), and vanadium (r = 0.92). The metals with a significant positive correlation with aluminum include cobalt (r = 0.72), copper (r = 0.72), manganese (r = 0.70), and vanadium (r = 0.90).

The data set for the correlation coefficients include all samples with aluminum and iron analyses, except one outlier for cobalt of 259 mg/kg at AOC 2 in the correlation with aluminum (it was included for iron), and one outlier for manganese of 3,780 mg/kg at AOC 5 for the correlations with both iron and aluminum. These samples were identified as outliers because excluding them caused the r value to increase substantially.

Samples that were not analyzed for either aluminum or iron were not included in the correlation analysis, but were reviewed for possible outliers. For example, there were three samples at AOC 12 with arsenic concentrations ranging from 20 to 38 mg/kg that are acknowledged as outliers in the next section and Attachment L.

Note that lead is the metal least correlated with aluminum and iron. This result is expected because there are known sources of lead at IR Site 35 such as LBP (AOCs 10 and 12) and automobile emissions.

4.3.1.2 IDENTIFICATION OF OUTLIERS

Outliers were identified from the correlation analysis, examination of the scatter plots, and data review to help assess whether some concentrations of metals are due to site activities. Scatter plots of the trace metals plotted against aluminum and iron are also presented in Appendix H, Figures H-2 through H-21. High concentrations of arsenic, cobalt, manganese, and zinc that did not co-occur with concentrations of aluminum or

iron above the background data set were considered outliers. High concentrations of arsenic and copper in samples without analysis for iron were also included.

The potential outliers are as follows, and a discussion of each outlier is included in Section 4.3.3 under the study area in which it occurred:

- aluminum: one concentration of 28,500 mg/kg in a sample from 0.25 to 1.25 feet bgs at boring location A23SB19 at AOC 23
- arsenic: one concentration of 12.2 mg/kg in a sample from 6.5 to 7.5 feet bgs at A23SB15 in AOC 23; this sample was collected from the native BSU
- cobalt: two concentrations of 41 and 259 mg/kg in samples from 1.2 to 2.0 feet bgs at A02SB03 and from 1.5 to 2 feet bgs at A02SB02 in AOC 2
- iron: one concentration of 46,300 mg/kg in a sample from 0 to 1 foot bgs at 126-0009 in AOC 23 (identified as an outlier on Figure H-12 in Appendix H)
- manganese: one concentration of 3,780 mg/kg reported in a sample from 6.5 feet bgs at boring A05SB03 in AOC 5; this sample was collected from the native BSU
- zinc: one concentration of 316 mg/kg in a sample from 0.3 to 0.5 foot bgs at boring MBG-3 in AOC 25

Metals data for samples without iron or aluminum analysis were also reviewed to identify the following possible outliers:

- arsenic: three concentrations from 20 to 38 mg/kg in samples from borings Parcel 106 Grid 28, Parcel 106 Grid 30, and Parcel 106 Grid 31 at AOC 12; another potential outlier was a concentration of 14.2 mg/kg from sample 123-0022 (0 to 0.5 foot bgs) at AOC 23
- copper: one concentration of 230 mg/kg reported in a sample from 0 to 0.5 foot bgs at 135-0009M in AOC 25

4.3.2 Metals in Groundwater

This subsection explains that the high concentrations of dissolved iron and manganese in some groundwater samples at IR Site 35 and Alameda Point background samples are indicative of reducing conditions (Kelly et al. 2005). Anthropogenic or natural factors are discussed that might have caused these reducing groundwater conditions, which may or may not be associated with Navy activities.

Iron or manganese are present at concentrations above background at eight (AOCs 2, 4, 5, 11/EBS Parcels 78–79, 17, 23, 24, and 25) study areas (Figure 4-7). Iron and manganese concentrations in groundwater above background are not pervasive across IR Site 35; these concentrations are above background in only 16 percent of all the data.

4.3.2.1 EVIDENCE OF REDUCING CONDITIONS

The presence of dissolved iron at concentrations above 1,000 µg/L is a reliable indicator of a reducing environment (Kelly et al. 2005). Under reducing conditions, iron and

manganese in soil minerals are chemically changed (reduced) to more soluble metal species (e.g., ferric iron to ferrous iron). When groundwater becomes reoxygenated, the dissolved iron and manganese oxidize and precipitate out of groundwater back into the soil. The most stable forms of iron and manganese in minerals in soil are the oxidized forms.

Concentrations of dissolved iron can be used to predict reducing conditions more reliably than either dissolved oxygen (DO) or electrical potential (Eh) measurements (Chapelle et al. 1996, Lindaberg and Runnells 1984). The iron minerals containing ferric iron (Fe^{+3}) are highly insoluble in groundwater over the range of pH levels of 5 to 8 (typical of groundwater at Alameda Point) and the Eh range of -400 to +600 mV (typical of groundwater in general). Iron is present in many forms in soil, including oxides, hydroxides, and carbonates. One of the most soluble forms is iron hydroxide. The maximum concentration of dissolved ferric iron is 0.0003 mg/L at a pH of 5 (Table 4-13). However, the reduced form, ferrous iron (Fe^{+2}), is highly soluble, as also shown in Table 4-13. Manganese in minerals becomes more soluble as the oxidation-reduction (redox) potential decreases below -400 millivolts (Wetzel 1983); manganese in soil minerals is reduced in this environment and dissolves in groundwater.

Under reducing conditions, when iron and manganese in minerals in soil are transformed into more soluble forms, trace minerals (particularly arsenic) adsorbed onto their surface or within their structure are released into groundwater as dissolved species (Zheng 2002). These trace metals will readsorb onto the iron minerals when they precipitate out under oxidizing conditions.

The dissolved metals in the background data set include concentrations of iron and manganese that are, based on the literature, indicative of reducing conditions. The 95th percentile and maximum background concentrations for iron in groundwater are 6,586 and 24,400 µg/L, respectively, indicating that reducing conditions existed in the vicinity of wells sampled to calculate background concentrations.

4.3.2.2 POTENTIAL CAUSES OF REDUCING CONDITIONS

At Alameda Point, sources of organic materials that can be decomposed in soil and groundwater resulting in reducing conditions include the following:

- releases of petroleum hydrocarbons
- leakage from municipal sewage pump stations
- anthropogenic organic material such as PAHs in the Marsh Crust
- natural organic material deposited in submerged coastal settings or estuaries

Historical maps of Alameda Island prior to the emplacement of fill material reveal the presence of past coastal features: estuaries, mudflats, sloughs, shallow marshlands, and tidal zone areas. These coastal areas were subject to deposition of natural and anthropogenic organic materials. Degradation and decomposition of organic materials in these environments would have led to reducing soil and groundwater conditions that

might still be present in the BSU. The coastal features are shown on the 1903 bathymetric map of Alameda Point (Figure 2-10). As shown on the figure, most of the study areas are located on what was formerly an estuary or tidal zone area.

Groundwater samples collected from many of the temporary wells were from an interval screened within the BSU. Visual evidence of reducing conditions were observed in the saturated soil (especially sediment logged as "bay sediments"), where the color was logged as dark gray and greenish gray, rather than yellowish brown (indicative of oxidizing conditions), suggesting a reduced form of iron (boring logs are included in Appendix D). The observed color would be indicative of ferrous iron oxide and hydroxide, and in groundwater dissolved ferrous species would be dominant. The Marsh Crust, a layer of material that underlies the fill material at Alameda Point (as shown on Figure 2-1), is likely present beneath portions of IR Site 35. The Marsh Crust is known to contain anthropogenic and natural PAHs and other organic materials that can be slowly degraded and decomposed by aerobic and anaerobic microorganisms.

4.3.2.3 COMPARISON OF CONCENTRATIONS OF METALS IN GROUNDWATER TO ALAMEDA POINT BACKGROUND

The maximum concentrations of metals reported in groundwater samples collected at IR Site 35 were compared with the background concentrations.

The metals were split into two groups and are presented in Tables 4-16 and 4-17.

- The first group (Table 4-16) are metals without background comparison criteria. These metals are not discussed further.
- The second group (Table 4-17) are those metals with one or more concentrations above the lower of the 95th percentile or the maximum reported concentration in the Alameda Point data set.

It is unknown whether some of the historical groundwater data represent total metals (unfiltered samples) that include particulates or filtered metals that represent dissolved metals concentrations only; this is important because one of the sampling techniques ("grab" groundwater sampling from a boring or a temporary well) typically produces a turbid sample. When this sampling technique is used, the suspended particulates (measured as turbidity of the sample) can result in higher concentrations of metals due to the contribution of metals from the solids. Samples collected during the 2005 RI fieldwork were filtered (0.45-micron pore-diameter filter) prior to laboratory analysis, allowing determination of dissolved metals concentrations with minimal amounts of suspended particulates.

The grab groundwater samples collected during other investigations prior to the 2005 RI may have contained higher amounts of suspended material, since these samples were probably unfiltered. The following groundwater samples listed in Table 4-16 and 4-17 had elevated concentrations of the listed metals and likely represent total (unfiltered) rather than dissolved (filtered) concentrations:

- 185I-008 (collected at AOC 17) – aluminum, chromium, cobalt, copper, iron, lead, nickel, and vanadium
- DHP-S03-03 (collected at AOC 25 from the SWBZ) – cadmium, thallium, and zinc

Like sample 185I-008, sample 185I-006 (collected at AOC 17) had elevated concentrations of aluminum, chromium, cobalt, iron, lead, and vanadium. Three groundwater samples (at borings A17SB01, -02, and -03) were collected during the RI from the vicinity of 185I-008 and 185I-006 and were filtered prior to analysis. Groundwater samples were collected from the FWBZ to the east and west of DHP-S03-03 at AOC 25. The high concentrations of metals in the samples collected during previous investigations at AOC 17 and AOC 25 were not reported in the RI samples. Another possible explanation for the difference in metals concentrations is a shift from anaerobic (reducing) to aerobic (oxidizing) conditions in the 10 years between the sampling events. Concentrations of iron were high (indicating reducing conditions) in the two 1995 samples, but were below background or below the method detection limit in the RI groundwater samples collected in 2005.

4.3.3 Soil and Groundwater Sampling Results for Metals

Metals concentrations in soil (Table 4-7) and groundwater (Table 4-11) at IR Site 35 were compared to PSCs and background concentrations. Metals concentrations in groundwater were also compared to surface water PSCs (Table 4-12). Metals in soil and groundwater at concentrations above background (Tables 4-18 through 4-29, Figures 4-6 through 4-18) are discussed below for each study area. Samples from AOCs 1, 3, 6, and 8 were not analyzed for metals, in accordance with the Work Plan (BEI 2006). Additionally, only the samples from the clean backfill material at AOCs 9 and 13 were analyzed for metals. No metals were reported in soil at concentrations above background or above PSCs at AOCs 7 and 21 (analyzed for lead), and EBS Parcel 205. Only arsenic in soil was above the PSC at AOC 18 but was below background. No metals were reported in groundwater at concentrations above background at AOC 18 and EBS Parcel 205.

4.3.3.1 AOC 2

At AOC 2, soil and groundwater samples were analyzed for metals.

Soil

At AOC 2, no metals were reported in soil at concentrations above PSCs, except arsenic. Arsenic was reported at 8.7 mg/kg, above the PRG (0.062 mg/kg) but below background (9.14 mg/kg). Seven metals (calcium, cobalt, lead, magnesium, nickel, thallium, and zinc) were reported at concentrations above background in 3 or fewer of the 14 to 17 soil samples analyzed for metals (Table 4-18 and Figure 4-8). Concentrations of calcium, lead, magnesium, nickel, and zinc were reported below the maximum concentration in the background data set, and therefore these metals concentrations may not actually exceed background concentrations.

There does not appear to be a pattern to the spatial distribution of metals present at concentrations above background, with the possible exception of cobalt (Figure 4-8). Two results for cobalt were identified as statistical outliers in Section 4.3.1.2. In the sitewide data set, cobalt concentrations show a significant positive correlation with aluminum and iron, except for these samples. The maximum reported cobalt concentration at A02SB02 (259 mg/kg, 1.5 to 2 feet bgs) and the next highest concentration at A02SB03 (41 mg/kg, 1.2 to 2 feet bgs) are below the PSC. Cobalt is the only metal in these samples with a concentration above background. It is not known whether the cobalt concentrations in soil at AOC 2 indicate a release from Navy activities or naturally occurring conditions.

Groundwater

Arsenic was the only metal reported in groundwater at concentrations above the PSC (Table 4-11, Figure 4-5); however, these concentrations were below background. Manganese and selenium were reported in groundwater at concentrations above background (Table 4-18). Manganese was reported at a concentration of 2,950 µg/L in the groundwater sample from A02SB01. Selenium was reported in both the groundwater samples collected at AOC 2 at concentrations of 17.8 and 19.1 µg/L, compared to the background concentration of 2.5 µg/L. Selenium concentrations in groundwater were below the surface water PSC of 71 µg/L.

A potential source of organic material that could result in reducing conditions would be a release from the domestic sewage pumping station located in Building 562, if one had occurred. However, in recent years, this pump station has been refurbished to replace system equipment and to change the direction of flow. Sewage is now pumped to a lift station located to the east towards the Posey Tube rather than to the west and across Oakland Inner Harbor (Delong, pers. com. 2007). Therefore, any potential for sewage leaks has been reduced or eliminated. There are no known releases from the domestic sewage pumping station.

Manganese was reported above background in only one of two groundwater samples and was not present at concentrations above background in soil. The concentrations of iron in groundwater were low (up to 10 times below background). Manganese tends to become soluble before iron under reducing conditions (Wetzel 1983). The low iron concentrations indicate that the reducing conditions are moderate compared to other study areas. Manganese returns to an insoluble form and precipitates from groundwater into soil with a rise in oxygen concentrations.

4.3.3.2 AOC 4

At AOC 4, soil and groundwater samples were analyzed for metals.

Soil

Iron was the only metal reported in soil samples at AOC 4 at a concentration above both the PSC and background. Aluminum, chromium, magnesium, potassium, sodium, and

vanadium were reported above background in the same soil sample (Table 4-19 and Figure 4-9). The soil sample collected from 3 to 3.5 feet bgs during the installation of well MBG-1 had a reported concentration of iron (27,900 mg/kg) above the PSC (residential PRG of 23,000 mg/kg) and the background concentration (22,280 mg/kg). This sample was part of the data set used to develop the background values and represents the maximum iron and chromium concentrations in the background data set (TtEMI 2001c). The two shallower soil samples (0.3 to 0.5 and 2 to 2.5 feet bgs) and the deeper soil sample (5 to 5.5 feet bgs) collected from the same location did not have concentrations of metals above background. Since the concentrations at AOC 4 above background (95th percentiles) were in a sample that is part of the background data set, they are considered naturally occurring.

Groundwater

Mercury (which does not have a background concentration) and zinc were reported in one sample at concentrations above surface water PSCs (Table 4-12). Mercury was reported at 0.14 J µg/L, which is above the lowest surface water PSC (CTR CCC of 0.025 µg/L). It is considered unlikely that mercury at 0.14 µg/L would migrate 400 feet in groundwater and result in a surface water concentration above the PSC at Oakland Inner Harbor. Zinc was reported above PSCs in one of three samples collected from well MBG-1. Zinc was reported at 113 µg/L, which is above the lowest surface water PSC (NRWQC and CTR CCC of 81 µg/L), and also above the background concentration of 36.39 µg/L; however, zinc was not consistently reported above groundwater PSCs. In another sample from this well, zinc was reported at 12 J µg/L, which is below background. Zinc was below the estimated laboratory detection limit of 2.8 µg/L in a third sample.

Barium, iron, manganese, and zinc were reported in one of three groundwater samples from well MBG-1 at concentrations above background. Iron, manganese, and zinc were slightly above background in the sample collected from MBG-1 in May 1998 (Table 4-19). Samples collected from this well in August 1998 did not have any metals present at concentrations above background. The iron and manganese concentrations in groundwater are indicative of low-level reducing conditions.

No site-related source of organic material that could have caused the reducing conditions was identified in soil or groundwater. One potential non-site-related source might be the natural conditions associated with a sediment layer (BSU) encountered at 9 feet bgs.

4.3.3.3 AOC 5

At AOC 5, soil and groundwater samples were analyzed for metals.

Soil

At AOC 5, 14 metals (barium, calcium, chromium, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, sodium, vanadium, and zinc) were reported at concentrations above background in 4 or fewer of 12 soil samples analyzed for metals

(Table 4-20 and Figure 4-10). Only iron and manganese had reported concentrations in soil above PSCs (Table 4-11).

Reported iron concentrations (38,200 J and 26,100 mg/kg) in soil samples collected at 1 to 2 feet and 6.5 to 8 feet bgs, respectively, from borings A05SB02 and A05SB03 were above the PSC (residential PRG of 23,000 mg/kg) and the background concentration (22,280 mg/kg). Manganese (3,780 mg/kg) was also reported at a concentration above the PSC (residential PRG of 1,800 mg/kg) and the background concentration (383.0 mg/kg) in the soil sample collected at 6.5 to 8 feet bgs from boring A05SB03.

The majority of metals present at concentrations above background were reported in 2 of 12 samples: A05SB02 collected from 1 to 2 feet and A05SB03 collected from 6.5 to 8 feet bgs. Section 4.3.1 shows that trace metals are co-located with high levels of aluminum and iron throughout IR Site 35, indicating that these concentrations are naturally occurring. The presence of common nutrients (magnesium, potassium and sodium) at concentrations above background in the same samples provides further indication that the metals present at concentrations above background do not represent releases.

The manganese concentration of 3,780 mg/kg was identified as an outlier in Section 4.3.1.2, based on the correlation analysis between manganese and iron and aluminum. The highest concentrations of iron and manganese at AOC 5 were from the two samples consisting of predominantly fine-grained sediments (silt and clay). These concentrations were likely due to a higher percentage of clay minerals and iron and aluminum oxides in the clay-size fractions. Several other metals were also present in these two samples at concentrations above background (Figure 4-10). The outlier sample from boring A05SB03 was collected from the native BSU.

Groundwater

Arsenic, iron, manganese, and selenium were reported above background in groundwater samples collected at AOC 5 (Table 4-20). Arsenic was the only metal reported above its PSC (MCL of 10 µg/L) at 31.2 µg/L and 29.1 µg/L (duplicate) in groundwater samples from boring A05SB01. Selenium was reported in the three samples collected at AOC 5 at concentrations from 13.2 to 21.6 µg/L; all concentrations were below the MCL of 50 µg/L. Iron was reported in a primary and a duplicate sample from A05SB01 at concentrations of 23,000 and 28,500 µg/L and at a concentration of 60.3 µg/L in a groundwater sample from A05SB02. Manganese was reported in groundwater in primary and duplicate samples from A05SB01 at concentrations of 1,910 and 2,470 µg/L and from A05SB02 at concentrations of 956 and 1,910 µg/L.

The presence of iron and manganese at these concentrations is indicative of reducing conditions. Arsenic was also reported at concentrations above background in these same samples and is likely associated with these reducing conditions. Ambient arsenic is often associated with iron in minerals. When iron becomes soluble through the reduction

process, trace metals such as arsenic can also be released from soil into groundwater (Zheng et al. 2002).

Iron and manganese were above background in one of two samples (Figure 4-10). When oxygen levels rise as groundwater reaches areas with DO, iron and manganese are oxidized and precipitate out of solution along with the arsenic back into soil. Sources for reducing conditions may be related to the natural geochemical environment (organic material in the BSU encountered in the two borings where groundwater samples were collected). Native bay sediment was encountered at approximately 5 and 7 feet bgs in the two borings and within the interval where groundwater samples were collected. Potential anthropogenic sources include the sewage lift station (Lift Station #3) located near former Building 493, which may have leaked in the past. However, lift stations do not tend to leak because the inlet and outlets are gravity-fed and not under pressure. The City of Alameda has repaired lines from this lift station in the past (Delong, pers. com. 2007) and therefore, even if the lift station pipelines did have historical leaks, these leaks would presumably have been corrected.

4.3.3.4 AOC 7

At AOC 7, soil samples were analyzed for metals. No metals were reported in soil at concentrations above background or PSCs. Groundwater samples were not collected and analyzed for metals, in accordance with the Work Plan (BEI 2006).

4.3.3.5 AOC 10

At AOC 10, soil samples were analyzed for metals. Groundwater samples were not collected and analyzed for metals, in accordance with the Work Plan (BEI 2006).

Soil

At AOC 10, eleven metals (barium, cadmium, chromium, copper, lead, mercury, nickel, selenium, thallium, vanadium, and zinc) were reported at concentrations above background in one or more soil samples (Table 4-21, Figure 4-11).

The metals with concentrations above background fall into two groups based on frequency of detection. Metals in the first group, including barium, cadmium, lead, nickel, and zinc, were above background in 30 percent or more of the 43 samples analyzed for these metals, but were below PSCs. Samples at AOC 10 were not analyzed for iron or manganese, metals considered naturally occurring at IR Site 35. However, the concentrations for these metals, except lead, are less than or approximately equal to the maximum concentration of the respective metals in the background data set, suggesting that these concentrations might be consistent with background concentrations. These metals concentrations are also below PSCs.

Metals in the second group, including chromium, copper, mercury, selenium, thallium, and vanadium, were rarely (in 1 or 2 of 43 samples) above background. Copper was reported above background in 2 of the 43 soil samples; one of these samples (Parcel 98

Grid 38) was reported at 81 J mg/kg, above the maximum background concentration of 49.1 mg/kg. Metals in this group are all below PSCs.

An NTCRA was performed at AOC 10 to address LBP in soil. Lead was the only metal reported in soil at concentrations above PSCs at AOC 10. Reported concentrations of lead (likely a result of LBP previously used at the AOC) in borings SS-36B-S25, -SE50, -SW25, -W50-S, and -W75 were above the PSC (NTCRA objective of 199 mg/kg) in samples collected from 0 to 0.5 foot bgs; these concentrations ranged up to a maximum concentration of 819 mg/kg. Lead was reported above the PSC in one sample collected at 0.5 to 1 foot bgs in boring SS-36B-S25. Results from previous investigations defined the vertical extent of lead in soil. Results from the RI borings defined the lateral extent of lead in soil. Lead was not reported at concentrations above the PSC in RI soil samples from borings advanced to the south of the historical samples with high lead concentrations. Lead in soil at AOC 10 is considered in the FS portion of this RI/FS Report.

4.3.3.6 AOC 11/EBS PARCELS 78–79

At AOC 11/EBS Parcels 78–79, soil and groundwater samples were analyzed for metals.

Soil

At AOC 11/EBS Parcels 78–79, 15 metals (aluminum, barium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, vanadium, and zinc) were reported at concentrations above background (Table 4-22 and Figure 4-12). Iron and vanadium were also above PSCs.

The majority of concentrations above background are found in 5 (A11SB02, A11SB03, D78SB01, D78SB02, and D78SB03) of 46 samples, all of which also included iron and manganese. As discussed in Section 4.3.1, a strong positive correlation with iron suggests that the concentrations of metals are naturally occurring. Aluminum, chromium, cobalt, copper, nickel, and vanadium were reported at concentrations above their background concentrations only in combination with iron concentrations above its background concentration. The presence of concentrations of the common nutrients (calcium, magnesium, and potassium) at concentrations above background indicates that these metals concentrations are likely naturally occurring.

Lead and zinc concentrations above background were most commonly not associated with elevated iron concentrations. No concentrations of lead and two of nine concentrations of zinc above background were associated with iron concentrations above background. The samples with these concentrations of lead and zinc above background were collected near the former communications antenna structure, where an NTCRA was performed to address LBP in soil.

Iron and vanadium were the only metals reported in soil samples at concentrations above PSCs and above background at AOC11/EBS Parcels 78–79. At AOC 11, iron was reported at concentrations of 23,100 and 29,900 mg/kg in soil samples collected at 1 to 2 feet bgs in borings A11SB02 and A11SB03, respectively. These concentrations were

above the PSC and above the background concentration of 22,280 mg/kg. At EBS Parcels 78–79, iron was also reported at concentrations from 23,900 to 49,500 mg/kg (above both the PSC and background concentrations) at 0 to 5 feet bgs in borings D78SB01, D78SB02, and D78SB03. Vanadium was reported at a concentration of 110 mg/kg in the 1- to 2-foot-bgs soil sample from boring D78SB03. This concentration was above the PSC (residential PRG of 78 mg/kg) and above the background concentration of 47.34 mg/kg.

Additionally, the post-removal backfill sample 88-001 had a reported concentration of cadmium at 2 mg/kg, above background concentration of 1.72 mg/kg. This fill soil was used to backfill the excavation created as part of the NTCRA conducted at EBS Parcels 78–79.

Unlike the majority of other metals above background in soil at AOC 11/EBS Parcel 78–79, metals in the NTCRA area were not co-located with iron. The other metals above background in soil at AOC 11/EBS Parcel 78–79 are evenly distributed, and there are no unusually high concentrations suggesting a release. Also, the majority of concentrations co-occur with iron and manganese, and there is no apparent pattern indicative of a release.

Groundwater

Five metals (arsenic, chromium, iron, manganese, and selenium) were reported in 11 groundwater samples at concentrations above background at AOC 11/EBS Parcels 78–79 (Table 4-22). Statistical analysis was performed on selected metals in groundwater at AOC 11/EBS Parcel 78–79 (Appendix H). The analysis indicated that arsenic, iron, and manganese concentrations in groundwater were not statistically different from those in the background data set, suggesting that there has not been a release of metals. Concentrations of chromium and selenium above background were present in a limited number of samples.

Arsenic was reported at a concentration of 21.3 µg/L in the groundwater sample collected from boring D79SB04, above the PSC (federal MCL of 10 µg/L) and slightly above the background concentration (20.72 µg/L).

4.3.3.7 AOC 12

At AOC 12, soil and sediment samples were analyzed for metals. Groundwater samples were not collected and analyzed for metals at AOC 12, in accordance with the Work Plan (BEI 2006).

Soil

At AOC 12, 17 metals (aluminum, arsenic, barium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, thallium, vanadium, and zinc) were reported at concentrations above background (Table 4-23 and Figure 4-13). Only two soil samples were analyzed for aluminum, calcium, iron, magnesium, and manganese: sample 107-0001 from 1 to 2 feet bgs and its duplicate, sample 107-0002. Concentrations of these five metals were above background in both of these samples.

Additionally, these samples had the only reported concentrations of cobalt, thallium, and vanadium above background. Of the 17 metals, arsenic, iron, lead, thallium, and vanadium were also present above PSCs.

For samples analyzed for metals other than lead alone, the metals above background tended to fall into two groups, with some similarities to the distribution pattern found at the other lead study area, AOC 10. Cadmium, lead, and zinc were the metals reported most frequently (in 19 of 76, 80 of 184, and 21 of 76 samples, respectively) at concentrations above background, but below PSCs. Other metals were reported less frequently in 10 or less samples from 75 or 76 samples (except for iron and aluminum, for which only 2 samples were analyzed).

Of the two samples analyzed for aluminum and iron, one had reported concentrations of aluminum and iron and nine other metals above background in either the primary sample or the duplicate collected at 1 foot bgs (107-0001). Iron and vanadium were also reported at concentrations above the PSCs. Iron was reported at 35,000 and 34,300 mg/kg in primary and duplicate samples from boring 107-0001 at 1 to 2 feet bgs, above the PSC (residential PRG of 23,000 mg/kg) and the background concentration of 22,280 mg/kg. Vanadium was reported at 113 and 116 mg/kg in the primary and duplicate samples collected at 1 to 2 feet bgs from boring 107-0001. These reported concentrations are above the PSC (residential PRG of 78 mg/kg) and the background concentration of 47.34 mg/kg.

Arsenic was reported at concentrations from 20 to 38 mg/kg in three soil samples collected at 2 feet bgs from borings Parcel 106 Grid 28, Parcel 106 Grid 30, and Parcel 106 Grid 31. These concentrations were above the PSC (residential PRG of 0.062 mg/kg) and the background concentration of 9.14 mg/kg. It is unknown whether the four arsenic concentrations reported above background are naturally occurring or associated with previous activities at AOC 12 such as historical pesticide use along the railroad tracks. Two of the four arsenic concentrations reported above background were collected from borings near the railroad tracks; arsenic is often associated with the pesticides commonly used along railroad tracks. These concentrations were identified as outliers in Section 4.3.1.2 and are addressed in the FS portion of this RI/FS Report.

Lead (likely sourced from LBP previously used at the AOC) was reported at 38 to 666 mg/kg from borings SS-33-NW50, -33-S50, -33-SE50, -33-SW50, -61-N50, -61-NE50, -61-NW50, -61-W75, -105-A1, and -105-C1 at 0 to 1.5 feet bgs outside the areas subject to the NTCRA for LBP. These concentrations were above the NTCRA removal action objective of 199 mg/kg and also above the background concentration of 37.66 mg/kg. Lead was not reported at concentrations above the PSC in soil samples collected from the surrounding RI borings, thereby defining the lateral extent of lead. The vertical extent (approximately 1.5 feet bgs) was defined during previous investigations.

The correlation analysis summarized in Section 4.3.1 indicates that iron, manganese, and vanadium are significantly correlated in soil across IR Site 35. Thallium and vanadium concentrations above PSCs at AOC 12 were reported in samples that also contain high

iron and manganese concentrations, indicating that these metals concentrations are naturally occurring rather than a result of Navy activities at AOC 12. Lead in soil at AOC 12 is considered in the FS portion of this RI/FS Report.

Manhole Sediment

Two sediment samples (3G and 6G-2) were collected from two manholes and were analyzed for lead to assess whether lead-containing soil washed down a storm sewer during the NTCRA. These manholes are located along storm drains that receive runoff from AOC 12. Sample 6G-2 was collected along the southern edge of AOC 12 (Figure 4-13), and sample 3G was collected farther down the line adjacent to the west edge of AOC 23 (Figure 4-16). Lead was reported at 763 and 99.7 mg/kg in sediment samples 3G and 6G-2, respectively. The reported concentration of 763 mg/kg in sample 3G was above the lead removal action objective of 199 mg/kg. The sample was collected adjacent to the western edge of AOC 23. Lead in sediment at AOC 12 is considered in the FS portion of this RI/FS Report; arsenic is considered along with lead.

4.3.3.8 AOC 17

At AOC 17, soil and groundwater samples were analyzed for metals.

Soil

At AOC 17, seven metals (aluminum, iron, magnesium, manganese, potassium, sodium and thallium) were reported at concentrations above background in 1 or 2 of 18 soil samples analyzed for metals (Table 4-24 and Figure 4-14).

Two samples from B12-10 had five of the nine metals with concentrations above background. The presence of common nutrients magnesium, potassium, and sodium, along with aluminum and manganese, indicates that these concentrations are likely naturally occurring. One sample collected at 1 to 2 feet bgs from A17SB02 had aluminum, iron, and manganese above background. Iron in this sample was the only metal reported in soil at a concentration (27,000 mg/kg) above its PSC (PRG of 23,000 mg/kg). A single thallium concentration (0.53 mg/kg) in a sample collected at 9 feet bgs was reported slightly above the background concentration (0.50 mg/kg). As discussed in Section 4.3.1, the co-occurrence of these metals and the common nutrients suggests that the concentrations are naturally occurring and do not represent a release from Navy activities.

Groundwater

Seven metals (aluminum, chromium, copper, iron, lead, vanadium, and zinc) were reported in groundwater at concentrations above background (Table 4-24). The only samples with metals above background were the two collected in 1995 during the EBS. The three discrete groundwater samples and one duplicate sample collected at AOC 17 during the 2005 RI did not have concentrations of metals above background.

The maximum concentrations of chromium, iron, and vanadium in groundwater at IR Site 35 were reported in the EBS sample 185I-008 collected at AOC 17. Chromium, iron, and vanadium were reported in both EBS samples at concentrations above background. Zinc was reported at a concentration of 115 µg/L above background in one sample from AOC 17 (185I-008).

Arsenic, aluminum, and chromium in two samples (185I-006 and -008), and nickel in one sample (185I-008) were reported above their PSCs. Reported arsenic concentrations in both EBS samples were above the PSC of 10 µg/L but below the background concentration of 20.72 µg/L. Reported aluminum concentrations (14,100 and 45,800 µg/L) and total chromium concentrations (51.9 and 173 µg/L) were above both the PSCs (1,000 and 50 µg/L, respectively) and background concentrations (1,070 and 12.45 µg/L, respectively). The reported nickel concentration (208 µg/L) was above the PSC of 100 µg/L; there is no Alameda Point background concentration for nickel.

As discussed in Section 4.3.2.3, the seven metals reported above background, as well as arsenic and nickel (reported above their PSCs), in the groundwater samples collected in 1995 are likely to represent total (unfiltered) metals rather than dissolved (filtered) concentrations because the samples were likely to have been unfiltered. The concentrations of these and other metals were substantially lower or not reported above detection limits in the three groundwater samples and one duplicate sample collected during the RI. Another possibility to account for the difference in metals concentrations is a change in geochemical conditions such as a shift from reducing (anaerobic) conditions (when samples were collected in 1995) to aerobic conditions (when the RI samples were collected in 2005). Concentrations of iron were high, which would indicate reducing conditions, in the two 1995 samples but were below background or nondetectable in the RI groundwater samples collected in 2005.

4.3.3.9 AOC 18

At AOC 18, no metals, except arsenic in soil, were reported in soil or groundwater samples at concentrations above either PSCs or background. Arsenic was reported at concentrations from 1.2 to 2.3 mg/kg in soil. These concentrations are above the PSC (residential PRG of 0.062 mg/kg) but below the background concentration of 9.14 mg/kg.

4.3.3.10 AOC 20

At AOC 20, soil and groundwater samples were analyzed for metals.

Soil

Only thallium was reported at a concentration above background in 1 of 11 soil samples analyzed for metals (Table 4-25 and Figure 4-15). Thallium was reported at 1.8 mg/kg, above the background concentration of 0.50 mg/kg and below the PSC of 5.2 mg/kg, in a sample collected at 023-0020 from 1.5 to 2 feet bgs. Two other samples (023-0020M and 023-0035M) were collected from this same location and depth interval, and three soil

samples were collected from nearby borings A20SB01 and A20SB02 during the 2005 RI sampling along with samples 023-0019M and duplicate 023-0034M during the 1995 EBS sampling. Thallium was not reported in any of these RI soil samples, and therefore thallium concentrations are not considered indicative of a Navy release.

Arsenic was the only metal reported in soil at AOC 20 at concentrations above the PSC (California residential PRG of 0.062 mg/kg) at concentrations of 1.3 to 2.3 mg/kg; however, concentrations were below the background concentration of 9.14 mg/kg.

Groundwater

Arsenic and vanadium were the only metals reported in groundwater at concentrations above background (Table 4-25), and arsenic was the only metal reported above its PSC. Arsenic was reported at 11 and 26.9 µg/L in the two groundwater samples collected at AOC 20 from borings A20SB01 and A20SB02, respectively, above the groundwater PSC (MCL of 10 µg/L) and the surface water PSC (NRWQC HHCO of 0.14 µg/L). Only the sample from A20SB02 had an arsenic concentration above the background concentration of 20.72 µg/L; however, this concentration is below the maximum concentration in the background data set of 40.7 µg/L. This sample was one of six collected at IR Site 35 that had arsenic concentrations above background. Vanadium was reported in the groundwater sample collected at A20SB02 at a concentration of 29.1 µg/L, slightly above the background concentration of 26.27 µg/L and below the maximum concentration in the background data set of 50.8 µg/L. Since arsenic and vanadium concentrations were only slightly above background, it is considered unlikely that these results indicate a release.

4.3.3.11 AOC 23

At AOC 23, soil and groundwater samples were analyzed for metals.

Soil

Twenty metals (aluminum, antimony, arsenic, barium, beryllium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, sodium, thallium, vanadium, and zinc) were reported at concentrations above background (Table 4-26 and Figure 4-16). Statistical analyses for selected metals in soil at AOC 23 (Appendix H) indicate that the aluminum, arsenic, cadmium, chromium, manganese, and vanadium concentrations were not statistically different from background. Four metals (arsenic, iron, thallium, and vanadium) were reported at concentrations above PSCs in soil samples collected at AOC 23.

The majority of data points with metals at concentrations above background were represented by 22 samples at the following locations: A23SB02, A23SB03, A23SB04, A23SB09, A23SB10, A23SB12, A23SB14, A23SB16, A23SB18, A23SB19, A23SB22, A23SB27, A23SB29, A23SB31, A23SB33, A23SB35, B06-09, 126-0009, and 126-0010. These samples also had concentrations of aluminum, iron, and several other metals also above background. As discussed in Section 4.3.1, the significant positive correlation of aluminum and iron with arsenic, cobalt, copper, manganese, and vanadium indicates that

these concentrations are likely naturally occurring. Other trace metals and common nutrients (e.g., magnesium, potassium, and sodium) are also in many of these samples. This suggests that the major and trace metals in these samples represent naturally occurring concentrations.

There are a number of samples with trace metals at concentrations above background that cannot be attributed to naturally occurring conditions based on correlation with aluminum or iron. However, there is no pattern in any particular metals distribution that indicates a specific release (Figure 4-16).

For the metals with concentrations above background, in accordance with the statistics in Appendix H, only iron and thallium had concentrations above the PSC as follows.

- Twenty samples had concentrations of iron above the PSC of 23,000 mg/kg. The range of iron concentrations at AOC 23 (6,380 J to 49,000 mg/kg) is within the range for other areas of IR Site 35 (5,990 to 49,500 mg/kg).
- One thallium concentration (6.4 J mg/kg) reported in soil was slightly above the PSC (PRG of 5.2 mg/kg); thallium was reported in only 16 of 160 samples analyzed for the metal at AOC 23. The samples with thallium were all historical samples from 1995; thallium was not reported in any of the RI soil samples.

Three possible outliers identified in Section 4.3.1.2 are discussed below.

- Aluminum at 28,500 mg/kg in a sample collected at A23SB19 from 0.25 to 1.25 feet bgs was identified as an outlier based on the scatter plot of aluminum and iron (Appendix H). This sample also had calcium, copper, potassium, sodium, and vanadium at concentrations above background. The correlation analysis indicated that copper and vanadium were well correlated with aluminum. This sample appears to be an outlier due to the low iron concentration rather than an elevated concentration of aluminum.
- Arsenic at 12.2 mg/kg in a sample collected at A23SB15 from 6.5 to 7.5 feet is not correlated with iron above background. The two shallower soil samples at this location did not have arsenic or any other metals reported above background. It should be noted that this sample was collected from the native BSU. A potential outlier also includes a concentration of 14.2 mg/kg from sample 123-0022 (0 to 0.5 foot bgs) at AOC 23. There are no data for iron in this sample.
- Iron at 46,300 mg/kg in a sample collected at 126-0009 from 0 to 1 foot bgs appears to be an outlier on Figure H-7 of Appendix H. This concentration of iron is unlikely to be a result of Navy activities because arsenic, barium, cobalt, copper, manganese, vanadium, and zinc are also above background concentrations in this sample. Iron is significantly correlated with arsenic, cobalt, copper, manganese, and vanadium throughout soil at IR Site 35.

The concentrations of these outliers and other metals are evenly distributed across AOC 23, and there is no apparent pattern indicative of a specific area of release.

Groundwater

Eight metals (arsenic, beryllium, chromium, iron, manganese, selenium, vanadium, and zinc) were reported in groundwater at concentrations above background at AOC 23 (Table 4-26). The majority of these concentrations were reported in only 1 of 42 or 46 samples, except for chromium (in 3 samples) and selenium (in 8 samples). Five of the eight metals reported above background were from the same sample (A23SB04).

The groundwater sample from A23SB04 had beryllium, chromium, iron, manganese, and vanadium reported above background. The presence of high concentrations of iron and manganese is indicative of reducing conditions as described in Section 4.3.2. The cause of the reducing conditions in groundwater is not known; however, it could be related to the low concentrations of TPH as diesel and BTEX reported in the groundwater at this location. It is also possible that reducing conditions are related to the presence of BSU sediment in the interval from which groundwater was collected. As discussed in Section 4.3.2.2, the color of the BSU was logged as dark gray, suggesting a reduced form of iron.

Selenium in groundwater, reported above background in 8 of 46 samples, did not exhibit an obvious pattern and does not appear to be related to a release at the study area. Zinc was reported only once in 46 samples, at a concentration (54.2 µg/L) above background (36.39 µg/L) in a sample from 123-0041 near former UST(R)-11. The samples collected from nearby locations during the RI did not have zinc reported at concentrations above background.

Cadmium was reported in grab groundwater samples from three locations (123-0040, 123-0041, and 123-0043) near former UST(R)-11, at concentrations from 0.15 µg/L. These were the only groundwater samples with reported cadmium concentrations at AOC 23. The RI samples collected nearby did not have reported concentrations of cadmium. There is no background concentration calculated for cadmium and the reported concentrations do not exceed its MCL (5 µg/L); however, it is discussed because it contributes to risk in groundwater (Section 6).

Arsenic and thallium are the only two metals reported in groundwater with concentrations above PSCs (Table 4-11). Arsenic concentrations were reported above the PSC (10 µg/L) in eight samples at concentrations from 10.5 to 22.6 µg/L. Only one concentration (22.6 µg/L) from boring A23SB09 was above the background concentration of 20.72 µg/L but was below the maximum arsenic concentration of 40.7 µg/L in the background data set. Thallium was reported in three samples at concentrations above the PSC; none were reported above background (5.2 µg/L). Statistical analysis performed for select metals at AOC 23 (Appendix H) indicated that arsenic and thallium concentrations at AOC 23 were not statistically different from background.

4.3.3.12 AOC 24

At AOC 24, soil and groundwater samples were analyzed for metals.

Soil

In the two borings at AOC 24 (197-0002M and A24SB01), 15 metals (aluminum, arsenic, barium, chromium, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, sodium, vanadium, and zinc) were reported in soil at concentrations above background in boring A24SB01 (Table 4-27 and Figure 4-17). The sample collected from A24SB01 at 3 to 4 feet bgs had only aluminum, iron, and manganese at concentrations above background. However, the deeper sample (5 to 6 feet bgs) in the native BSU had aluminum, arsenic, barium, chromium, copper, iron, lead, magnesium, mercury, nickel, potassium, sodium, vanadium, and zinc at concentrations above background. The type of sample material (i.e., native clay), and the number of metals (including iron, aluminum, and most common nutrients) with concentrations above background support the conclusion that metals present in this sample are naturally occurring.

Arsenic and iron were the only two metals reported at concentrations above PSCs at AOC 24. Arsenic was reported at 11.2 mg/kg, above the PSC (California residential PRG of 0.062 mg/kg) and above the background concentration (9.14 mg/kg) in the 5- to 6-foot-bgs sample from boring A24SB01 but below the maximum background concentration of 15.6 mg/kg. Iron was reported at concentrations above the PSC (residential PRG of 23,000 mg/kg) and background concentration (22,280 mg/kg) in two samples from this same boring (34,200 J and 34,500 J mg/kg, from depths of 3 to 4 and 5 to 6 feet bgs, respectively).

Groundwater

No metals were reported in groundwater at concentrations above PSCs (Table 4-27). Iron and manganese are the only two metals reported in the one grab groundwater sample collected at AOC 24 at concentrations above background. Concentrations of iron and manganese were 36,700 and 3,060 µg/L, respectively. As discussed in Section 4.3.2, high concentrations of iron in groundwater are indicative of reducing subsurface conditions. The reducing conditions in groundwater may be caused by either natural or anthropogenic organic material in the subsurface. AOC 24 was investigated because of reports of an OWS. However, there was no evidence of an OWS, and only low levels of TPH in soil and groundwater (diesel at 110 µg/L) were reported. The source of organic material in soil or groundwater that could have resulted in reducing subsurface conditions has not been identified; however, reducing conditions could be related to the presence of BSU sediment in the interval from which groundwater was collected and the likely presence of the Marsh Crust beneath the study area. As discussed in Section 4.3.2.2, the color of the BSU was logged as dark gray, suggesting a reduced form of iron.

4.3.3.13 AOC 25

At AOC 25, soil and groundwater samples were analyzed for metals.

Soil

At AOC 25, 17 metals (aluminum, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, magnesium, mercury, nickel, potassium, sodium, thallium, vanadium, and zinc) were reported in soil at concentrations above background (Table 4-28 and Figure 4-18).

The majority of concentrations above background were located in four borings (130M-001M, A25SB01, A25SB02, and A25SB03) in the northern portion of AOC 25. Based on the co-occurrence of elevated iron concentrations with the concentrations of trace metals and common nutrients in three of these samples, it is likely that these and possibly other trace metals concentrations are naturally occurring (Section 4.3.1).

Zinc at 316 mg/kg in a sample collected from 0.3 to 0.5 foot bgs at boring MBG-3 was identified as an outlier in Section 4.3.1.2. There are seven sampling locations in the surface in the vicinity of this boring, and only one sample had a concentration of zinc above background. There is no indication of a widespread release of zinc.

Arsenic, iron, and lead were the only metals reported at concentrations above PSCs. Arsenic was reported at 9.6 mg/kg, above the PSC (PRG of 0.062 mg/kg) and slightly above background (9.14 mg/kg), in one sample collected at 8 to 9 feet bgs from boring 130M-001M. There are no data for iron or aluminum in this sample, but the three samples with iron data collected in this area showed elevated iron.

Iron was reported above the PSC (PRG of 23,000 mg/kg) in three samples from two locations: one sample from boring A25SB01 (35,900 mg/kg) at a depth of 1 to 1.5 feet bgs; and two samples from boring A25SB03 at depths from 3.5 to 4 feet bgs (25,100 mg/kg) and 6.5 to 7 feet bgs (27,600 mg/kg). The three reported concentrations were above the PSC and also above the background concentration (22,280 mg/kg).

Lead was reported slightly above the PSC (PRG of 150 mg/kg) in 1 sample (157 mg/kg) of 30 from boring A25SB03 collected at 3.5 to 4 feet bgs. This reported concentration was also above the background concentration (37.66 mg/kg).

Scattered samples with a few trace metals present at concentrations above background cannot be correlated with iron or aluminum. However, there is no pattern that indicates a specific release of metals at AOC 25.

Copper was reported at a concentration of 230 mg/kg above background (39.14 mg/kg) but not above the PSC (3,100 mg/kg) in a sample collected from 0 to 0.5 foot bgs at 135-0009M. This sample was considered an outlier during the review of the metals data without iron or aluminum analysis.

Groundwater

Eight metals (arsenic, chromium, iron, manganese, selenium, thallium, vanadium, and zinc) were reported above background in groundwater samples at AOC 25 (Table 4-28).

Iron, the metal most frequently reported above background concentrations, was reported in 6 of 15 samples in three locations A25SB01, A25SB02, and MBG-3 (Figure 4-7) (Section 4.3.1). Manganese was also reported above background in the sample from A25SB02. Elevated iron and manganese concentrations are indicative of reducing conditions in three of eight locations. Other trace metals such as arsenic and vanadium that are associated with iron can also be released when iron becomes soluble (Section 4.3.1). For example, the 1 of 15 samples with vanadium reported above background was collected from A25SB01 and also had concentrations of iron above background.

Organic material in soil or groundwater that could cause reducing conditions in groundwater was not identified. Historical uses do not indicate the potential for a release of a large amount of organic material. It is possible that the source is either naturally occurring or due to reducing conditions at adjacent sites. CAA-3C (with associated petroleum hydrocarbons) is located adjacent to and west of the northern portion of AOC 25. AOC 25 is in the vicinity of the former estuary (Figure 2-10) and has approximately 5 feet of sand located above the native BSU sediments. The Marsh Crust, although not encountered in the borings, is likely to be present. Either the BSU layer or the Marsh Crust could be associated with reducing conditions.

Chromium was reported above background in samples collected at two locations at AOC 25, DHP-S03-03 and A25SB01, at concentrations of 15.4 J and 27.5 µg/L, respectively. Both of these concentrations were below the maximum chromium concentration of 82.8 µg/L in the background data set. Selenium was reported above background in 4 of 15 samples collected at AOC 25 at concentrations from 5.4 to 16.6 µg/L. All concentrations were above the maximum in the background data set; however, concentrations were below the PSC of 50 µg/L. The 1 sample (of 15 samples) with zinc above background was collected from the SWBZ at DHP-S03-03 and also had elevated concentrations of cadmium and thallium, as discussed below.

Arsenic, cadmium, and thallium were reported at concentrations above PSCs (Table 4-28). Arsenic was reported in 9 of 15 groundwater samples from wells MBG-3 and M03-11 at concentrations above the PSC (MCL of 10 µg/L). However, only one groundwater sample from the SWBZ at well M03-11 sampled in June 2003 had a reported arsenic concentration (21.7 J µg/L) slightly above the background concentration of 20.72 µg/L.

Cadmium and thallium were reported at concentrations of 17.2 J and 51.8 J µg/L, respectively, which are above PSCs (MCLs of 5 and 2 µg/L, respectively), in a grab groundwater sample from DHP-S03-03. A background value has not been established for cadmium. The reported thallium concentration was above the background concentration of 5.2 µg/L. Cadmium and thallium concentrations in groundwater are believed to have resulted from the sampling technique (likely an unfiltered grab groundwater sample) and likely represent their presence in particulates in the sample, rather than dissolved concentrations. Reports of previous activities at the study area do not suggest that activities at IR Site 35 in the vicinity of DHP-S03-03 could have impacted the SWBZ and

caused elevated concentrations of thallium, cadmium, and zinc in groundwater. Three groundwater samples were collected from the FWBZ groundwater during the RI at locations surrounding DHP-S03-03. Thallium and cadmium were not reported at concentrations above background in any of these groundwater samples.

4.3.3.14 EBS PARCEL 205

At EBS Parcel 205, soil and groundwater samples were analyzed for metals.

No metals were reported in soil at concentrations above background or PSCs. No metals were reported above background in either of two discrete groundwater samples. However, arsenic was reported at 15.7 µg/L (in the sample from boring D205SB02), which is above the PSC (MCL of 10 µg/L) and above the aquatic screening criterion (NRWQC HHCO of 0.14 µg/L). These arsenic concentrations were below the background concentration of 20.72 µg/L.

4.3.3.15 SWMUs

At the SWMUs, soil and groundwater samples were analyzed for metals.

Soil

For all SWMUs except UST(R)-11, metals concentrations in soil samples were below background. At UST(R)-11 (also discussed under AOC 23, Section 4.3.3.11) 11 metals (aluminum, barium, chromium, cobalt, iron, lead, manganese, mercury, nickel, potassium, and zinc) were above background in 11 samples collected from seven locations (123-0027, 123-0028, 123-0029, 123-0030, 123-0031, A23SB27, and A23SB28; Table 4-29 and Figure 4-16). The majority of metals above background were reported in two samples collected from one location, A23SB27 (1 to 2 and 3 to 4 feet bgs). As discussed in Section 4.3.3.11, the metals are believed to be naturally occurring. This is supported by the presence of metals co-located in the same samples with aluminum and iron at concentrations above background. The metals (barium, lead, mercury, and zinc) that were not co-located with aluminum and iron were reported at concentrations below the maximum background concentrations (reported concentrations of 102, 59.4, 1.6, and up to 80.4 mg/kg for barium, lead, mercury, and zinc, respectively, compared to maximum background concentrations of 156, 165, 2.71, and 191 mg/kg, respectively). These metals are also believed to be naturally occurring because there was no apparent pattern in the distributions of these metals at AOC 23 that would indicate a release.

Only arsenic and iron concentrations exceeded PSCs in soil; arsenic concentrations were below background.

Groundwater

UST(R)-11 was the only SWMU where groundwater samples were analyzed for metals. None of the metals concentrations were above PSCs. Zinc was the only metal reported at a concentration above background in one of six samples; it was reported at 54.2 µg/L from location 123-0041. This concentration is below the maximum zinc concentration in

the background data set, indicating that zinc concentrations may not be above background. A federal primary MCL has not been established for zinc.

4.4 SUMMARY OF THE NATURE AND EXTENT OF CONTAMINATION

This subsection presents a summary of the nature and extent of contamination in soil and groundwater at IR Site 35. The term "exceedance" used in the following subsections refers to concentrations above PSCs.

4.4.1 Organic Chemicals in Soil

VOCs were limited to a small vinyl chloride exceedance in AOC 23. Soil with the elevated concentration of benzene is likely to have been removed during a fuel pipeline removal. Other exceedances are considered insignificant due to either very low concentrations or very limited extent.

Significant exceedances of TPH in soil at AOCs 21, 23, and 25 and ASTs 173A, 173B, and 173C are referred to the TPH Program for review. Locations at AOCs 21 and 23 that are within CAA-B should be assessed under the TPH Program with CAA-B. Additionally, TPH exceedances in the eastern portion of AOC 23 should be assessed under the TPH Program with adjacent CAA-3A, and those in the northern portion of AOC 25 should be assessed under the TPH Program with adjacent CAA-3C. Other exceedances at AOC 17, the southern portion of AOC 25, EBS Parcels 78–79, and UST(R)-11 are not considered significant due to their low concentrations, the apparent weathered condition of the TPH, the use of older and less accurate analytical methods, and/or insignificant impact to groundwater.

No SVOCs other than PAHs were reported at concentrations above PSCs. PAH exceedances are being addressed separately from the AOCs and are considered in the FS.

Heptachlor reported at AOC 3 is the only significant pesticide at concentrations above the PSC. Pesticide exceedances at AOC 13 are not considered significant due to their limited extent, relatively low concentrations, and low potential for migration.

PCBs reported above PSCs at AOCs 2, 6, 7, 8, and 23 are also not considered significant due to their limited extent, relatively low concentrations, and low potential for migration.

4.4.2 Organic Chemicals in Groundwater

Naphthalene was reported in one grab groundwater sample in AOC 1 at a concentration of 1,200 µg/L. Although there is no PSC for naphthalene in groundwater, the concentration is worth noting. The extent of naphthalene has not been completely defined on the upgradient (southwestern) side of the AOC. However, naphthalene was not reported in two other groundwater samples (from borings generally downgradient), suggesting that the extent is limited.

VOC exceedances in groundwater included low concentrations of vinyl chloride, benzene, and 1,2-DCA in AOC 23. Vinyl chloride was reported around Building 13 and

also southwest of Building 66. Although these concentrations are low, they are considered significant because they occur over a large area and are above MCLs where groundwater is considered a potential drinking water source. A single concentration of benzene in the eastern portion of EBS Parcel 71 is not considered significant, because of the limited extent and because it was only slightly above the MCL. Two exceedances of 1,2-DCA were reported in EBS Parcel 126 north and east of Building 399 and are likely associated with the adjacent IR Site 3 and CAA-3A.

Low concentrations of cis-1,2-DCE and vinyl chloride at EBS Parcel 205 are not considered significant since it is unlikely that this area would be used for a drinking water source due to probable saltwater intrusion if there were sustained pumping and also due to the parcel's location west of Saratoga Street.

TPH was reported at concentrations above PSCs in groundwater at AOCs 20, 21, and 23, EBS Parcel 205, and ASTs 173A, 173B, and 173C, which are referred to the TPH Program for review. Locations at AOCs 20, 21, and 23 and EBS Parcel 205 that are near or within CAA-B should be assessed under the TPH Program with CAA-B. Additionally, TPH exceedances in the northern portion of AOC 25 should be assessed under the TPH Program with CAA-3C. Other exceedances at AOC 24, the southern portion of AOC 25, and SWMUs AST 152 and UST(R)-11 are not considered significant due to their low concentrations and/or limited extent in groundwater.

One PAH was reported in a grab groundwater sample at a concentration above the PSC. The PAH B(a)P was reported in groundwater from AOC 23 and is likely an artifact of sampling (associated with suspended material) rather than representing a dissolved concentration. Because of its low solubility and tendency to sorb to clay-size particles and organic matter in soil, B(a)P would not be expected to be dissolved in groundwater.

There were no groundwater samples with reported concentrations of pesticides or PCBs above PSCs. However, reported concentrations of PCBs below MCLs in groundwater samples drive risk at two areas. The PCBs were reported in one groundwater sample at AOC 23 and in one sample at EBS Parcels 78–79, and are likely artifacts of sampling (associated with suspended material) rather than dissolved concentrations. Because of low solubility and a tendency to sorb to organic matter in soil, PCBs would not be expected to be dissolved in groundwater.

4.4.3 Metals in Soil and Groundwater

Concentrations of metals above PSCs and background in soil and groundwater are summarized in the following paragraphs. Comparisons and statistical analyses were used to assess whether metals concentrations in soil and groundwater are indicative of Navy releases or naturally occurring conditions. Regardless of the conclusions, all data for all chemicals (except essential nutrients) were included in the risk evaluations in Section 6.

4.4.3.1 METALS IN SOIL

Metals concentrations in soil were reported above background in all study areas sampled for metals except AOCs 7, 18, and 21 (analyzed for lead only) and EBS Parcel 205. These metals were aluminum, arsenic, antimony, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, sodium, thallium, vanadium, and zinc. Metals in soil were reported at concentrations above PSCs at nine study areas (AOCs 4, 5, 10, 11/EBS Parcels 78–79, 12, 17, 23, 24, and 25). These metals were arsenic, iron, lead, manganese, thallium, and vanadium.

A detailed sitewide analysis of frequently reported metals in soil was performed that included a correlation analysis and preparation of probability plots, histograms, and other data visualizations. Other metals were not included because of the high frequency of concentrations below reporting limits. A correlation analysis with aluminum and iron was used to help assess whether metals concentrations at IR Site 35 may be reflective of naturally occurring assemblages of metals (e.g., in common rock-forming minerals) rather than industrial releases (Schropp and Windom 1988). Scatter plots and correlation analysis were used to help identify outlier data (Section 4.3.1.1), and histograms and other data visualizations were prepared (Appendix H) in response to agency comments on the draft RI/FS Report.

Results of the statistical analyses showed a significant positive correlation of arsenic, cobalt, copper, manganese, and vanadium with aluminum and iron, suggesting that these metals may generally represent naturally occurring concentrations rather than a release from industrial activities (except possibly for some outliers of these metals). An assessment of outliers indicated that some concentrations of arsenic (AOCs 12 and 23), cobalt (AOC 2), manganese (AOC 5), and zinc (AOC 25) do not co-occur with concentrations of aluminum and/or iron above background. These outliers are discussed further under the applicable study areas in Section 4.3.3.

It is interesting to note that lead (known to be associated with LBP at AOC 10, AOC 12, and EBS Parcel 79, which were subject to an NTCRA) is the least correlated with aluminum and iron. Lead in soil at AOCs 10 and 12 is considered in the FS.

4.4.3.2 METALS IN GROUNDWATER

Similar to metals in soil, metals concentrations in groundwater were reported above background in 8 of 11 study areas (AOCs 2, 4, 5, 11/EBS Parcels 78–79, 17, 23, 24, and 25) sampled for metals. These metals were aluminum, arsenic, antimony, barium, beryllium, chromium, copper, iron, lead, manganese, selenium, thallium, vanadium, and zinc. Metals in groundwater were above PSCs in nine study areas (AOCs 2, 4, 5, 11/EBS Parcels 78–79, 17, 20, 23, and 25 and EBS Parcel 205). These metals were aluminum, arsenic, cadmium, chromium, mercury, nickel, thallium, and zinc. Some of the metals concentrations in groundwater above both background and PSCs are believed to result from geochemical conditions or, in some cases, to be related to suspended material in unfiltered samples rather than metals releases (Section 4.3.2.1).

The iron and manganese present in soil can be transformed into more soluble species under reducing conditions in groundwater. Minerals with iron also contain certain trace minerals (as reflected in the significant positive sitewide correlations), which are also released when the iron transforms. When groundwater becomes oxygenated, iron, manganese, and trace metals precipitate out of groundwater back into the soil. The areas with dissolved concentrations of iron and manganese above background are limited at IR Site 35 (Figure 4-7). Concentrations of iron and manganese indicative of reducing conditions are also found in the background data set.

Concentrations of metals above background and PSCs in groundwater at some study areas (notably AOCs 17 and 25) were identified in samples from previous investigations and appear to represent total (particulate and dissolved metals present in unfiltered samples) rather than dissolved concentrations (filtered samples). Comparable concentrations of dissolved metals were not reported in any RI groundwater samples. Another possibility for the difference in metals concentrations is a shift from reducing to aerobic conditions in the 10 years between the sampling events. In the two 1995 samples, concentrations of iron were high, which would indicate reducing conditions; but in the RI groundwater samples collected in 2005, concentrations were well below background or nondetectable.

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Section 5
FATE AND TRANSPORT

Fate and transport analysis is used to assess the physical and chemical changes that may occur to contaminants and to analyze transport mechanisms that may act upon them. This section is an overview of the fate and transport mechanisms that are common to contaminants (i.e., chemicals that are either reported at concentrations above PSCs, as discussed in Section 4, or identified as a major risk contributor [Section 6]) in the study areas at IR Site 35. Specific fate and transport analyses are provided (if applicable) for each study area in Attachments A through W to this RI/FS Report.

Section 5.1 presents a conceptual site model for IR Site 35. This model incorporates physical characteristics, the nature and extent of contamination, migration pathways, and intermedia transport mechanisms that are shared by contaminants in most of the study areas at IR Site 35.

Section 5.2 presents a discussion of the fate of the contaminants that have been identified at the individual study areas. For purposes of this discussion, "fate" refers to the physical and chemical properties of each group of contaminants (e.g., VOCs, SVOCs, and inorganic chemicals) that affect contaminant transport and persistence in the environment. The discussion of fate addresses general characteristics for groups of contaminants identified at IR Site 35 and includes physicochemical properties for contaminants.

Section 5.3 presents a discussion of transport pathways that are common to contaminants at most of the study areas. This section summarizes the climatic conditions, site physical characteristics, and contaminant distributions that lead to conclusions about viable transport pathways at IR Site 35.

5.1 CONCEPTUAL SITE MODEL

The conceptual site model summarizes the physical characteristics (e.g., climate, geology, surface drainage systems, and hydrogeology) that influence the fate and transport of contaminants. It also summarizes the distribution of contaminants in soil and groundwater at IR Site 35. These summaries form the basis of the discussion of potential contaminant migration pathways. These pathways complete the conceptual site model, which is used to identify and prioritize pathways that pose the greatest potential impact to the environment.

5.1.1 Physical Characteristics of the Site

The physical characteristics of IR Site 35 are described in detail in Section 2. The following subsections highlight those factors that significantly impact fate and transport of contaminants.

5.1.1.1 CLIMATE

The San Francisco Bay Area is characterized by a climate with mild summer and winter temperatures. Light afternoon winds, generally blowing from west or northwest, are typical at Alameda Point. Occurrences of gale-force or greater winds are rare. The mean annual precipitation at Alameda Island is 23 inches with most of the precipitation

generally occurring from October through April. Infiltration is usually estimated to be approximately 10 percent of the annual rainfall (Walton 1989). For Alameda Point, this would result in an annual recharge rate of 2.3 inches. Based on other site-specific factors, including the surface cover of the sites, net infiltration from precipitation at IR Site 35 may be even less than the estimated 2.3 inches.

5.1.1.2 GEOLOGY

Alameda Island and IR Site 35 were created through multiple fill episodes, as discussed in Section 2.6. The shallow subsurface geology of IR Site 35 consists of a fill material overlying the BSU. Depth to the BSU varies, yet generally increases from east to west. The fill material consists primarily of fine- to medium-grained, poorly graded sand and lesser amounts of fine-grained silty sand and fine-grained clayey sand. Laterally discontinuous layers of silt, sandy silt, clay silt, and lean clay exist within the sand units at some study areas and are more common on the eastern portion of IR Site 35. Some study areas include construction fill soils used as a foundation material for roads or structures. This fill soil typically consists of well-graded gravel with silt and sand, poorly graded gravel with clay and sand, and well-graded sand with clay and gravel. Topsoil is present in some areas with organic silts and clays.

Underlying the fill layer is the BSU. The Young Bay Mud of the BSU is described in site borings as dark greenish-gray to dark gray lean clay and fat clay. It ranges from soft to stiff and from low to medium plasticity. The lean clays have varying amounts of silt and fine sand. The Marsh Crust was typically not observed at the interface between the fill layer and the BSU at IR Site 35. When observed, it was described as a thin, black, organic layer.

5.1.1.3 SURFACE WATER DRAINAGE

Because there are no natural streams or ponds on Alameda Island, precipitation evaporates into the atmosphere, is removed by evapotranspiration from plants, infiltrates to groundwater, or runs off into the storm drain network and/or directly into Oakland Inner Harbor and Seaplane Lagoon. Most of the ground surface at IR Site 35 is covered with residences, commercial/industrial buildings, concrete, or asphalt, except for some unpaved areas (e.g., most of AOC 12 and small sections of AOCs 1, 3 through 8, 10, 13, and 25 and some of the PAH Areas). Most precipitation drains into the storm drain system that discharges to Oakland Inner Harbor and Seaplane Lagoon.

5.1.1.4 HYDROGEOLOGY

As discussed in Section 2, the FWBZ consists of unconfined groundwater encountered in the fill layer and extends to 5 to 18 feet bgs at IR Site 35. This FWBZ in the fill layer is a local feature of Alameda Point and is not present regionally (TtEMI 1999). The upper portion of the BSU, which underlies the FWBZ, includes a semiconfining layer (referred to as the Young Bay Mud) composed of estuarine deposits consisting of clay and silty and clayey sand. This layer inhibits hydraulic communication between the FWBZ and the

SWBZ, a semiconfined aquifer composed of the lower portion of the BSU, the Merritt Sand Formation (where present), and the upper unit of the San Antonio Formation. Vertical communication between the FWBZ and SWBZ is believed to be minimal in the central groundwater region of Alameda Point. The SWBZ, exposed in the channel and port areas, is considered to be in direct communication with the water of San Francisco Bay. This aquifer is the conduit for saltwater intrusion along Oakland Inner Harbor and Seaplane Lagoon to the lower portion of the FWBZ and the entire SWBZ beneath Alameda Point (DWR 1960, TtEMI 2000a).

A groundwater mound exists in the central portion of Transfer Parcel EDC-5 and flows radially outward toward surface water bodies located to the north, south, and west. Groundwater flow is typically toward the north and northwest for study areas in the northern portion of Transfer Parcel EDC-5. However, a groundwater low exists north of IR Site 7. The groundwater gradient is gradual, at approximately 0.002 foot/foot toward Oakland Inner Harbor. Groundwater flow is typically to the south for study areas in the southern portion of Transfer Parcel EDC-5, with a gradient of approximately 0.004 foot/foot toward Seaplane Lagoon.

As discussed in Section 2.4, significant tidal influence on groundwater can be expected in areas of IR Site 35 located adjacent to Oakland Inner Harbor and Seaplane Lagoon. This would include the northern portion of AOC 4, and the southern portions of AOC 23 and EBS Parcel 205. Study areas located further inland of the surface water bodies may experience minor tidal influence and groundwater fluctuation. These study areas would likely include AOCs 2, 3, 20, 21, and portions of AOC 23.

5.1.2 Distribution of Contaminants

The predominant chemicals reported in soil and groundwater at IR Site 35 were identified in Section 4 of this report. The risk assessment presented in Section 6 also identifies risk contributors (cancer risk greater than 10^{-6} and hazard values above or equal to 0.8) by medium and by study area. Contaminants (chemicals that are not naturally occurring, have concentrations identified above PSCs, and are risk contributors) are discussed in the remainder of Section 5 and consist of VOCs, TPH, SVOCs, pesticides, PCBs, and metals in soil and groundwater. Table 5-1 lists the contaminants identified at each study area. Carcinogenic PAHs reported in soil samples at IR Site 35 with B(a)P equivalent concentrations above the PSC are addressed with the PAH Areas. Therefore, for soil, only noncarcinogenic PAHs with concentrations above PSCs (or those identified as risk contributors) are included in Table 5-1 for the other study areas.

Section 4 in Attachments A through W presents specific results and discusses the nature and extent of the contaminants for an individual study area. The following summary of contaminant distribution is presented to complete the conceptual site model.

5.1.2.1 SOIL

Past activities at IR Site 35 may have impacted soil at some of the study areas. Soil contamination is generally the result of spills, leaks, and discharges of fuels, oils, and

other waste substances such as LBP onto the ground surface. Contaminants include VOCs, PAHs, fuels, pesticides, PCBs, and metals. Most contaminants identified at IR Site 35 are reported in vadose zone soil.

The study areas with impacts to soil are listed below, along with the chemical or class of chemical that is above PSCs, represents a release, or is a risk contributor:

- AOC 2: Aroclor 1260
- AOC 3: pesticides
- AOC 6: Aroclor 1260
- AOC 7: Aroclor 1254
- AOC 8: Aroclor 1254
- AOC 10: lead
- AOC 11/EBS Parcels 78–79: diesel-range TPH
- AOC 12: arsenic and lead
- AOC 13: pesticides
- AOC 17: diesel-range and motor oil–range TPH
- AOC 21: diesel-range and gasoline-range TPH
- AOC 23: benzene, vinyl chloride, diesel-range TPH, gasoline-range TPH, motor oil–range TPH, carbazole, chrysene, Aroclor 1254, and Aroclor 1260
- AOC 25, diesel-range and motor oil–range TPH
- ASTs 173A, 173B, 173C: motor oil–range TPH
- PAH Areas: PAHs

The data for the following study areas indicated no impacts to soil: AOCs 1, 4, 5, 9, 18, 20, and 25; OWS 017; and ASTs 016, 039, 152, and 392. PAHs are addressed within the PAH Areas and are not included with an AOC or other study area.

5.1.2.2 GROUNDWATER

The study areas with impacted groundwater are listed below, along with the chemical or class of chemical that is above PSCs, represents a release, or is a risk contributor:

- AOC 1: naphthalene
- AOC 11/EBS Parcels 78–79: TCE, pesticides, and Aroclor 1260
- AOC 18: naphthalene
- AOC 20: diesel-range and JP-5–range TPH
- AOC 21: diesel-range and gasoline-range TPH
- AOC 23: VOCs, diesel-range and motor oil–range TPH, SVOCs, PCBs

- AOC 24: diesel-range TPH
- AOC 25: diesel-range and motor oil–range TPH
- EBS Parcel 205: chlorinated VOCs and diesel-range, gasoline-range, and motor oil–range TPH
- AST 152: diesel-range TPH
- ASTs 173A, 173B, and 173C: diesel-range and motor oil–range TPH

A review of the data from study areas where groundwater samples were collected suggests that groundwater has not been impacted by previous activities at AOCs 2, 4, 5, 9, and 17; OWS 017; or ASTs 016, 039, and 392. It appears that the type and relatively low concentrations of the contaminants reported in soil at these study areas have resulted in minimal contamination outside the vadose zone.

5.1.2.3 SEDIMENT

The RI included sampling of sediments at two manhole locations along one storm sewer line. The sampling was conducted at the request of the agencies to evaluate any potential impact of the lead removal previously performed at AOC 12. The sediment sample from the location furthest downflow had elevated concentrations of lead (972 mg/kg compared to the lead removal action objective of 199 mg/kg).

5.1.3 Potential Routes of Migration

Three primary media can potentially transport contaminants: air, groundwater, and surface water/sediment. The following subsections summarize the characteristics of the contaminant migration pathways at IR Site 35.

5.1.3.1 AIR PATHWAY

Consistent winds prevalent at Alameda Point create the potential for mobilization of contaminants through the air. Chemicals may be transported in the air as volatiles or in association with fugitive dust.

Volatilization is the process by which liquids vaporize and escape to the atmosphere. VOCs dissolved in groundwater or present in soil (either adsorbed to soil particles or as residual product) can volatilize and migrate into the vadose zone and then into the atmosphere. The amount of organic chemicals released to the atmosphere depends on the extent and concentrations of VOCs, proximity of chemicals to the surface, composition and gas permeability of the vadose zone, barometric pressure, and vapor pressure of the chemical. Volatile chemicals have been reported in soil and groundwater samples collected at IR Site 35, and the potential for these contaminants to be transported by direct volatilization exists.

Contaminants that are present in surface soil may be transported by wind. Transport in association with fugitive dust is based on the erosion potential of the surface, particle size, and wind speed. In addition, dispersion will occur in the atmosphere, causing

particle concentrations to undergo dilution as the dust moves off-site. Buildings, vegetation, and ground covering (e.g., concrete and asphalt) are present on the surface of many of the study areas at IR Site 35, decreasing the tendency to generate fugitive dust. However, the potential for transport of particulates though air exists at AOCs 1, 3 through 8, 10, 12, and 13 and part of the PAH Areas, due to the unpaved surfaces and sparse vegetation at these study areas. Regardless, the risk evaluation (Section 6) assumes no surface cover.

5.1.3.2 GROUNDWATER PATHWAY

Migration of chemicals of interest in groundwater is controlled by geochemistry chemical concentrations and characteristics, groundwater flow velocity and gradient, and dispersion, diffusion, retardation, natural attenuation mechanisms, and lithology. Groundwater has been impacted by contaminants at nine study areas and two SWMUs (Section 5.1.2.2) within IR Site 35. Contaminants that readily dissolve in water are those most likely to be transported by this pathway.

Groundwater along with contaminants can also migrate through preferential pathways in the subsurface. At IR Site 35, the possible pathways are storm sewers and other piping, when present below the water table, and pipe bedding with hydraulic conductivity greater than that of the surroundings subsurface. Many studies have been conducted at Alameda Point to evaluate the potential for groundwater migration through subsurface utilities (e.g., the storm drain system) and utility backfill. The evaluations have indicated that the bedding material surrounding subsurface utilities is not a significant pathway for contaminant transfer (Section 1.6.4.1). These studies have also indicated that subsurface piping is not likely to transfer groundwater contaminants from adjacent IR sites to IR Site 35.

Vertical migration of groundwater to deeper aquifers is not considered a significant transport pathway at IR Site 35 because of the presence of the low-permeability Young Bay Mud in the BSU, which reduces the potential for downward migration.

Chemicals not currently present in groundwater could migrate into the groundwater and move, as discussed above, with the groundwater. At IR Site 35, a possible transport pathway for chemicals between soil and groundwater is the leaching of contaminants from soil into groundwater caused by the infiltration of rainwater. Leaching of residual contaminants from soil to groundwater as a result of a rising or fluctuating groundwater table is also considered a possible transport mechanism at some areas of IR Site 35. The chemical concentrations leached into groundwater depend on the solubility of the chemicals, the soil texture and chemical composition, the net volume and rate of precipitation infiltration, and the concentration of chemicals of interest at the point of release.

5.1.3.3 SURFACE WATER/SEDIMENT PATHWAY

Contaminants in surface water can be transported by traction, saltation, and suspension of particulates or as solutes or colloids in the surface water. Surface water transport is

affected by the amount of rainfall, type of contaminant, surface properties, and topography of the area. Buildings, vegetation, and ground coverings all impact the ability of contaminants to migrate from the study areas to other areas of IR Site 35 or off-site. Contaminants most likely to be transported in association with suspended colloids or particulates would be those compounds that are tightly sorbed to soil particles. At IR Site 35, these include metals, petroleum hydrocarbons, SVOCs (including PAHs), pesticides, and PCBs.

Due to the exposed soil or sparse vegetation, transport of contaminants by stormwater runoff exists at the following study areas: AOCs 1, 3 through 8, 10, 12, and 13 and the PAH Areas. Additionally, sediment associated with AOC 12 present in the storm sewer could be transported by surface runoff collected and passed through these conduits during storm events.

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A chemical that is immobile and persistent in the environment tends to remain in place. The tendency toward immobility and persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Such properties include solubility, volatility, tendency to transform or degrade (usually described by a half-life or an environmental half-life in a given medium), and chemical affinity for solids or organic matter (usually described by a partitioning coefficient).

This subsection presents the specific physicochemical parameters of selected contaminants (those reported above PSCs and/or identified as major risk contributors) reported at IR Site 35 study areas. Specific information for contaminants identified at each study area is discussed in relation to their mobility and persistence (as applicable) in Attachments A through W to this RI/FS Report. To facilitate the presentation of the physicochemical parameters, study area–specific contaminants reported in soil and groundwater are listed in Table 5-1. As described below, each chemical group has similar physicochemical properties that influence contaminant mobility or persistence in the environment.

5.2.1 Organic Compounds

The mobility or persistence of organic compounds is governed by their physicochemical properties and the transformation mechanisms that act on them.

5.2.1.1 PHYSICOCHEMICAL PROPERTIES

The relevant physicochemical parameters for the organic chemicals reported at the IR Site 35 study areas include water solubility, vapor pressure, Henry's law constant, and organic carbon partition coefficient (K_{oc}), as listed in Table 5-2.

The solubility of a contaminant in water is a key parameter that affects the transport of solutes via the water medium. Highly soluble substances can be readily leached from soil and are generally mobile in groundwater. Solubilities of organic chemicals generally range from less than 0.001 mg/L to greater than 100,000 mg/L.

Volatilization is the process by which liquids vaporize and escape to the atmosphere. The volatility of a chemical in its pure state is dependent on its vapor pressure. Vapor pressure is the pressure (often expressed in millimeters of mercury) of a vapor in equilibrium with its liquid or solid form at a given temperature. Vapor pressure typically ranges from 1×10^{-7} to 760 millimeters of mercury at 25 degrees Celsius for liquids, with the higher values indicating a greater tendency to volatilize or enter the gas phase.

Henry's law constant is based on the equilibrium relationship between the solubility of a gas in water and the partial pressure of the gas in the atmosphere above the water. Henry's law constant reflects the tendency of a gas dissolved in liquid to transfer to the atmosphere. It is commonly used to measure the potential for vapor transport. The greater the value of Henry's law constant, the greater the tendency of the gas to be released into the air and transported into the atmosphere. The lower the constant, the greater the tendency of the gas to remain dissolved in the liquid phase and have the potential to be transported by water. VOCs with Henry's law constants greater than 10^{-5} atmosphere per cubic meter per mole indicate that, at equilibrium, more than 50 percent of the VOC will partition into the gas phase (Olsen and Davis 1990).

K_{oc} is a measure of the partitioning tendency of the compound from water to organic matter. The normal range of K_{oc} values is from 1 to 1×10^{7}, with higher values indicating greater sorption potential and less mobility in the saturated zone. Compounds with a K_{oc} of less than 100 are considered moderately to highly mobile. Empirical relationships have been developed between K_{oc} and the distribution coefficient (K_d). The most common relationship assumes the following form:

$$K_d = f_{oc} \times K_{oc}$$

where:

K_d = distribution coefficient (proportional to the soil retardation factor)
f_{oc} = fraction organic carbon content of the soil
K_{oc} = organic carbon partition coefficient

Fraction organic carbon (f_{oc}) content can be determined from total organic carbon values. Total organic carbon content was determined for soil samples collected at six of the study areas (AOCs 2, 11, 17, 18, and 23 and PAH Areas). These results are included in Table 3-5 and discussed in Section 3.2.1.1. The values for f_{oc} and the specific K_{oc} value for a given organic chemical can then be used to estimate whether the chemical is more likely to be associated with the soil or water phase. Numerous soil properties can also affect the aqueous transport of chemicals through porous media: soil-particle size, clay mineral composition, pH, cation-exchange capacity, and organic carbon content. Organic carbon content is usually the most important soil property controlling the mobility of organic compounds (Howard et al. 1991).

In general, organic chemicals with higher water solubilities and vapor pressures and lower K_{oc} values (e.g., VOCs) tend to have greater volatility and lower sorption potential, resulting in greater mobility in liquid and gaseous media. Organic compounds with lower water solubilities and vapor pressures and higher K_{oc} values (e.g., PCBs, pesticides, and PAHs) have a higher potential to remain sorbed to soil, lowering their mobility in liquid and gaseous media.

5.2.1.2 TRANSFORMATION PROCESSES

Transformation processes acting on organic chemicals in the natural environment include biodegradation, hydrolysis, redox reactions, and photodecomposition. In all cases, new chemical compounds or gases are formed as a result. The time that is required to degrade half the mass of a chemical is referred to as its half-life. Half-life times in soil for selected organic compounds reported at IR Site 35 are presented in Table 5-2.

Biodegradation involves the conversion of organic compounds with reactions controlled by living organisms, primarily microbes. Biodegradation can occur either aerobically (with oxygen as the electron acceptor) or anaerobically (another element/compound is used as the electron acceptor). Biodegradation is influenced by a number of factors, such as availability of electron acceptors, pH, redox potential, temperature, water content, organic carbon concentration, and biological factors (e.g., microbial species and population density). Biodegradation rates can also be influenced by nutrient concentrations and diffusion rates of the contaminants. As groundwater migrates, biodegradation can have significant impact on the degradation and destruction of organic compounds. In the natural environment, biodegradation is usually much more rapid than nonbiological processes.

The end products of biodegradation processes are simple chemicals such as carbon dioxide, water, and chloride. Evaluations have been conducted at several sites at Alameda Point. Results of these evaluations indicate that biodegradation of BTEX and chlorinated solvents can be a significant environmental fate process at Alameda Point. Although these evaluations were not conducted at IR Site 35, they indicate that, in general, the subsurface conditions at Alameda Point can be favorable for active biodegradation.

Hydrolysis is a chemical reaction in which water reacts with another substance to form two or more new substances. Hydrolysis reactions are sometimes biologically mediated. Abiotic chemical hydrolysis reactions are a function of parameters such as pH, dissolved organic matter, and dissolved metal ions; reactions generally occur at a much slower rate than biological hydrolysis reactions. Dehydrohalogenation, a particular type of hydrolysis reaction, is the primary reaction mechanism for the degradation of many halogenated organic compounds. This transformation mechanism may contribute to destruction of organic compounds at IR Site 35.

Redox reactions involve the transfer of an electron from an electron donor (oxidized) to an electron acceptor (reduced) and may also mediate other reactions (e.g., biological

reactions) with contaminants that are present. This transformation mechanism may also contribute to the destruction of organic compounds at IR Site 35.

Photolysis (photodecomposition) involves the decomposition of an organic compound as a result of the compound absorbing electromagnetic radiation. Typically, photolysis occurs only in the upper 0.5 centimeter of the soil.

Transformation of organic contaminants is discussed further by category below.

Volatile Organic Compounds

In general, VOCs reported in soil and groundwater at IR Site 35 were either chlorinated compounds (i.e., PCE, TCE, DCE, 1,2-DCA, and vinyl chloride) or related to fuels (i.e., benzene and naphthalene). Four of the compounds (benzene, 1,2-DCA, cis-1,2-DCE, and vinyl chloride) were reported at concentrations above PSCs (Tables 4-1 and 4-7).

VOCs are subject to both chemical and biological degradation. Biologically mediated degradation of VOCs typically occurs at much faster rates than simple chemical degradation, and microorganisms are known to degrade VOCs under soil conditions similar to those at Alameda Point (Howard et al. 1991).

Chlorinated VOCs. Chlorinated VOCs (e.g., PCE, TCE, 1,2-DCA, cis-1,2-DCE, and vinyl chloride) are a VOC chemical group impacting soil and groundwater at IR Site 35. They are simple organic compounds bonded with chlorine. Chlorinated VOCs generally have low-to-moderate solubilities, high volatilities, low-to-moderate partition coefficients, high mobilities, and densities greater than water. They tend to adsorb weakly to clay and organic soil, and under suitable conditions, they are relatively easily leached from soil to groundwater. In the subsurface, depending on conditions (the presence of nutrients, microorganisms, a reducing environment, etc.), chlorinated VOCs can typically be degraded in both aerobic and anaerobic environments. The reductive dechlorination is a biological process that breaks down chlorinated ethenes in groundwater. For example, PCE and TCE degrade in reducing environments to form 1,2-DCE or 1,1-DCE (with the most common intermediate being cis-1,2-DCE), followed by vinyl chloride. However, degradation does not always occur, and the time required for each dechlorination step may vary widely. The reductive dechlorination process is associated with the accumulation of intermediate products and an increase in chlorine.

Dehalococcoides and several dehalococcoides-like organisms are the only known microorganisms that completely dechlorinate TCE, DCE, and vinyl chloride in an anaerobic environment (Major 2002). There are several known strains of *Dehalococcoides*, each with different tolerances and differing abilities to dechlorinate ethenes and other chlorinated compounds. At least one of these strains has been shown to be present at Alameda Point (Koenigsberg et al. 2002, 2003; Richardson et al. 2002). When these organisms are not present, anaerobic dechlorination stalls at cis-1,2-DCE. Vinyl chloride can be rapidly degraded (by aerobic oxidation) under aerobic conditions (U.S. EPA 1998).

Fuel-Related VOCs. Two compounds, benzene and naphthalene, that are typically present in fuels were reported above PSCs in soil and/or groundwater at IR Site 35.

Benzene was reported in soil samples from AOC 23 above the PSC and was identified as a risk driver in groundwater at AOC 23 and EBS Parcel 205. Benzene is biodegraded under certain environmental conditions. Benzene degradation can occur both in the presence of oxygen (aerobic) and absence of oxygen (anaerobic). Under aerobic conditions, benzene has been shown to degrade at a relatively fast rate, while under anaerobic conditions the degradation of benzene occurs at a very slow rate (Alvarez et al. 1998).

Naphthalene was reported in grab groundwater samples from three study areas (AOCs 1, 18, and 23) at concentrations that identified it as a risk driver. Biodegradation is the dominant fate process for naphthalene in aquatic systems. Half-lives reported for naphthalene range from 3 to 1,700 days in various water systems, with the fastest rates of biodegradation occurring in oil-polluted water and the slower rates in unpolluted waters. In general, biodegradation rates increase with naphthalene concentration (ATSDR 1995).

Semivolatile Organic Compounds

PAHs, a category of SVOCs, were reported at IR Site 35 in groundwater at concentrations above PSCs; these concentrations contribute significantly to risk. PAHs were reported in soil with B(a)P equivalent concentrations above PSCs. As a chemical class, PAHs generally have low volatility, low water solubility, and a high affinity for sorption to soil organic matter. Low volatility, expressed quantitatively by vapor pressure, constrains vapor-phase transport of PAHs in the vadose zone. PAHs are hydrophobic compounds (i.e., lacking an affinity for water) with low water solubility and high affinity for sorption to organic particles. Low water solubility and strong sorption to soil particles limit the relative importance of leaching through soil as a transport process and cause the PAHs to move very slowly relative to percolating infiltration. The sorption behavior of PAHs is expressed quantitatively as the K_{oc} value. Table 5-2 summarizes the physicochemical properties of selected organic compounds.

In shallow soil, biodegradation is the most important transformation process affecting the persistence of PAHs. Another potentially important transformation process, photolysis, is limited to areas where surface soils are exposed to sunlight. The persistence of some PAHs is due to their resistance to biodegradation. This resistance is proportional to molecular weight and the number of polar functional groups attached to the PAH aromatic ring structure. High-molecular-weight, multiringed PAHs that do not contain polar functional groups (e.g., pyrene) are the most resistant to biodegradation. As such, they remain in soil for significantly longer periods of time than lower-molecular-weight PAHs containing fewer aromatic rings (e.g., naphthalene) (Research Triangle Institute 1995).

In surface water, PAHs can photolyze, oxidize, biodegrade, bind to suspended particles or sediment, or bioaccumulate in aquatic organisms. In sediment, PAHs can biodegrade or accumulate in aquatic organisms. PAHs in soil can undergo nonbiological degradation (photolysis and oxidation), accumulate in plants, or biodegrade. PAHs in soil can also

enter groundwater, although their low solubility in water and high affinity for soil greatly retard this process (Research Triangle Institute 1995).

Polychlorinated Biphenyls

PCBs have been reported at IR Site 35 at concentrations above PSCs in soil samples from five study areas: AOCs 2, 6, 7, 8, and 23. With the exception of the soil samples collected at AOC 2, these soil samples were collected from the upper 2 feet of soil. Additionally, PCBs were reported in groundwater samples from two of the study areas (AOC 11/EBS Parcels 78–79 and AOC 23) at concentrations that contribute significantly to risk. In both cases, PCBs were reported in only one grab groundwater sample from each study area.

Grab groundwater samples tend to have high turbidity (contain more soil particles) than groundwater samples collected from wells that have undergone a development and purging process. It is likely that the PCB concentration reported in the groundwater samples does not represent a dissolved concentration but contains some contribution from PCBs sorbed to the soil particles suspended in the samples.

The mobility of PCBs is greatly affected by adsorption to organic matter in soil as described above for organic compounds. This is due to both their large size and their physical and chemical characteristics. These compounds have moderate-to-very-high K_{oc} values, resulting in their strong affinity for organic matter in soil and causing them to be relatively immobile.

PCBs are among the most persistent man-made compounds in the environment, and can resist degradation for years. PCBs degrade slowly in soil in natural systems. Anaerobic systems degrade PCBs (with accompanying reduction in toxicity) more rapidly than aerobic systems. Degradation rates are inversely proportional to the chlorine content of the PCB compound. For PCB-contaminated sites, the PCBs will likely persist in soil unless native microbial communities are augmented with specific microbes found to be effective in PCB degradation, or until native communities are enhanced through soil amendments.

Organochlorine Pesticides

Organochlorine pesticides such as dieldrin, heptachlor, 4,4′-DDT, and 4,4′-DDD have been reported in soil samples from AOCs 3 and 13 at concentrations above PSCs. At AOC 3, pesticides were reported in samples from the upper 2 feet bgs. At AOC 13, pesticides were reported in samples from depths up to 7.5 feet bgs. Pesticides were also identified as risk drivers for groundwater at AOC 11/EBS Parcels 78–79.

Organochlorine pesticides are hydrocarbon compounds in which various numbers of hydrogen atoms have been replaced by chlorine atoms. These chemicals were introduced in the 1940s, and many of their uses have been restricted by the U.S. EPA because of their persistence in the environment. Characteristics of most organochlorine pesticides are their propensity for sorption to organic matter, low water solubility, and high persistence in the environment.

Petroleum Hydrocarbons

TPH was reported in soil and groundwater samples at concentrations above their respective PSCs (Tables 4-2 and 4-8). TPH consists of several hundred chemical compounds that originated from crude oil. Petroleum hydrocarbons identified as diesel, gasoline, JP-5, or motor oil were reported above PSCs at ten study areas in IR Site 35. Exceedances were reported in both soil and groundwater samples. Many of the TPH concentrations reported above PSCs were from samples collected prior to the 2005 RI sampling.

TPH analysis using U.S. EPA Method 8015-M is subject to positive biases, especially for detection of dissolved petroleum constituents in groundwater samples (Zemo 1997). The analytical method is an aggregate-specific rather than a constituent-specific analysis, and quantifies an amount of "total" hydrocarbons that elute within a particular boiling range or range of molecular weights, rather than reporting concentrations of individual constituents. As a result, nonpetroleum hydrocarbons such as naturally occurring hydrocarbons and degradation products of the original fuel (alcohols and organic acids with minor aldehydes, phenols) can contribute to the reported TPH concentrations (Zemo 1997). U.S. EPA Method 8015-M normally does not include a silica gel step or other cleanup steps to remove these polar nonpetroleum materials; therefore, the TPH results for soil and groundwater samples will include these nonpetroleum constituents. The samples collected prior to the 2005 RI sampling likely did not undergo silica gel cleanup in the laboratory prior to analysis. However, the soil and groundwater samples collected in 2005 did undergo silica gel cleanup prior to analysis.

Fuel components reported in soil and groundwater are subject to the same degradation processes, often called "weathering," as other organic components. Each of the main weathering processes (dissolution in water, volatilization, and biodegradation) affects individual hydrocarbons present in the fuel (e.g., benzene and naphthalene) in a unique manner. When a fuel mixture is released, aromatics are the principal contaminants likely to partition into the groundwater. Aliphatic compounds such as alkanes, alkenes, and cycloalkanes are likely to partition into the air because of their higher volatilities. Initially, equilibrium partitioning between fuel and groundwater occurs in the vicinity of the release and is based on the solubility of the pure species in water and the weight percentage of each compound in the fuel.

Biodegradation is one of the most important transformation mechanisms for natural attenuation of petroleum hydrocarbons. While the fuel components remain in the subsurface, they have been shown to degrade under both aerobic and anaerobic conditions. Almost all fuel hydrocarbons can be biodegraded under aerobic conditions, while aromatic compounds (e.g., benzene), simple PAHs, and some nitrogen heterocyclic organic compounds can be degraded in anaerobic groundwater. Generally, the petroleum hydrocarbons that are most mobile in the environment are also readily degraded. Microorganisms are most effective at degrading low-to-moderate concentrations of contaminants. High concentrations and very low concentrations of contaminants may not be biodegradable.

5.2.2 Metals

Metals are not subject to the degradation reactions that affect organic compounds because they are elements rather than compounds, making them naturally persistent in the environment. However, metals are vulnerable to redox reactions that can change their valence, species (the form in which a metal is present in solution), and net ionic charge. The characteristics of each metal species can, in turn, strongly influence the transport behavior of that metal in the environment and determine whether a metal will be present as an immobile phase in soil or as a mobile phase dissolved in groundwater.

The basis of this influence is the effect on the partitioning of the metal between soil, organic compounds, and water. Numerous soil properties also affect the partitioning behavior of metals; soil-particle size (surface area), clay mineral type and composition, pH, cation-exchange capacity, and organic carbon content can all influence the relative importance of a number of partitioning reactions.

Partitioning reactions that determine the distribution of metal species in the soil-water system include ion exchange, adsorption, absorption, precipitation, and complexation. The net effect of these diverse, sometimes competing reactions is described as sorption and is measured empirically with a K_d. The K_d is also dependent on a variety of soil characteristics that include soil pH and soil type. Due to the multiplicity and complexity of the partitioning reactions that determine the K_d, simplifying assumptions must be used to approximate K_d from literature values.

The distribution coefficient is expressed as follows:

$$K_d = \frac{(S)}{(C)}$$

where:

K_d = distribution coefficient
S = mass of solute in the solid phase per unit mass of solid phase
C = concentration of solute in solution

Although K_d values are dependent on many factors, values based on adsorption potential, soil pH, and soil clay content are expected to provide a reasonable estimate of K_d values applicable to Alameda Point soils. The greater the K_d, the more likely it is that the metal will remain sorbed to soil and not be transported by the water phase. Table 5-3 provides the physicochemical properties of the metals reported in samples from IR Site 35.

Table 5-1 lists the metals with concentrations above PSCs and background and those that contribute to risk at each of the IR Site 35 study areas. Metals identified as contaminants at IR Site 35 in Table 5-1 include the following:

- arsenic in soil at AOC 12
- lead in soil at AOCs 10 and 12

Section 4.3.3 presents text description and figures on the number and location of metals present at concentrations above background at each study area.

5.2.3 Mobility of Contaminants

Contaminant migration can be discussed empirically relative to their retardation factors as presented in Freeze and Cherry (1979). The retardation factor represents a ratio of the velocity of the contaminant to the velocity of groundwater. Contaminants that react with the solid phase (the aquifer) move at a slower rate than those that do not react with the solid phase. The retardation factor is computed from the following equation (Freeze and Cherry 1979):

$$R = \frac{v_g}{v_c} = 1 + \left(\frac{\rho_b}{n} \times K_d \right)$$

where:

R = retardation factor (unitless)
v_g = groundwater velocity
v_c = contaminant velocity
ρ_b = bulk mass density
n = porosity
K_d = distribution coefficient

Retardation factors for organic compounds and selected metals were estimated and are shown on Tables 5-2 and 5-3, respectively. The values for bulk mass density (approximately 106 pounds per cubic foot or 1.7 grams per cubic centimeter) and effective porosity (0.37) used in the calculations were based on an average of the values reported for soil samples collected at IR Site 35 that were classified as silty sand (Table 3-5). For organic compounds, K_d was calculated using the values for K_{oc} listed in Table 5-2 and a value of 0.015 for the fraction of organic carbon. This value is in the range of the fractions of organic carbon reported for soil samples collected at study areas at IR Site 35 (Table 3-5). For selected metals, the K_d values listed in Table 5-3 were used to calculate the retardation factor.

A retardation factor of 1 would indicate that the contaminant travels at the same velocity as the groundwater. For organics, the retardation factors range from 2 for 1,2-DCA and vinyl chloride to over 100,000 for the more hydrophobic compounds such as PAHs. For metals, the retardation factors range from 88 for iron to 8,200,000 for chromium (III). Thus, iron is expected to travel up to 88 times more slowly than groundwater, and chromium (III) is expected to travel up to 8,200,000 times more slowly than groundwater, based on published data for the distribution coefficient values.

It should be noted that published soil-water distribution coefficients vary depending on the conditions under which they were measured. These retardation factors would also vary depending on the distribution coefficient used. However, they provide important information about the mobility of each metal relative to the other contaminants at IR Site 35. Additionally, it should be noted that in all cases, the metals at IR Site 35 are expected to travel through the subsurface more slowly than the groundwater flow.

5.3 POTENTIAL MIGRATION MECHANISMS

Chemicals of interest may migrate from impacted media at IR Site 35 via several potential routes, or pathways. The following viable transport mechanisms have been identified for IR Site 35 study areas:

- atmospheric transport of vapors and fugitive dust
- transport of contaminated soils or dissolved contaminants in surface water runoff
- transport of soil contaminants to groundwater
- transport of contaminants in groundwater away from the study area and toward surface water bodies (Seaplane Lagoon and Oakland Inner Harbor) in the direction of groundwater flow
- (in response to an agency request) transport of contaminated sediments in one storm sewer line at AOC 12 to Seaplane Lagoon

Table 5-4 indicates the viable pathways and those that may be significant for contaminant migration at each study area. SWMUs were not included in the evaluation of contaminant migration. Per the DQOs for SWMUs (Table 3-3), fuel-related contamination identified at SWMUs during the RI is recommended for further evaluation under the TPH Program. This subsection discusses the significance of each pathway to the movement of contaminants at the study areas within IR Site 35.

5.3.1 Atmospheric Transport

As discussed below, atmospheric transport is considered a possible transport mechanism at 20 of the IR Site 35 study areas (Table 5-4). Contaminated material can be transported through the atmosphere in either the vapor phase or adsorbed to suspended particulate matter (fugitive dust).

5.3.1.1 VAPORS

Vadose zone soil samples and groundwater samples were analyzed for VOCs at IR Site 35 where VOCs were thought to be present. VOCs were generally reported at trace-to-low concentrations (less than 100 µg/kg) in shallow soil samples and low concentrations (less than 10 µg/L) in grab groundwater samples at most of these study areas. The distribution of reported VOCs is limited at IR Site 35.

Atmospheric transport via vapors is a viable transport mechanism at all of the study areas where VOCs were reported; however, for most study areas, the concentrations and limited extent of chemicals that can be transported by this mechanism are expected to cause no impact to outdoor air quality on-site or off-site. The already low contaminant concentrations in soil and groundwater would be further reduced in air by the gradual release of the VOCs to the air and by atmospheric dispersion and mixing as VOCs are transported away from IR Site 35.

The potential exists for volatile compounds in soil and groundwater to migrate through the vadose zone and accumulate in indoor air in current and future buildings. Vapor migration of contaminants into indoor air was evaluated at all study areas where VOCs were reported.

5.3.1.2 FUGITIVE DUST

Fairly constant, low-to-moderate winds and dry climatic conditions during July through October are conducive to the formation and transport of dust. These conditions can result in the transport of surface soil contaminants that are adsorbed to the particle surfaces or absorbed within the structure of the mineral particle. Contaminants reported in surface-soil samples include VOCs, TPH, SVOCs, PCBs, pesticides, and metals.

The presence of buildings, pavement, and landscaping tends to reduce the potential for the release of contaminants as contaminated dust. Since most of IR Site 35 is paved, covered by buildings, or landscaped, generation and transport of fugitive dust are not a significant transport mechanism for all study areas, but are considered possible at study areas without pavement or maintained landscaping (AOCs 1, 3 through 8, 10, 12, and 13 and parts of the PAH Areas). The following study areas have both contaminant concentrations above PSCs in surface soils and exposed surface soils: AOCs 8, 10, and 12 and the PAH Areas. If the surface cover is disturbed or removed in the future, particulate dispersion from soil will be considered a possible transport pathway at IR Site 35. Regardless, the risk evaluation (Section 6) assumes no surface cover.

5.3.2 Surface Water Runoff

Transport by surface water runoff is considered a possible transport pathway at the study areas where the surface soil is exposed. The following study areas have both contaminant concentrations above PSCs in surface soils and exposed surface soils: AOCs 1, 5, 6, 8, 10, and 12 and the PAH Areas.

Transport by this pathway at IR Site 35 is somewhat mitigated by the following factors.

- Most of the site is paved.
- The site is flat, thus limiting the velocity and the scouring ability of any runoff.
- Ponding of surface water occurs due to depressions in unpaved areas.

5.3.3 Transport of Soil Contaminants to Groundwater

Transport of chemicals from vadose zone soil to groundwater can result from rainwater percolating downward through chemical-impacted soil to the underlying saturated zone. Transport of chemicals from soil to groundwater can also occur when groundwater levels fluctuate in chemical-impacted soil, allowing chemicals to dissolve into groundwater. In addition, rising water levels can entrain soil moisture that may already contain dissolved chemicals.

Because of the contaminants reported in the vadose zone soil, this pathway is considered potentially significant only at AOC 23.

The transport of contaminants from vadose zone soil to groundwater at IR Site 35 is somewhat mitigated by the following factors.

- Contaminants at IR Site 35 typically have a higher affinity for soil than for groundwater.
- Most of IR Site 35 is paved or covered with buildings, which lessens the volume of infiltration.
- Contaminant impacts in soil are limited in areal extent.
- Concentrations of chemicals in soil are relatively low (nonaqueous-phase liquid [NAPL] has not been identified at IR Site 35).
- Significant tidal influence is limited to areas adjacent to Oakland Inner Harbor and Seaplane Lagoon.

If the surface cover at the site is disturbed or removed, infiltration may become more important in the future.

5.3.4 Groundwater Transport

Groundwater flow direction varies at IR Site 35. Shallow groundwater at Alameda Point generally flows from central areas toward the shorelines. Migration of contaminants in groundwater flow is considered an active transport pathway for the all study areas with impacted groundwater.

Vertical migration of groundwater to the SWBZ is not considered a significant transport pathway at IR Site 35 because of the aquitard underlying the fill layer at the site.

Groundwater migration to surface water bodies is a viable transport pathway for the AOCs near the shoreline because contaminants have been reported in groundwater at some of the study areas at concentrations above PSCs, and the groundwater flow near the shoreline is toward Oakland Inner Harbor or Seaplane Lagoon. However, whether chemicals of interest will be transported to Oakland Inner Harbor or Seaplane Lagoon at appreciable rates and concentrations is dependent on the mobility of the chemicals in groundwater and other chemical and physical variables.

5.3.5 Sediment Transport

Sediment present in a storm sewer located downflow of AOC 12 has been impacted by lead. This material can be transported by water collected and flowing through the storm sewers. Because the material is located at the bottom of the manhole cleanouts, a significant velocity of water into the sewers would be necessary to resuspend the contaminated sediment and carry it to the outfall at Seaplane Lagoon. This is considered a possible transport pathway, and it is addressed with AOC 12.

Section 6
HUMAN-HEALTH RISK ASSESSMENTS

Risk assessments were performed as part of this RI/FS Report to assess potential impacts on human health from exposure to chemicals at IR Site 35. These evaluations were conducted in accordance with guidelines published by the U.S. EPA in the Risk Assessment Guidance for Superfund Part A (U.S. EPA 1989), Part B (U.S. EPA 1991b), and Part E (U.S. EPA 2004a) and supporting documents and guidelines published by Cal/EPA (1993, 1994, 1999, 2005). The results of four types of risk evaluation are discussed, in the following order.

1. Cancer risk and noncancer hazard values for PAHs in soil are calculated for conditions prior to soil removals (pre-TCRA) conducted in most of the DAs (BEI 2005b). The risks are calculated using a 95 percent upper confidence limit (UCL) exposure point concentration (EPC) and PRGs. These results are presented along with the post-TCRA results for PAHs published in the Transfer Parcel EDC-5 SI Report (BEI 2005b).
2. Tier 1 risk evaluations for 14 study areas (AOCs 2, 4, 5, 6, 7, 8, 9, 13, 17, 18, 20, 21, 24, and 25) calculate combined U.S. EPA and Cal/EPA cancer risk and noncancer hazard for non-PAH chemicals in soil and groundwater based on the maximum reported concentrations and generic risk-based levels published by regulatory agencies (Cal/EPA 2005) for a residential scenario.
3. Baseline HHRAs for five study areas (AOCs 1, 3, 11/EBS Parcels 78–79, and 23 and EBS Parcel 205) calculate U.S. EPA and Cal/EPA cancer risk and noncancer hazard using site-specific assumptions and the standard procedures for a baseline risk assessment included with an RI.
4. Lead-only evaluations for two study areas (AOCs 10 and 12) compare concentrations of lead to site-specific PRGs protective of children.

The following factors were considered when determining whether a Tier 1 or baseline risk assessment approach was most applicable for an AOC:

- the presence of chemicals with concentrations above PSCs and/or background concentrations
- previously stated public interest (e.g., EBS Parcels 78 and 79 were assigned to an HHRA)
- the frequency of detection and the distribution of the chemicals in light of the site history

Areas where the review indicated that a site-specific assessment was warranted to determine the necessity for further action were designated for a baseline HHRA. Areas where the review indicated that no further action would be warranted using protective assumptions and generic risk-based guidelines were designated for a Tier 1 assessment. After initial calculations, the assignments were reviewed for a second time to verify that each AOC would receive adequate risk evaluation for CERCLA decision-making purposes.

All metals were included in the list of Tier 1 and HHRA COPCs, regardless of whether the concentrations were above or below background. No metals, except calcium, magnesium,

potassium, and sodium, which are known to be required human nutrients, were excluded as COPCs from the risk calculations based on the discussion presented in Section 4.3.

The pre-TCRA PAH cancer risk and noncancer hazard value calculations are presented in Appendix I. The details of the Tier 1 risk evaluation, HHRA, and lead-only evaluation methods and results are presented in Appendix J.

6.1 OVERVIEW OF THE RISK ASSESSMENT METHODOLOGIES

This section presents an overview of the methodologies used in the risk evaluations.

6.1.1 Pre- and Post-TCRA PAH Risk Calculations

This section describes the method used in this RI/FS Report to calculate the pre-TCRA risks in soil and the methods from the SI Report used to calculate the post-TCRA PAH risks in soil. The results of both risk calculations are presented in Section 6.2.

The pre-TCRA PAH risks from this RI/FS Report include the cancer risk and noncancer hazard values calculated for PAHs at DAs 2, 3, 4, 5, 6, 7, 8, 9, 11, 16, 17, and 18 for three depth intervals: 0 to 2, 0 to 4, and 0 to 8 feet bgs. A removal action occurred at each of these DAs where B(a)P equivalent concentrations exceeded 1,000 µg/kg in the 0- to 2-foot-bgs interval (FWEC 20004). The post-TCRA PAH cancer risks and noncancer hazard values from the SI Report are presented for the same depths. In the DAs where no removal action was conducted, post-TCRA risks from the SI Report are the same as pre-TCRA risks.

The pre-TCRA U.S. EPA and Cal/EPA cancer risk and noncancer hazard values were calculated by dividing the EPC by the chemical-specific residential PRG. The EPC/PRG ratio was multiplied by 10^{-6} to convert to cancer risk for the carcinogenic PAHs. No conversion is needed for noncancer hazard values.

The EPC is the concentration in soil, air, or groundwater that represents the level of exposure for a human lifetime. The U.S. EPA recommends using the 95 percent UCL of the arithmetic mean or the maximum concentration, whichever is lower. An EPC was calculated for each PAH in soil using the U.S. EPA software ProUCL, Version 2.3. Samples reported as nondetect were included as values with a concentration of one-half the detection limit. There were no limitations on the percentage of nondetects. The Student's t-test was used to calculate the EPC for normal data; the Land equation was used for lognormal data; the gamma UCL was used for data that fit a gamma distribution. The approximate Chebyshev limit was used for nonparametric data (U.S. EPA 2002c).

The post-TCRA cancer risks are based on a composite of U.S. EPA and Cal/EPA cancer risks, with the most stringent (highest risk) value selected for each carcinogenic PAH.

Surrogate PRGs were used when no state or federal PRGs were available. These surrogate PRGs were selected based on chemical similarity with chemicals for which PRGs have been developed.

6.1.2 Tier 1 Evaluation Methods

A Tier 1 evaluation calculates cancer risk and noncancer hazard values using published risk-based guidelines from the U.S. EPA, Cal/EPA, and Water Board (RWQCB 2005).

6.1.2.1 TIER 1 DATA EVALUATION

The Tier 1 evaluations include all chemicals identified in at least one sample of soil (without regard to depth) and groundwater, except for PAHs in soil and the essential nutrients calcium, magnesium, potassium, and sodium in soil or groundwater. PAHs in soil are not included because site-specific cleanup goals will be established for PAHs. In the total risk calculations, metals were included in the list of Tier 1 COPCs regardless of whether the concentrations were above or below background.

6.1.2.2 TIER 1 SOURCES OF RISK-BASED GUIDELINES

The selected risk-based guidelines represent the most protective of published levels for each exposure pathway shown on Figure 6-1. The following is a list of the risk-based guidelines and exposure pathways in soil and groundwater covered by these guidelines.

- For exposure to Tier 1 COPCs in soil, the most stringent of the following were used:
  - Ingestion, inhalation of particles and vapors in outdoor air, and dermal contact with soil were evaluated with the most stringent of the following:
    - U.S. EPA Region 9 PRGs (U.S. EPA 2004b)
    - Cal/EPA California Human Health Screening Levels (Cal/EPA 2005)
  - Inhalation of vapors from soil in indoor air was evaluated using the Water Board's ESLs for indoor air with high-permeability soil (RWQCB 2005) (VOCs only)
- For exposure to Tier 1 COPCs in groundwater, the most stringent of the following were used:
  - Ingestion and inhalation of vapors while showering were evaluated using the U.S. EPA Region 9 PRGs for tap water (U.S. EPA 2004b)
  - Inhalation of vapors from groundwater to indoor air was evaluated with the ESLs for indoor air with high-permeability soil (RWQCB 2005) (VOCs only)

The Tier 1 risk evaluation is protective for all pathways listed, including indoor air vapors from groundwater, because the most stringent of the published criteria for each chemical, including VOCs, was used. For example, at AOC 2, four VOCs were reported in soil. The ESLs for protection of indoor air are more stringent than the PRGs for soil for three of these VOCs, but not for the fourth, carbon disulfide. So for carbon disulfide, the more stringent PRG was used for calculating risk, even though it is not based on indoor air, because it is the more protective criterion for the indoor air pathway.

6.1.2.3 TIER 1 CALCULATION OF CANCER RISK AND NONCANCER HAZARD VALUES

The cancer risk and noncancer hazard values were calculated for residential exposure pathways using the Tier 1 protocol from Cal/EPA (2005). The maximum concentration of Tier 1 COPCs in soil and groundwater at any depth was used. Cumulative cancer risk and noncancer hazard were also calculated by adding the values for individual chemicals. The total cancer risk and noncancer hazard values were calculated by adding the values for soil to those for groundwater.

The results for total cancer risks and noncancer hazard values and the risk results without metals at concentrations below background are presented for the following three exposure groups:

- Exposure Group 1 – for all soil and groundwater exposure pathways
  - total (all COPCs)
  - COPCs without metals below background
- Exposure Group 2 – for soil and vapors from VOCs in groundwater
  - total (all COPCs for this exposure group)
  - COPCs without metals below background
- Exposure Group 3 – for residential use of groundwater
  - total (all COPCs for this exposure group)
  - COPCs without metals below background

Tier 1 Cancer Risk Characterization

Cancer risk represents the probability that exposure to COPCs could result in an increased risk of cancer. Cancer risk is termed "the probability of increased individual excess cancer." This means the risk over and above the natural risk of cancer in the general population. Cancer risk is a statistical probability, and does not predict how many cases of cancer will occur. The risk-based guidelines that are based on the cancer end point are set at a target risk level of 10^{-6}. The cancer risk is calculated by dividing the maximum concentration by the risk-based guideline and multiplying by 10^{-6} as follows:

$$\text{cancer risk} = \frac{\text{maximum concentration} \times 10^{-6}}{\text{risk-based guideline}}$$

The cancer risk for each chemical is added together to estimate overall risk. Cancer risks are discussed in the context of a risk management range of 1 in 1,000,000 (10^{-6}) to 1 in 10,000 (10^{-4}). For risks between 10^{-6} and 10^{-4}, site-specific factors are considered when making decisions about whether or not action is required to reduce risk.

Tier 1 Noncancer and Lead Risk Characterization

Noncancer health effects are evaluated based on a hazard quotient (HQ) for individual chemicals. The HQ is the ratio of the maximum concentration to the risk-based guideline, as shown below. The risk-based guideline is a concentration that is unlikely to lead to adverse health effects over a lifetime.

$$HQ = \frac{\text{maximum concentration}}{\text{risk-based guideline}}$$

An HQ value of 1 indicates that lifetime exposure has limited potential for causing an adverse noncancer effect in sensitive populations, and values of less than 1 can generally be considered acceptable. Values greater than 1 are usually given closer attention.

The sum of chemical-specific HQs is called a hazard index (HI). It is only appropriate to add HQ values for different chemicals if they have the same health effect. Adding HQ values into a single cumulative HI value across chemicals is a preliminary estimate of the highest possible noncancer risk.

The maximum concentration of lead in soil is compared to the residential PRG of 150 mg/kg to determine whether there is a potential risk associated with exposure to lead in soil. An HQ for lead is included in the total HI; however, the health effects of lead are not considered additive with other noncancer health effects per U.S. EPA and Cal/EPA risk assessment practices. Therefore, lead is not included in the calculation of noncancer risk without background metals. For the majority of study areas, the maximum lead concentration is below the background concentration.

6.1.2.4 TIER 1 RISK CHARACTERIZATION WITHOUT METALS AT BACKGROUND CONCENTRATIONS

The cancer risk and noncancer hazard value without metals with a maximum concentrations at or below background are presented in addition to the total cancer risk and noncancer hazard value. This approach is recommended by U.S. EPA for cancer risk. The noncancer hazard value without metals below background is presented to allow consideration of the effectiveness of any remediation.

Several of the study areas have iron and manganese and some trace metals reported at concentrations above background. Correlation analysis suggests that these metals are present at naturally occurring concentrations and are not due to a release resulting from Navy activities (Section 4.3). Nevertheless, only metals concentrations below Alameda Point background were excluded in these calculations.

6.1.2.5 TIER 1 UNCERTAINTY ANALYSIS

Varying degrees of uncertainty exist in each step of the risk assessment process. Tier 1 risk evaluations use risk-based concentrations published by the U.S. EPA (PRGs), Cal/EPA (California Human Health Screening Levels [CHHSLs]), and the Water Board (ESLs) as a basis for making decisions. Tier 1 risk evaluations are conducted at sites

where a site-specific baseline risk assessment is not warranted based on the lack of historical evidence of significant releases and the distribution and concentrations of chemicals in soil. The existing data are considered adequate for each Tier 1 risk evaluation; the evidence that a release did not occur consists of sampling data collected from any area potentially associated with chemical use.

The risk-based concentrations considered in this Tier 1 evaluation address the principal exposure pathways, including ingestion of soil, inhalation of vapors in outdoor air from soil, ingestion of groundwater and inhalation of vapors while showering, and inhalation of vapors in indoor air from soil and groundwater. Uncertainty is associated with two pathways which are not included in this list: dermal contact with soil and groundwater, and ingestion of homegrown produce. The results of the Tier 1 risk evaluation are protective of these two pathways for the following reasons.

- Generic risk-based values are designed to be protective in a range of situations.
- The most stringent of several risk-based values for each chemical was used to calculate the cumulative total risk.
- The maximum concentration of each chemical (except PAHs) reported above detection limits at the AOC is used. In a baseline risk assessment, an upper bound average concentration is used, which can be much lower than the maximum concentration.
- Data from samples from all depths are included in the selection of the maximum concentration. In a site-specific baseline risk assessment, only chemicals reported at particular relevant depths are used.

There is a semiquantitative discussion of the uncertainty associated with the dermal pathway based on the ratio of the dermal pathways to ingestion pathways calculated for the study areas in which HHRAs were conducted.

U.S. EPA guidance states that noncancer hazard values are added together only for chemicals that have the same health effects. In the Tier 1 results, noncancer hazard values are added together. If the total HI without background is below 1, then there is a high level of confidence that there will be no adverse health effects. However, for hazard values greater than 1, it is appropriate to determine whether the chemicals cause the same adverse health effect. The health effects of four metals with hazard values above 1 (iron, manganese, thallium, and vanadium) are discussed in Appendix J, Section J1. Evidence is provided that the noncancer health effects of these metals are not additive with other metals. Also, there is evidence that iron may not cause adverse health effects even at exposures above the PRG.

In addition, there are samples with concentrations of iron, manganese, and some trace metals that are higher than those in the Alameda Point pink background data set. The discussion in Section 4.3 indicates that most of these metals concentrations are naturally occurring in soil and not a result of a release from Navy activities.

6.1.3 HHRA Methodology

The methods for the HHRA are presented in this section. The following subsections include discussions of the data evaluation, exposure assessment, toxicity assessment, risk characterization, and uncertainty analysis.

6.1.3.1 HHRA DATA EVALUATION

The identification of HHRA COPCs in soil was based on the results from analyses of samples collected between 0 and 10 feet bgs (or between the surface and the groundwater table, if the depth to groundwater was less than 10 feet bgs). All metals were included in the list of HHRA COPCs, regardless of whether their maximum concentrations were above or below background concentrations.

All chemicals reported in at least one sample collected during the RI and/or included in the RI, as well as historical data, were included as HHRA COPCs, except calcium, magnesium, potassium, and sodium, which are known to be required human nutrients. The HHRA included PAHs in soil. In total risk, no metals were excluded based on comparison to background.

6.1.3.2 HHRA EXPOSURE ASSESSMENT

The exposure assessment evaluates the ways in which people may come in contact with COPCs now and in the future. In order to conduct multiple risk assessments within the accelerated schedule for IR Site 35, the U.S. EPA concurred with the following simplifications to the U.S. EPA's baseline risk assessment process.

- Baseline risks will be evaluated for residential receptors only.
- Baseline risks will be evaluated for reasonable maximum exposure (RME) only.

Exposure Pathways

Exposure pathways considered complete for the residential scenario at IR Site 35 for this risk assessment are shown on Figure 6-1. Future residents could potentially come into contact with COPCs in vadose zone soil (0 to 10 feet bgs or to the water table, if depth to groundwater is less than 10 feet bgs). During future site activities, deeper soil that is above the water table could be brought to the surface during construction. Although it is unlikely that groundwater would be used as a domestic water supply for drinking and showering, hypothetical exposure pathways for groundwater were included in the HHRA to provide additional information for risk management decisions.

Specific exposure pathways for soil and groundwater evaluated for a future resident include the following:

- incidental ingestion of soil and dermal contact with soil
- inhalation of soil particulates and vapors from soil in outdoor air
- inhalation of vapors from soil and groundwater that may migrate to indoor air

- ingestion of produce grown in local soil
- residential use of groundwater (ingestion, inhalation of vapors while showering, and dermal contact while showering) for study areas with groundwater data

Exposure Point Concentrations

In cases where there are fewer than ten samples, the maximum concentration was used. An EPC was calculated for each COPC using the methods described in Section 6.1.1.

An EPC was calculated for each COPC in soil and groundwater using the U.S. EPA software ProUCL, Version 2.3. Samples reported as nondetect were included as values with a concentration of one-half the detection limit. There were no limitations on the percentage of nondetects. The Student's t-test was used to calculate the EPC for normal data; the Land equation was used for lognormal data; the gamma UCL was used for data that fit a gamma distribution. The approximate Chebyshev limit was used for nonparametric data (U.S. EPA 2002c).

Daily intake is the amount of a chemical that a person could take into his or her body averaged over the period that he or she could be exposed. RME daily intake is estimated by combining variables including contact rate, body weight, exposure duration, and averaging time, with the EPC. The calculation using these variables results in an estimate of daily intake for each exposure pathway. Table J1-2 in Appendix J presents the equations and exposure parameters that were used to estimate daily intake, or dose, for residential for RME assumptions.

The Johnson and Ettinger model, using site-specific soil parameters, was used to calculate EPCs for inhalation of vapors in indoor air originating in soil and groundwater. The physical properties from the soil sample that gave the highest indoor air concentrations were selected from among the 12 samples analyzed for geotechnical data (Table J1-6).

The U.S. EPA Region 9 volatilization factors and particulate emission factor presented in the PRGs were used to calculate EPCs for inhalation of vapors and particulates in outdoor air originating in soil.

Site-specific assumptions were developed for ingestion of homegrown produce. The uptake factors are presented on Table J1-5 in Appendix J.

6.1.3.3 HHRA TOXICITY ASSESSMENT

Toxicological effects fall into two categories: those that could potentially cause cancer (carcinogens) and those that cause other types of adverse health effects (noncarcinogens). The toxicity value for carcinogenic effects is called a cancer slope factor (CSF) and the toxicity value for noncarcinogenic effects is called a reference dose (RfD). Chemicals that show a potential for both carcinogenic and noncarcinogenic health effects are assigned both CSFs and RfDs. Toxicity values are presented in Table J1-7 in Appendix J. Toxicity profiles for each COPC are presented in Attachment J1.

The toxicity values used in this risk assessment were obtained from the table of PRGs published by U.S. EPA Region 9 (U.S. EPA 2004b). Values from U.S. EPA Integrated Risk Information System (IRIS) are confirmed through a review of the IRIS database (U.S. EPA 2006) to check for updates that have occurred since the publication of the PRGs.

Exposures to lead in soil were evaluated using Cal/EPA's Lead Risk Assessment Spreadsheet Version 7 (LeadSpread 7) (Cal/EPA 1999). Site-specific PRGs for lead in soil of 184 mg/kg with a scenario including ingestion of homegrown produce and 322 mg/kg for a scenario without ingestion of homegrown produce were calculated using local concentrations for lead in outdoor air and drinking water supply.

6.1.3.4 HHRA RISK CHARACTERIZATION

The final step in any risk assessment is the combination of daily intake and toxicity values to calculate potential cancer and noncancer health risks. The U.S. EPA directive entitled Memorandum Regarding the Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions (U.S. EPA 1991a) states the following.

> Where cumulative carcinogenic site risk to an individual based on reasonable maximum exposure for both current and future land use is less than 1E-04, and the noncarcinogenic hazard quotient is less than 1, action generally is not warranted unless there are adverse environmental impacts.

Cancer Risk Characterization

Cancer risk represents the probability that exposure to COPCs could result in an increased risk of cancer. Cancer risk is termed "the probability of increased individual excess cancer." This means the risk over and above the natural risk of cancer in the general public. Cancer risk is a statistical probability, and does not predict how many cases of cancer will occur.

cancer risk = daily intake × CSF

The total cancer risk includes risk from COPCs that are reported at or below background concentrations. The cancer risk without metals below background excludes the cancer risk attributed to metals reported at concentrations below background.

Noncancer Hazard and Lead Risk Characterization

Noncancer health effects are evaluated based on an HQ for individual chemicals. An HQ value of 1 indicates that lifetime exposure has limited potential for causing an adverse noncancer effect in sensitive populations, and values of less than 1 can generally be considered acceptable.

noncancer risk = daily intake / RfD

The EPC for lead in soil is compared to the site-specific PRGs of 184 mg/kg for a residential scenario including ingestion of homegrown produce and 322 mg/kg without

ingestion of homegrown produce to determine whether there is a potential risk associated with exposure to lead.

6.1.3.5 RISK CHARACTERIZATION WITHOUT METALS AT BACKGROUND CONCENTRATIONS

A separate calculation of risk without metals below background is presented. The COPC list was refined to eliminate metals in soil or groundwater with maximum concentrations at or below 95th percentile background concentrations. Additionally, statistical evaluations were conducted for metals at AOC 11/EBS Parcels 78–79 and AOC 23 with maximum concentrations above 95th percentile background concentrations but below the maximum concentration in the background data set (Appendix H). These analyses indicated that at AOC 11/EBS Parcels 78–79, cadmium in soil, and arsenic, iron, and manganese in groundwater are below background. These evaluations also indicated that at AOC 23, aluminum, arsenic, chromium, manganese, and vanadium in soil are below background, and arsenic and thallium in groundwater are below background.

6.1.3.6 UNCERTAINTY ANALYSIS

Varying degrees of uncertainty exist in each step of the risk assessment process. To compensate for these uncertainties, the U.S. EPA has developed risk assessment protocols that are designed so that potential risks are not underestimated.

The HHRAs are designed so that any actual exposure will not be underestimated. For direct contact with soil (ingestion and dermal contact), RME exposure assumes a hypothetical resident is in contact with the soil for 350 days a year for 30 years (6 years as a child and 24 years as an adult) for cancer risk. Noncancer hazard is based on a child as the more sensitive receptor.

The HHRAs assume that groundwater will be used as a potable water source in the residence. However, AOC 1 and EBS Parcel 205 (HHRA conducted for both) are in areas that the Water Board has concurred meet exemption criteria for drinking water sources in SWRCB Res. 88-63 (SWRCB 1988) and California Regional Water Quality Control Board Res. 89-39 (RWQCB 2003).

Section 6.1.2.5 also discusses the evidence that the health effects of iron, manganese, thallium, and vanadium are not additive and the evidence that small increases in exposure to iron above the HI of 1 (e.g., by a factor of 10) may not cause adverse health effects.

6.1.4 Lead-Only Evaluations

Two study areas that were subject to lead removals, AOCs 10 and 12, were evaluated only for lead. The health effects of lead are evaluated by comparing the EPC to the site-specific PRG for lead (Section J1.3.3 in Appendix J) of 184 mg/kg with homegrown produce and 322 mg/kg without homegrown produce.

6.2 PRE- AND POST-TCRA RESULTS

The results for pre- and post-TCRA estimates are presented in Tables 6-1 and 6-2, respectively. The pre-TCRA cancer risk and noncancer hazard calculations are presented in Appendix I. The post-TCRA cancer risk and noncancer hazard calculations were included in Appendix B of the SI Report for Transfer Parcel EDC-5 (BEI 2005b).

6.3 TIER 1 EVALUATION RESULTS

This section presents the results of the Tier 1 risk assessments conducted on data from 14 study areas including AOCs 2, 4, 5, 6, 7, 8, 9, 13, 17, 18, 20, 21, 24, and 25. The results are presented in Table 6-3 by exposure group, in Table 6-4 by risk drivers, and in Appendix J. Discussions of the site description and background are presented in applicable attachments to this RI/FS Report.

The results for cancer risks and noncancer hazard values are presented for the following three exposure groups:

- **Exposure Group 1**

  All soil and groundwater pathways (residential development and residential use of groundwater), including ingestion of soil and groundwater, inhalation of vapors in indoor and outdoor air, inhalation of vapors in indoor air while showering, inhalation of particulates from soil in outdoor air, and dermal contact with soil.

- **Exposure Group 2**

  Pathways for soil and vapors from VOCs in groundwater (reasonable current and future use exposure with residential development but with residential water from the current municipal water supply), including ingestion of soil, inhalation of vapors in indoor and outdoor air, inhalation of particulates in outdoor air, and dermal contact with soil. These exposure pathways represent the most reasonable current and future use, as it is highly unlikely that shallow groundwater would ever be used as a source of drinking water.

- **Exposure Group 3**

  Exposure pathways for residential use of groundwater, including ingestion of groundwater and inhalation of vapors in indoor air while showering.

The following subsections discuss only the results for the exposure groups applicable to each study area (Exposure Groups 1, 2, and/or 3). For example, for those study areas where groundwater data were deemed unnecessary per the Work Plan (BEI 2006), only Exposure Group 2 risks were calculated.

The risk-based guidelines for groundwater do not include dermal exposure while showering. The detailed discussions of the results presented in Appendix J explain that including the dermal (showering) pathway for residential use of groundwater would not change the results.

6.3.1 AOC 2 Tier 1 Conclusions

For soil and groundwater data for the three exposure groups at AOC 2, the cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 2×10^{-3} and 7

  Without metals below background: 1×10^{-5} and 4

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 2×10^{-4} and 3

  Without metals below background: 9×10^{-6} and 0.6

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 2×10^{-3} and 4

  Without metals below background: 4×10^{-8} and 4

For reasonable future use, Exposure Group 2 without metals below background, the majority of the cancer risk for soil is associated with Aroclor 1260, which had a low detection frequency.

For residential use of groundwater, the Exposure Group 3 noncancer hazard without metals below background is due largely to manganese (HQ of 3).

6.3.2 AOC 4 Tier 1 Conclusions

For soil and groundwater data for the three exposure groups at AOC 4, the cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 2×10^{-3} and 5

  Without metals below background: 5×10^{-7} and 3

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 9×10^{-5} and 2

  Without metals below background: 5×10^{-7} and 2

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 2×10^{-3} and 3

  Without metals below background: 4×10^{-9} and 1

For the three exposure groups, the cancer risk and noncancer hazards without metals below background are below 10^{-6} and are less than an HI of 1 without iron, respectively.

6.3.3 AOC 5 Tier 1 Conclusions

For soil and groundwater data for the three exposure groups at AOC 5, the cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 5×10^{-3} and 12

  Without metals below background: 4×10^{-3} and 10

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 1×10^{-4} and 6

  Without metals below background: 4×10^{-7} and 5

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 4×10^{-3} and 6

  Without metals below background: 4×10^{-3} and 6

For reasonable future use, the Exposure Group 2 noncancer hazard value without metals below background and without iron and manganese is 1.

For residential use of groundwater without metals below background, the Exposure Group 3 cancer risk is due to arsenic, and the noncancer HI above 1 is due to iron (HQ of 3) and manganese (HI of 3).

6.3.4 AOC 6 Tier 1 Conclusions

The total cancer risk of 5×10^{-6} at AOC 6 is based on exposure pathways for soil only (Exposure Group 2). The cancer risk above 10^{-6} is due to a PCB, Aroclor 1260, identified in 3 of 12 samples. There are no Tier 1 COPCs with noncancer health effect guidelines, and there are no metals data.

6.3.5 AOC 7 Tier 1 Conclusions

At AOC 7, the cancer risks of 9×10^{-5} (total) and 4×10^{-6} (without metals below background) are based on exposure pathways for soil only (Exposure Group 2). The cancer risk above 10^{-6} without metals below background is largely due to Aroclor 1254 reported in 2 of 18 samples. Without metals below background, there are no COPCs with noncancer health effect guidelines; therefore, an HI was not calculated.

6.3.6 AOC 8 Tier 1 Conclusions

For soil, the total cancer risk of 3×10^{-6} at AOC 8 is based on an exposure pathway for soil only (Exposure Group 2).

The total cancer risk is within the risk management range, based on 1 of 14 samples with a reportable quantity of Aroclor 1254. An HI was not calculated because there are no noncancer health effect guidelines for Aroclor 1254, the only COPC identified. There are no metals data.

6.3.7 AOC 9 Tier 1 Conclusions

For soil at AOC 9, the total cancer risk of 9×10^{-5} and the noncancer hazard value of 0.001 are based on exposure pathways for soil only (Exposure Group 2). Without metals below background, the noncancer hazard value is 0.001. There are no COPCs with risk-based guidelines for cancer when metals below background are eliminated, and so a cancer risk was not estimated. The total cancer risk is within the risk management range, and the noncancer hazard value is below 1.

6.3.8 AOC 13 Tier 1 Conclusions

At AOC 13, the cancer risks of 1×10^{-4} (total) and 6×10^{-6} (without metals below background) and the noncancer hazard values of 0.0007 (both total and without metals below background) are based on exposure pathways for soil only (Exposure Group 2). The COPCs are pesticides.

6.3.9 AOC 17 Tier 1 Conclusions

For soil and groundwater data for the three exposure groups at AOC 17, the cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 2×10^{-3} and 16

  Without metals below background: 2×10^{-6} and 13

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 7×10^{-5} and 3

  Without metals below background: 5×10^{-8} and 2

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 2×10^{-3} and 13

  Without metals below background: 2×10^{-6} and 11

For reasonable future use, the Exposure Group 2 noncancer hazard without metals below background is below 1 without iron.

For residential use of groundwater, the Exposure Group 3 cancer risk without metals below background is due to chromium. The noncancer hazard value is due to aluminum (HQ of 1), iron (HQ of 6), and vanadium (HQ of 3). These metals are associated with 2001 data from samples that were likely unfiltered, since they were either not reported at comparable concentrations in the RI or were not reported above detection limits.

6.3.10 AOC 18 Tier 1 Conclusions

For soil and groundwater data for the three exposure groups at AOC 18, the cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 8×10^{-5} and 1

  Without metals below background: 4×10^{-5} and 0.04

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 4×10^{-5} and 0.9

  Without metals below background: an HI of 0.0004; cancer risk was not estimated because there are no COPCs with risk-based guidelines for cancer

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 4×10^{-5} and 0.2

  Without metals below background: 4×10^{-5} and 0.04

For Exposure Groups 1 and 3, the cancer risk without metals below background is associated with naphthalene in groundwater.

6.3.11 AOC 20 Tier 1 Conclusions

For soil and groundwater data for the three exposure groups at AOC 20, the cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 4×10^{-3} and 2

  Without metals below background: 4×10^{-3} and 1

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 4×10^{-5} and 1

  Without metals below background: 3×10^{-8} and 0.4

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 4×10^{-3} and 0.8

  Without metals below background: 4×10^{-3} and 0.8

For residential use of groundwater, the Exposure Group 3 total cancer risk is due to arsenic in groundwater. One of two groundwater samples had a concentration of arsenic above background 95th percentile concentration but below the maximum background concentration. The noncancer hazard value is below 1.

6.3.12 AOC 21 Tier 1 Conclusions

For soil and groundwater data for the three exposure groups at AOC 21, the cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 1×10^{-6} and 0.07

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 2×10^{-8} and 0.04

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 1×10^{-6} and 0.03

For all three exposure groups, the cancer risks are at or below 10^{-6} for soil and groundwater, and the noncancer HIs are below 1.

6.3.13 AOC 24 Tier 1 Conclusions

For soil and groundwater data for the three exposure groups at AOC 24, the cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 9×10^{-4} and 11

  Without metals below background: 2×10^{-4} and 10

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 2×10^{-4} and 4

  Without metals below background: 2×10^{-4} and 3

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 7×10^{-4} and 7

  Without metals below background: 1×10^{-9} and 7

For reasonable future use, the Exposure Group 2 cancer risk without metals below background is due to arsenic in soil. The maximum concentration of arsenic of 11.2 mg/kg is slightly above the background 95th percentile concentration of 9.14 mg/kg but below the maximum background concentration of 15.6 mg/kg. Without arsenic, the cancer risk is below 10^{-6}. The HI for soil is below 1 without iron and not considering the effects of aluminum, manganese, and vanadium as additive.

For residential use of groundwater, the Exposure Group 3 noncancer hazard without metals below background is largely due to iron (HQ of 3) and manganese (HQ of 3).

6.3.14 AOC 25 Tier 1 Conclusions

For soil and groundwater data for the three exposure groups at AOC 25, the cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 3×10^{-3} and 35

  Without metals below background: 3×10^{-3} and 34

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 2×10^{-4} and 6

  Without metals below background: 1×10^{-6} and 5

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 3×10^{-3} and 29

  Without metals below background: 3×10^{-3} and 29

For reasonable future use, the Exposure Group 2 noncancer hazard without metals below background is below 1 without iron and without adding the health effects of metals with HQ values below 1 (aluminum, mercury, thallium, and vanadium). Cadmium is considered consistent with background because the maximum concentration of 1.8 mg/kg is only slightly above the background concentration of 1.72 mg/kg.

For residential use of groundwater, the Exposure Group 3 cancer risk without background is due to arsenic in groundwater, which is only marginally (1 µg/L) above the 95th percentile background concentration and well below the maximum background concentration. Without arsenic, the cancer risk is below 10^{-6}.

The noncancer hazard value in groundwater is primarily due to thallium in a single sample (HI of 22) collected in 1994 and two metals, iron (HQ of 3) and manganese (HQ of 2). Thallium was not reported in any of the 2005 groundwater samples; the 1994 sample was likely not filtered.

6.4 HUMAN-HEALTH RISK ASSESSMENT RESULTS

The results of the five baseline HHRAs for three exposure groups are presented in Table 6-5 and with the risk drivers in Table 6-6. Risk drivers are HHRA COPCs that represent the majority of the risk. Cancer risks and noncancer hazard values are presented for the following three exposure groups:

- **Exposure Group 1**

  All soil and groundwater pathways (residential development and residential use of groundwater), including ingestion of soil and groundwater, inhalation of vapors in indoor and outdoor air, inhalation of vapors in indoor air while showering, inhalation of particulates from soil in outdoor air, dermal contact with soil, and ingestion of homegrown produce.

- **Exposure Group 2**

  Pathways for soil and vapors from VOCs in groundwater (reasonable current and future use exposure with residential development but with residential water from the current municipal water supply), including ingestion of soil, inhalation of vapors in indoor and outdoor air, inhalation of particulates in outdoor air, and dermal contact with soil. These exposure pathways represent the most reasonable current and future use, as it is highly unlikely that shallow groundwater would ever be used as a source of drinking water.

- **Exposure Group 3**

  Exposure pathways for residential use of groundwater, including ingestion of groundwater, inhalation of vapors in indoor air while showering, and dermal contact while showering.

Note that these are the same as the Tier 1 exposure pathways except that two additional pathways are included: ingestion of homegrown produce and dermal contact with groundwater while showering.

6.4.1 AOC 1 HHRA Conclusions

The U.S. EPA cancer risk for Exposure Group 1 is 1×10^{-6}. The Cal/EPA cancer risk is the same for Exposure Groups 1 and 3, at 4×10^{-3}. The U.S. EPA cancer risk for Exposure Group 3 could not be calculated because none of the COPCs in this exposure group are classified as carcinogens. The noncancer hazard values are 29 for Exposure Group 1, and 27 for Exposure Group 3.

The Cal/EPA cancer risk and noncancer hazard are due to ingestion of naphthalene in groundwater.

For reasonable future use, the U.S. EPA and Cal/EPA cancer risks for Exposure Group 2 are 1×10^{-6} and 5×10^{-5}, respectively, due to naphthalene vapors from groundwater to indoor air. The HI is 2. Soil samples were not analyzed for metals, in accordance with the Work Plan (BEI 2006).

6.4.2 AOC 3 HHRA Conclusions

For reasonable future use, the U.S. EPA and Cal/EPA cancer risks for Exposure Group 2 are 3×10^{-3} with and without PAHs. The HI is 3. The cancer risk is associated largely with uptake of the pesticide heptachlor by homegrown produce. Soil samples were not analyzed for metals, in accordance with the Work Plan (BEI 2006).

6.4.3 AOC 11/EBS Parcels 78–79 HHRA Conclusions

For AOC 11/EBS Parcels 78–79, the U.S. EPA and Cal/EPA total cancer risks including metals below background are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 3×10^{-3} and 8×10^{-3}, respectively

  Without metals below background: 2×10^{-3} and 5×10^{-3}, respectively

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 2×10^{-5} and 8×10^{-5}, respectively

  Without metals below background: 5×10^{-6} and 3×10^{-6}, respectively

  Without metals below background and PAHs in soil: 4×10^{-6} and 1×10^{-6}, respectively

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 3×10^{-3} and 8×10^{-3}, respectively

  Without metals below background: 2×10^{-3} and 5×10^{-3}, respectively

The noncancer hazard values including metals below background are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 233

  Without metals below background: 222

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 2

  Without metals below background: 2

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 231

  Without metals below background: 220

For Exposure Groups 1 and 3, the majority of the cancer and noncancer risk is associated with ingestion of PCBs in groundwater, based on the reported concentration of PCBs in one possibly anomalous sample out of ten groundwater samples.

For Exposure Group 2, the majority of the cancer risk is due to the potential vapor migration of TCE in groundwater to indoor air. The HI value without iron is 1.

The EPC for lead of 27.8 mg/kg in soil is below site-specific PRGs of 184 and 322 mg/kg with and without the homegrown produce pathway, respectively.

6.4.4 AOC 23 HHRA Conclusions

For AOC 23, the U.S. EPA and Cal/EPA total cancer risks including metals below background are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 2×10^{-2} and 3×10^{-2}, respectively

  Without metals below background: 2×10^{-2} and 3×10^{-2}, respectively

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 3×10^{-5} and 2×10^{-4}, respectively

  Without metals below background: 2×10^{-5} and 5×10^{-5}, respectively

  Without metals below background and PAHs in soil: 1×10^{-5} and 3×10^{-5}, respectively

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 2×10^{-2} and 3×10^{-2}, respectively

  Without metals below background: 2×10^{-2} and 3×10^{-2}, respectively

The noncancer hazard values including metals below background are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 408

  Without metals below background: 401

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 3

  Without metals below background: 2

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 405

  Without metals below background: 399

The risk drivers are PCBs and PAHs in one sample of groundwater. The hazard values without metals below background are due to PCBs in one groundwater sample.

For current and reasonable future use (Exposure Group 2), the noncancer hazard value without iron is 1.

The maximum concentration of lead in soil of 135 mg/kg is below the site-specific PRGs of 184 and 322 mg/kg with and without ingestion of homegrown produce, respectively.

6.4.5 EBS Parcel 205 Conclusions

For EBS Parcel 205, the U.S. EPA and Cal/EPA total cancer risks including metals below background are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 4×10^{-4} and 2×10^{-3}, respectively

  Without metals below background: 8×10^{-5} and 6×10^{-5}, respectively

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 4×10^{-5} and 1×10^{-4}, respectively

  Without metals below background: 2×10^{-5} and 3×10^{-5}, respectively

  Without metals below background and PAHs in soil: 2×10^{-5} and 3×10^{-5}, respectively

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 3×10^{-4} and 2×10^{-3}, respectively

  Without metals below background: 8×10^{-5} and 6×10^{-5}, respectively

The noncancer hazard values including metals below background are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 6

  Without metals below background: less than 1

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: at or less than 1

  Without metals below background: less than 1

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 4

  Without metals below background: less than 1

The cancer risk drivers without metals below background are VOCs in groundwater. Noncancer hazard values without metals below background are below 1.

For reasonable future use (Exposure Group 2), the U.S. EPA and Cal/EPA cancer risks without metals below background are largely due to vapor migration into indoor air.

6.5 LEAD-ONLY SITE EVALUATIONS

This subsection presents the results for AOCs 10 and 12, where lead removals have occurred in the past and lead is the only COPC. Two EPCs were calculated for lead:

- AOC-wide EPC using all data
- higher-impact EPC using data from areas beneath hardscape that were not included in lead removal action

6.5.1 AOC 10 Evaluation of Lead Exposure

The EPC is 105 mg/kg for the AOC-wide data and 385 mg/kg for the area of higher impact. The concentrations in the former are below the site-specific PRGs of 184 and 322 mg/kg with and without ingestion of homegrown produce, respectively. The concentrations in the area of higher impact are above both site-specific PRGs.

6.5.2 AOC 12 Evaluation of Lead Exposure

The EPC is 77.5 mg/kg for the AOC-wide data and 267 mg/kg for the area of higher impact. The concentrations in the former are below the site-specific PRGs of 184 and 322 mg/kg with and without ingestion of homegrown produce, respectively. The concentrations in the area of higher impact are above the site-specific PRG with ingestion of homegrown produce but below the site-specific PRG without ingestion of homegrown produce.

Section 7
REMEDIAL INVESTIGATION CONCLUSIONS AND RECOMMENDATIONS

Data collected during the RI and previous investigations were used to evaluate the nature and extent of contamination; to conduct study area–specific Tier 1 risk evaluations, baseline HHRAs, and risk evaluations for lead only; and to support decisions for future response actions at the IR Site 35 study areas. Study area–specific conclusions and recommendations are presented in Attachments A through W to this report. This section presents the RI recommendations for each study area.

The RI sampling and laboratory analyses were conducted in accordance with DQOs in the Work Plan (BEI 2006). The DQO problem statement and decision questions for each study area are evaluated in the Conclusions and Recommendations sections of Attachments A through W to this report. In general, the DQOs have been met for the study areas recommended for no further action. Some of the study areas carried forward into the FS portion of this RI/FS Report would require additional data collection.

Preliminary recommendations regarding non-CERCLA fuel constituents are also presented, based on historical and RI data. Fuel concentrations above PSCs (TPH ESLs) will be reviewed under the TPH Program to determine whether areas within the boundaries of IR Site 35 should be incorporated into existing CAAs and whether the Water Board's criteria for closure of low-risk fuel sites are met. If additional work related to TPH contamination is needed at any study area (e.g., SWMUs), then it will be conducted as part of the TPH Program.

7.1 STUDY AREAS CARRIED FORWARD TO THE FEASIBILITY STUDY

This subsection provides the conclusions and recommendations for the study areas that will be carried forward to the FS. The following study areas are included in the FS and are discussed in Sections 8 through 11:

- AOC 1
- AOC 3
- AOC 10
- AOC 12
- AOC 23
- PAHs in soil

7.1.1 AOC 1

The primary focus of investigations conducted at AOC 1 was to assess soil and groundwater quality in the vicinity of three OWSs, two of which had been used as grease pits for the kitchen. Soil and groundwater samples were collected at up to five locations during previous investigations and the RI.

The primary chemical reported at AOC 1 is naphthalene in groundwater; there is no groundwater PSC for this compound. Other reported analyte concentrations in soil and groundwater at AOC 1 were below PSCs.

Naphthalene was reported at 1,200 µg/L in a grab groundwater sample from boring A01SB03 adjacent to OWS 63A. The naphthalene concentration in a saturated soil sample from this boring was below the soil PSC. The concentration in this soil sample likely reflects the naphthalene concentration reported in groundwater from this boring. While the extent of naphthalene in groundwater at AOC 1 has not been completely defined, results of two other groundwater samples (borings A01SB01 and A01SB02, located generally downgradient) suggest the extent is limited. Groundwater at AOC 1 would not be a drinking water source based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.

Results of the baseline HHRA show a total cancer risk of 1×10^{-6} and 4×10^{-3} for U.S. EPA and Cal/EPA, respectively, and an HI of 29. Without residential groundwater use, the Cal/EPA cancer risk is 5×10^{-5} with a noncancer HI of 2. Without residential use of groundwater, the cancer risk and hazard value are driven by the potential migration of naphthalene into indoor air.

Data collected during previous investigations and the RI were sufficient to perform a baseline HHRA and support decisions on the necessity for remedial actions at AOC 1. The nature and extent of naphthalene in groundwater are not completely delineated, and total risk due to naphthalene in groundwater is above the risk management range if groundwater is used as a municipal or domestic supply. However, AOC 1 is located in an area not considered a source for municipal and domestic water supply.

An FS is recommended for AOC 1 for the following reasons.

- Naphthalene is an emergent chemical; the toxicity factor for naphthalene has recently been revised by Cal/EPA and is currently being revised by U.S. EPA.
- The cancer risk without residential groundwater use is driven by inhalation of naphthalene in indoor air. While the cancer risk is within the risk management range for a future resident, the Navy is recommending an FS for AOC 1 to be sensitive to possible public concerns about naphthalene while U.S. EPA revises its toxicity factor.

7.1.2 AOC 3

The primary focus of investigations conducted at AOC 3 was to assess the presence and distribution of pesticides in soil. Soil and groundwater samples were collected at up to eight locations during previous investigations and the RI.

Pesticides (notably heptachlor and dieldrin) were the primary chemicals reported at AOC 3 in the vicinity of a former pesticide mixing area. Heptachlor likely results from a localized release and not from routine pesticide application. Dieldrin was reported in one

unvalidated EBS soil sample at a concentration above the PRG; however, it was not reported in a validated reanalysis of the sample, and may not have been present. Heptachlor was the only pesticide reported in RI samples (in the upper 2 feet bgs in one sample). Only the western extent of heptachlor remains undefined; the proximity of sampling locations in the other directions with results reported below detection limits suggests that the extent may be limited. In accordance with the Work Plan, groundwater samples collected during the RI were not analyzed because pesticides were not reported above detection limits in the deepest soil samples (BEI 2006).

Results of the baseline HHRA show both a U.S. EPA and Cal/EPA RME total cancer risk for soil of 3×10^{-3}; the noncancer HI is 3. Both the cancer risk and noncancer HI are due to ingestion of heptachlor in homegrown produce. Without the homegrown produce exposure pathway, U.S. EPA and Cal/EPA cancer risks are within the risk management range (at 8×10^{-5} and 7×10^{-5}, respectively), and the noncancer HI is less than 1.

Data collected during the RI were sufficient to define the nature and approximate extent of pesticides, perform a baseline HHRA, and support decisions on the necessity for remedial actions at AOC 3.

An FS is recommended to address heptachlor in the upper 2 feet bgs of soil at AOC 3 because the cancer risk is above the risk management range and the HI is above 1. Additional sampling to define the western extent of heptachlor in soil is recommended for inclusion in the FS alternatives. No further action is recommended for groundwater beneath AOC 3 because pesticides are generally not soluble or mobile and are not expected to migrate readily to groundwater.

7.1.3 AOC 10

The primary focus of previous investigations and an NTCRA at AOC 10 was lead in soil associated with LBP on a former radio antenna tower. Lead concentrations above the NTCRA removal action objective of 199 mg/kg remain at AOC 10 outside of the excavation area in shallow soil (0 to 1 foot bgs) in a limited area beneath the hardscape cover. Soil samples were collected at 62 locations during previous investigations and the RI.

Results of the lead evaluation show that the EPC (105 mg/kg) for the entire AOC is below the site-specific PRGs of 184 and 322 mg/kg with and without the ingestion of homegrown produce, respectively. However, the EPC calculated for the area with remaining lead in soil at concentrations above the lead removal action objective is 385 mg/kg, which is above the site-specific PRGs.

The data collected during the RI were sufficient to characterize the nature and extent of contamination, perform a lead evaluation, and support decisions on the necessity for remedial actions at AOC 10. The extent of lead remaining in soil above the NTCRA removal action objective was defined.

An FS is recommended for the area of soil with elevated lead concentrations remaining in the upper 1 foot bgs at AOC 10. This recommendation is based on study area conditions, fate and transport analysis, and results of the lead evaluation. While the lead EPC for the entire AOC is below the site-specific PRGs, the EPC for the area with higher lead concentrations is above these values. No further action is recommended for groundwater beneath AOC 10 because contamination from LBP is generally neither soluble nor mobile and is not expected to readily migrate to groundwater.

7.1.4 AOC 12

The primary focus of previous investigations and an NTCRA at AOC 12 was lead in soil associated with LBP on two former water towers. Lead concentrations above the NTCRA removal action objective remain in portions of AOC 12 outside the excavation area in shallow soil (0 to 1.5 feet bgs) in a limited area beneath the hardscape cover. Soil samples were collected at 107 locations during previous investigations and the RI.

Four other metals were reported above PSCs. Arsenic was reported above the PSC and above background in three samples (and one duplicate sample) located near railroad tracks in the same areas as the higher lead concentrations. It is not known whether the four arsenic concentrations reported above PSCs and background are naturally occurring or associated with previous activities at AOC 12 such as the historical use of pesticides along the railroad tracks. Two of the four arsenic concentrations were collected from borings near the railroad tracks; these concentrations were identified as outliers in Section 4.3.1.2 and are addressed in the FS portion of this RI/FS Report. Iron and vanadium were reported above PSCs in primary and duplicate soil samples collected from a different boring. Iron and vanadium are not believed to be associated with Navy activities, based on the evaluation in Section 4.3. Thallium was reported in the same sample at a concentration equal to the PRG of 5.2 mg/kg and slightly above (5.8 mg/kg) in a duplicate sample. The association of thallium in the same sample with other metals believed to naturally occurring at AOC 12 (e.g., iron, manganese, and vanadium) suggests that thallium is also naturally occurring.

Results of RI samples defined the extent of lead in soil to below the PSC. Concentrations above the lead NTCRA removal action objective remain in the upper 1 foot bgs in a limited area beneath hardscape cover. Lead identified in one storm sewer sediment sample was above the removal action objective of 199 mg/kg. Results of the lead evaluation show that the EPC (77.5 mg/kg) for the entire AOC is below the site-specific PRGs of 184 and 322 mg/kg with and without ingestion of homegrown produce, respectively. However, the EPC calculated for the area with remaining lead in soil above the removal action objective is 267 mg/kg, which is above the site-specific PRG for soil with ingestion of homegrown produce, but below the site-specific PRG for soil without ingestion of homegrown produce.

The data collected during the RI were sufficient to characterize the nature and extent of lead remaining above the NTCRA removal action objective, perform a lead evaluation,

and support decisions on the necessity for remedial actions at AOC 12. The extent of lead remaining in soil above the NTCRA removal action objective was defined.

An FS is recommended for the area of soil with elevated lead concentrations remaining in the upper 1 foot bgs at AOC 12. This is based on study area conditions, fate and transport analysis, and results of the lead evaluation. While the lead EPC for the entire AOC is below the site-specific PRGs, the EPC for the area with higher lead concentrations is above the PRG with ingestion of homegrown produce. The three concentrations of arsenic would also be addressed in the FS for AOC 12, since they are in the same areas as the higher lead concentrations. Sediment with elevated lead concentrations in the storm sewer would also be addressed.

No further action is recommended for groundwater beneath AOC 12 because contamination from LBP is generally neither soluble nor mobile nor expected to migrate readily to groundwater. Additionally, no further action is recommended for the one location with concentrations of iron, thallium, and vanadium. Reported iron concentrations at AOC 12 are within the range of iron concentrations for IR Site 35 that are believed to represent background, as discussed in Section 4.3. Thallium was not consistently above the PRG in a primary and duplicate sample.

7.1.5 AOC 23

AOC 23 was established to address soil and groundwater contaminants in areas previously used for chemical storage or handling at eight EBS parcels (EBS Parcels 71, 72, 110, 121, 123, 124, 125, and 126). Additionally, the regulatory agencies requested further evaluation of NAS generator accumulation points (GAPs) 15 and 29, Naval Aviation Depot (NADEP) GAP 43, OWS 067, and SWMU AOC 098.

Benzene, 1,2-DCA, and vinyl chloride were the only VOCs reported in soil or groundwater above PSCs. Vinyl chloride was the most frequently reported VOC, and was reported above the PSC in one EBS Parcel 123 soil sample, located southeast of Building 13 and southwest of Building 98. Vinyl chloride was either not reported or was below the PSC in shallower soil samples from the same boring. The lateral extent of vinyl chloride in soil appears to be limited, since it was not reported above laboratory detection limits in other soil samples analyzed for VOCs beneath and around adjacent Buildings 13 and 98.

Except for one sample, vinyl chloride concentrations in groundwater reported above the PSC (MCL of 0.5 µg/L) were in the same area (around Building 13) and are laterally defined. One sample with vinyl chloride above the PSC was from the southern portion of AOC 23, southwest of Building 66. IR Site 21 is south of this location, and it is not clear whether this concentration is associated with IR Site 21. The interpreted extent of VOCs in groundwater associated with IR Site 21, as presented in recent Alameda Point basewide groundwater monitoring reports, does not extend north to AOC 23. The highest reported groundwater concentration of vinyl chloride at AOC 23 was 2.8 µg/L from a grab sample. The concentration of vinyl chloride in the southern area was slightly above

a surface water PCS, but it is unlikely that migration of this concentration approximately 150 feet would result in an exceedance in Seaplane Lagoon.

Benzene was reported in one grab groundwater sample at 1.1 µg/L, slightly above the PSC (MCL of 1 µg/L). Two groundwater samples from the eastern portion of AOC 23 had concentrations of 1,2-DCA that are likely associated with the adjacent CAA-3A. RI sampling did not confirm a previous concentration of benzene (27,000 µg/kg) reported in an EBS soil sample collected at 7.5 to 8.5 feet bgs in EBS Parcel 71. This concentration was above the residential soil PRG of 640 µg/kg. Benzene was reported below laboratory detection limits in all soil and groundwater samples collected from the RI boring. It appears that the previously reported benzene in soil at this location is not present. This sampling location is within CAA-B, and soil associated with this sample was likely removed as part of subsequent pipeline removal activities. This assumption is supported by observations of gravelly fill soil in this RI boring.

Diesel-, motor oil-, and some gasoline-range TPH was reported in soil and groundwater across AOC 23 at concentrations above PSCs (TPH ESLs). There was no apparent pattern to the distribution of TPH. Most notably, motor oil–range TPH was reported in a soil sample at 27,000 mg/kg, in the upper 0.5 foot beneath Building 399 in EBS Parcel 126. Diesel-range TPH was also reported in this sample at 1,900 mg/kg. Building 399 borders CAA-3A, located immediately east of AOC 23. Concentrations of TPH in groundwater above PSCs ranged from 110 to 940 µg/L (diesel-range TPH).

B(a)P was reported in 1 of 45 groundwater samples above the PSC (MCL of 0.2 µg/L) and is likely an artifact of sampling (turbid sample with suspended material) rather than representing a dissolved concentration. Because of low solubility and a tendency to sorb to organic matter in soil, B(a)P would not be expected to be dissolved in groundwater. The B(a)P equivalent concentrations in soil above the PSC were considered under the PAH Areas, as discussed in Section 7.1.6.

Aroclor 1260 was the only PCB reported at a concentration above the PSC in 1 of 134 samples. Aroclor 1260 was reported at 500 J µg/kg in soil sample 123-0022 collected from a depth of 0 to 0.5 foot bgs. This is above the residential PRG of 220 µg/kg. However, Aroclor 1260 was reported at 5 µg/kg in duplicate sample 123-044. Samples from previous investigations and the RI defined this possible exceedance both laterally and vertically. PCBs (Aroclors 1016 and 1260) were reported in one groundwater sample below PSCs (MCLs), but the HHRA identified these detections as primary risk drivers. These concentrations are likely an artifact of sampling (associated with suspended material due to turbidity) rather than representing dissolved concentrations. Because of the low solubility and tendency to sorb to organic matter and clay-size particles in soil, these PCBs are typically not found dissolved in groundwater.

Concentrations of arsenic, iron, thallium, and vanadium were present at concentrations above PSCs in soil; however, only the iron and thallium concentrations were also above background. Iron is not believed to be associated with Navy activities, based on the

evaluation in Section 4.3. Only one thallium concentration (6.4 mg/kg) reported in soil was slightly above the PSC (PRG of 5.2 mg/kg).

Four possible outliers at AOC 23 identified in Section 4.3.1.2 are as follows: aluminum at 29,500 mg/kg in a sample collected at A23SB19, arsenic at 12.2 mg/kg in a sample collected at A23SB15, iron at 46,300 mg/kg from sample 126-0009, and arsenic at 14.2 mg/kg from sample 123-0022.

Thallium and arsenic in groundwater were above the PSCs but below background except for one arsenic sample slightly above background. Iron, manganese, and vanadium were above background in groundwater. The concentrations of arsenic, iron, manganese, and vanadium in groundwater are believed to result from dissolution of metals into groundwater due to reducing conditions. No site-related source of organic material that could have caused the reducing conditions was identified in soil or groundwater. One potential non-site-related source might be the presence of BSU sediment in the interval from which groundwater was collected, as discussed in Section 4.3.2.2.

TDS measurement from 38 groundwater samples collected during the RI at AOC 23 ranged from 371 to 21,900 mg/L, and the average TDS concentration was 3,638 mg/L. Yield at six borings was low, based on observations of very slow groundwater recharge during sampling. Groundwater yield was not quantified during sampling; however, yield was low enough that it was difficult to collect enough water for sample analysis. Some samples were collected on a second day due to low yield. However, samples for VOC analysis were taken on the first day.

Results of the baseline HHRA show U.S. EPA and Cal/EPA cancer risks for Exposure Group 1 excluding metals below background were 2×10^{-2} and 3×10^{-2}, respectively, with an HI of 401. The cancer risk above 10^{-4} is due to PAHs in 2 of 45 samples and PCBs in 1 of 37 samples. The HI is largely due to a single detection of Aroclor 1260 in groundwater at a concentration below the MCL; Aroclor 1016 also contributed to the HI (4), but to a much lesser extent. These PCBs are likely an artifact of sampling (associated with suspended material due to turbidity) rather than representing dissolved concentrations. Because of their low solubility and tendency to sorb to organic matter in soil, PCBs are not typically found dissolved in groundwater.

Without metals below background, PAHs in soil and groundwater, and PCBs in groundwater, the U.S. EPA and Cal/EPA risks are 1×10^{-5} and 3×10^{-5}, respectively, with an HI of 2. The HI above 1 is mostly due to iron in soil (0.8) and PCBs.

Data collected during previous investigations and the RI adequately defined the nature and extent of contaminants and were sufficient to perform a baseline HHRA and support decisions on the necessity for remedial actions at AOC 23.

The recommendations for AOC 23 are as follows.

- An FS is recommended for vinyl chloride in groundwater at AOC 23. While contribution to cancer risk is within the risk management range, reported concentrations from grab groundwater samples were above the MCL around

Building 13 and at one location south of Building 66. AOC 23 is located east of Saratoga Street, and groundwater beneath this area is considered a potential drinking water source. The reported concentration of vinyl chloride south of Building 66 is also above a surface water PSC; however, it is considered unlikely that vinyl chloride (reported at 2.7 µg/L) would migrate approximately 150 feet in groundwater and result in a surface water concentration above the PSC of 2.4 µg/L.

The FS alternatives would also address the exceedance of vinyl chloride in soil reported just above the water table at one location in the same area (southeast of Building 13). Initial studies are also recommended for inclusion in the FS alternatives to verify that vinyl chloride concentrations are above MCLs (because concentrations in a well are often lower than in a grab sample).

- It is recommended that TPH results at AOC 23 be reviewed under the TPH Program to determine whether the Water Board's criteria for closure of low-risk fuel sites are met, or whether areas at AOC 23 should be incorporated into CAAs. TPH concentrations were reported in soil and groundwater at AOC 23, most notably in the upper foot of soil at one location beneath Building 399. This building is adjacent to CAA-3A.

- No further action is recommended for benzene and 1,2-DCA reported in groundwater above PSCs (MCLs). Benzene was reported in one grab groundwater sample at 1.1 µg/L, slightly above the PSC (MCL of 1 µg/L). Two concentrations of 1,2,-DCA in groundwater were reported in the eastern portion of AOC 23, and are likely associated with the adjacent IR Site 3 and CAA-3A.

- No further action is recommended for PCBs and PAHs in groundwater. PCBs and PAHs reported in three groundwater samples are the primary risk drivers at AOC 23, and are likely an artifact of sampling (associated with suspended material) rather than representing dissolved concentrations. Because of low solubility and tendency to sorb to organic matter in soil, PCBs and the heavier-molecular-weight PAHs are rarely found dissolved in groundwater.

  Reported concentrations of PAHs and PCBs in groundwater were limited in extent. Aroclors 1260 and 1016 were reported only once in the same grab groundwater sample at concentrations below PSCs (MCLs). The PAHs benz(a)anthracene, benzo(b)fluoranthene, B(a)P, chrysene, and indeno(1,2,3-cd)pyrene were reported in the same grab groundwater sample located within the fuel line removal area for CAA-B; fuel line removal activities were performed subsequent to the sampling. Benz(a)anthracene was also reported in another grab groundwater sample. Of these PAHs, only B(a)P has an MCL; the reported concentration of 3 J µg/L was above the MCL of 0.2 µg/L.

- No further action is recommended for benzene in soil. This sampling location is within CAA-B, and soil associated with this sample likely was removed as part of subsequent pipeline removal activities.

- No further action is recommended for PCBs in soil. The risk contributed by PCBs in soil is within the risk management range, and contribution to the HI is less than 1.

- No further action is recommended for metals in soil or groundwater. Metals at concentrations above background that contribute to HI values above 1 are largely due to iron in soil and iron, manganese, and vanadium in groundwater. These metals have an HQ of 1 or less, and their health effects are not considered additive with other chemicals. These metals are believed to be naturally occurring in soil. In groundwater, these metals are believed to result from dissolution of the metals in soil due to reducing conditions.
- PAHs in soil are addressed as part of the PAH Areas (Section 7.1.6).

7.1.6 PAHs in Soil

PAHs in soil at Transfer Parcel EDC-5 are addressed under IR Site 35 in response to regulatory agency comments on the draft Work Plan (BEI 2006). AOCs 14, 15, and 16, which were identified solely because of the presence of PAHs, have been incorporated into the PAH Areas. Previous investigations identified PAHs in soil above the Alameda Point–specific residential soil screening criterion of 620 µg/kg for B(a)P equivalent concentrations. This prompted the Navy to conduct a TCRA in an area referred to as the West Housing Area (FWEC 2004). Soil removals in the West Housing Area were conducted using a grid pattern (approximately 58 feet square) at EBS Parcels 62, 96, 97 (AOC 4), 80 (AOC 9), 98 (AOCs 5, 7, and 8), and 103 (AOCs 13, 18, and former AOC 14). Soil around sampling locations with B(a)P equivalent concentrations above 1,000 µg/kg in the top 2 feet of soil were removed, except at six locations that were covered by hardscape or areas that were not residential. Average B(a)P equivalent concentrations remaining after the TCRA ranged from 6 to 506 µg/kg (Table 4-5) for the PAH risk assessment DAs described below.

Soil samples were collected at over 1,500 locations throughout Transfer Parcel EDC-5 during previous investigations and at AOCs during the RI. Agencies agreed that additional PAH samples would not be collected outside the AOCs during the RI.

As agreed upon with U.S. EPA on November 14, 2005, baseline risks were not calculated for the PAH Areas in the RI for IR Site 35. However, post- and pre-TCRA risk results associated with PAHs in soil were calculated in the SI Report and this RI/FS Report, respectively. Because of the large size of Transfer Parcel EDC-5, these risks were calculated for 18 subareas (exposure units) within the transfer parcel; these subareas were referred to as DAs. For the 12 DAs subject to the PAH TCRA, the pre-TCRA risk calculations show that cancer risk associated with PAHs in soil range from 2×10^{-6} to 4×10^{-5} for all depth intervals, and range from 2×10^{-6} to 2×10^{-5} for the 0- to 2-foot-bgs depth interval that was subject to the TCRA. Results of post-TCRA calculations (for the same 12 DAs) show slightly lower cancer risks that range from 2×10^{-6} to 3×10^{-5} for all depth intervals, and 2×10^{-6} to 1×10^{-5} for the 0- to 2-foot-bgs depth interval. Reductions in risk for individual DAs ranged from 0 to a factor of 5.

Data collected during previous investigations and the RI were sufficient to characterize the general occurrence and distribution of PAHs in soil at Transfer Parcel EDC-5 and support decisions on the necessity for additional remedial actions for PAHs in soil. In

accordance with the Work Plan, B(a)P equivalent concentrations reported above the PSCs within Transfer Parcel EDC-5 will be included in the FS portion of this RI/FS Report to consider whether remedial action is needed to reduce or manage risk.

7.2 STUDY AREAS RECOMMENDED FOR NO FURTHER ACTION

The following study areas are recommended for no further action: AOCs 2, 4, 5, 6, 7, 8, 9, 11/EBS Parcels 78–79, 13, 17, 18, 20, 21, 24, and 25; EBS Parcel 205; and the SWMUs. These study areas are summarized below.

7.2.1 AOC 2

The primary focus of the investigation at AOC 2 was to assess open space adjacent to Building 562 because of its former use for hazardous materials storage and because stains were observed during the EBS. Soil and groundwater samples were collected at up to 10 locations during previous investigations and the RI.

At AOC 2, no metals were reported in soil at concentrations above PSCs. However, two samples collected at AOC 2 had concentrations of cobalt above background that were identified as outliers in the sitewide statistical evaluation (Section 4.3.1.2). It is not known whether the cobalt concentrations in soil at AOC 2 represent a release from Navy activities or are naturally occurring.

The primary organic chemical reported at AOC 2 was the PCB Aroclor 1260. Aroclor 1260 was reported at concentrations above the PSC in 2 soil samples from borings A02SB03 and A02SB04 (of 17 total samples). Aroclor 1260 was not reported above laboratory detection limits in soil from adjacent locations, suggesting that the extent is limited to the areas around these two borings.

B(a)P equivalent concentrations of PAHs in soil at two locations were above the PSC. These locations were incorporated into the PAH Areas, as discussed in Section 7.1.6.

Results of the Tier 1 risk evaluation for AOC 2 show a total cancer risk of 2×10^{-3}, due to arsenic in both soil and groundwater below background, and an HI of 7, due primarily to manganese in groundwater. Arsenic in soil is not believed to be associated with Navy activities, based on the evaluation in Section 4.3. Furthermore, manganese in groundwater at concentrations above background is believed to result from dissolution of naturally occurring metals in soil due to reducing conditions. Without metals below background and without residential groundwater use, the cancer risk is 9×10^{-6} with an HI of 0.6. Without residential use of groundwater, the cancer risk is due largely to the presence of Aroclor 1260.

Manganese was reported above background in only one of two groundwater samples and was not present at concentrations above background in soil. A potential source of organic material that could result in reducing conditions would be a release from the domestic sewage pumping station located in Building 562, if one occurred. However, any potential for sewage leaks has been reduced or eliminated through retrofitting and refurbishing

activities. There are no known on-site releases from the domestic sewage pumping station.

Data collected during previous investigations and the RI sufficiently defined the nature and extent of contamination to enable the performance of a Tier 1 risk evaluation and support decisions on the necessity for remedial actions at AOC 2.

No further action is recommended at AOC 2 for PCBs (Aroclor 1260) in soil and manganese in groundwater for the following reasons.

- Cancer risk associated with PCBs in soil is within the risk management range of 10^{-6} to 10^{-4}.
- Groundwater at AOC 2 would not be a drinking water source, based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.
- PCBs in soil are generally not soluble or mobile and not expected to readily migrate to groundwater.
- PAHs are addressed as part of the PAH Areas (Section 7.1.6).
- Manganese concentrations above background in groundwater are limited in extent and likely due to reducing conditions.

7.2.2 AOC 4

Soil and groundwater samples were collected at up to 47 locations during previous investigations. Sampling was not conducted during the RI because the agencies and Navy agreed that results from previous investigations were sufficient to support a Tier 1 risk evaluation and decisions on the necessity for remedial action at AOC 4.

Iron was the only metal reported in soil samples at AOC 4 at a concentration above both the PSC and background concentration. The soil sample was collected during the installation of well MBG-1. This sample was part of the data set used to develop the background values and is considered to represent naturally occurring concentrations.

The primary chemicals reported at AOC 4 were metals (iron, mercury, and zinc) in groundwater at concentrations above background or surface water PSCs. Specifically, mercury and zinc were reported above surface water PSCs in one of three samples collected from well MBG-1 located approximately 400 feet from the shoreline. However, a mercury source was not indicated by soil results from the well boring, and it is unlikely that mercury (reported at 0.14 µg/L) would migrate 400 feet in groundwater and result in a surface water concentration above the PSC. Zinc was not consistently reported in groundwater samples (reported in one of three samples) at concentrations above background or above the surface water PSC.

The iron concentrations in one of three groundwater samples are indicative of reducing conditions. No site-related source of organic material that could have caused the

reducing conditions was identified in soil or groundwater. One potential non-site-related source might be the natural conditions associated with the presence of BSU sediment in the interval from which groundwater was collected, as discussed in Section 4.3.2.2.

B(a)P equivalent concentrations in soil above the PSC were considered under the PAH Areas, as discussed in Section 7.1.6.

Results of the Tier 1 risk evaluation show a total cancer risk of 2×10^{-3} and an HI of 5. Total cancer risk without metals below background is 5×10^{-7} (below the risk management range) and the noncancer HI is 3 (the HI is 2 without residential use of groundwater). The noncancer HI values above 1 are due to iron in soil and groundwater. However, iron in soil is considered naturally occurring, and iron was only reported in groundwater at a concentration above background in one of three samples collected from well MBG-1. The presence of iron in groundwater appears to be caused by reducing conditions. Additionally, the health effects for iron are not considered additive with other chemicals.

No further action is recommended at AOC 4. Further evaluation of the extent of metals (iron, mercury, and zinc) in groundwater and analytes in soil (iron and PAHs) is not recommended for the following reasons.

- Without metals concentrations below background, cancer risk is within the risk management range of 10^{-6} to 10^{-4}. The HI above 1 is due mostly to iron in soil and groundwater. Iron in soil is considered to be naturally occurring. Iron in groundwater appears to be caused by reducing conditions and not due to a release associated with Navy activities. Additionally, the health effects for iron are not considered additive with other chemicals.
- Mercury and zinc in groundwater were reported above surface water PSCs; however, zinc was not consistently reported above the Alameda Point background or the PSC. A mercury source was not indicated by soil results from the well boring, and it is unlikely that mercury would migrate 400 feet in groundwater and result in a surface water concentration above the PSC.
- PAHs are addressed as part of the PAH Areas (Section 7.1.6).

7.2.3 AOC 5

The primary focus of investigations at AOC 5 was to assess whether possible releases from a sewage lift station have impacted soil and groundwater quality. Soil and groundwater samples were collected at up to seven locations during previous investigations and the RI.

Iron and manganese in soil were reported at concentrations above PSCs and background in two soil samples from A05SB02 and A05SB03, respectively. The highest concentrations of iron and manganese at AOC 5 were from samples consisting of predominantly fine-grained sediments (containing a higher percentage of clay minerals and iron and aluminum oxides); furthermore, one of these samples was collected from the native BSU (Young Bay Mud). The manganese concentration in the sample collected from the

BSU was identified as an outlier in the sitewide statistical evaluation (Section 4.3.1.2) based on the correlation analysis between manganese and iron and aluminum. B(a)P equivalent concentrations in soil above the PSC were considered under the PAH Areas, discussed in Section 7.1.6.

TDS measurements from two groundwater samples collected during the RI at AOC 5 were 3,240 and 13,700 mg/L. Yield at both borings was low, based on observations of very slow groundwater recharge during groundwater sampling.

Results of the Tier 1 risk evaluation show a total cancer risk of 5×10^{-3}, due to arsenic concentrations present in soil and groundwater (arsenic in soil is present at concentrations consistent with background). The HI is 12, due largely to iron and manganese in soil and groundwater. Iron and manganese in soil are considered naturally occurring. Without metals below background, the cancer risk of 4×10^{-3} is due to arsenic concentrations in groundwater. The HI of 10 is due to iron and manganese in soil and groundwater. Without metals below background and without residential groundwater use, the cancer risk is 4×10^{-7} with an HI of 5, also due to iron and manganese in soil.

Arsenic was the only metal reported above its PSC and above background in a groundwater sample from boring A05SB01. Iron and manganese are risk drivers in groundwater, and were above background (there are no PSCs for groundwater) in only one of two samples. The presence of concentrations of arsenic, iron, and manganese at elevated concentrations in groundwater is indicative of reducing conditions and is believed to result from dissolution of naturally occurring metals in soil. A potential source of organic material that could result in reducing conditions would be a release from the domestic sewage lift station located near former Building 493, if one occurred. However, lift stations do not tend to leak because the inlet and outlets are gravity fed and any potential for sewage leaks has been reduced or eliminated through retrofitting and refurbishing activities. Another possible source of the organic material is natural conditions associated with the presence of BSU sediment in the interval from which groundwater was collected, as discussed in Section 4.3.2.2.

Data collected during previous investigations and the RI were sufficient to perform a Tier 1 risk evaluation and support decisions on the necessity for remedial actions at AOC 5.

No further action is recommended at AOC 5. Further evaluation of the extent of metals in soil and groundwater and PAHs in soil is not recommended for the following reasons.

- The cancer risks above the risk management range and above background are due to arsenic in groundwater, and the HI values above 1 are due to iron and manganese in soil and groundwater.
- The iron and manganese concentrations in soil are considered to be naturally occurring. The iron and manganese concentrations in groundwater are indicative of reducing conditions. Arsenic was also reported at concentrations above background in the same groundwater samples and is likely associated with these reducing conditions. Naturally occurring arsenic is often associated

with iron in minerals. When iron becomes soluble through the reduction process, trace metals such as arsenic can also be released from soil into groundwater (Zheng et al. 2002).

- There is evidence of elevated metals associated with reducing conditions. The source of reducing conditions could be natural or anthropogenic. Potential sources of anthropogenic releases have been corrected.
- PAHs are addressed as part of the PAH Areas (Section 7.1.6).

7.2.4 AOC 6

The primary focus of investigations at AOC 6 was to assess whether PCBs remain in soil west of Building 553, where a PCB removal was performed but no confirmation samples were collected. PCB-containing oil had sprayed out toward the west from an electrical substation housed in this structure. Soil samples were collected at up to 10 locations during previous investigations and the RI.

The primary chemical reported at AOC 6 was Aroclor 1260 in soil, which was reported above the PSC in 1 of 12 samples. The western extent was not defined to concentrations below the PSC; however, the extent is likely limited because PCB-containing oil had sprayed out and is expected to decrease toward the west. B(a)P equivalent concentrations in soil above the PSC were considered under the PAH Areas, as discussed in Section 7.1.6.

Results of the Tier 1 risk evaluation show a total cancer risk for soil of 5×10^{-6}. Only one COPC was identified (Aroclor 1260), and an HI was not calculated because Aroclor 1260 does not have a noncancer health effects guideline.

Data collected during previous investigations and the RI sufficiently characterized the nature and extent of PCBs to perform a Tier 1 risk evaluation and support decisions on the necessity for remedial actions at AOC 6.

Confirmation sampling is recommended at AOC 6 to define the western extent of PCBs (Aroclor 1260) in soil. Otherwise, no further action is recommended for PCBs in soil because associated risk is within the risk management range. No further action is recommended for groundwater because PCBs are generally not soluble or mobile and do not readily migrate to groundwater. No further investigation of PAHs in soil is recommended since PAHs are addressed as part of the PAH Areas (Section 7.1.6).

7.2.5 AOC 7

Soil samples were collected at up to 13 locations during previous investigations. Sampling was not conducted during the RI because the agencies and Navy agreed that results from previous investigations were sufficient to support a Tier 1 risk evaluation and decisions on the necessity for remedial action at AOC 7.

The primary chemical reported at AOC 7 is Aroclor 1254 in soil, reported in 2 of 18 samples, the lateral extent of which appears limited to two areas (BB30 and CC27) based

on nearby sampling results. B(a)P equivalent concentrations in soil above the PSC were considered under the PAH Areas, as discussed in Section 7.1.6.

Results of the Tier 1 risk evaluation show a total cancer risk for soil of 9×10^{-5}, and the noncancer HI is 0.4. Cancer risk, excluding metals below background, is 4×10^{-6}. All reported metals concentrations were less than background. There are no COPCs with noncancer health effects guidelines when metals below background are eliminated.

Further evaluation of the extent of PCBs (Aroclor 1254), metals, and PAHs in soil is not recommended for the following reasons.

- Cancer risk associated with PCBs in soil is within the risk management range of 10^{-6} to 10^{-4}.
- Groundwater impacts are not a concern because PCBs in soil are generally not soluble or mobile and do not readily migrate to groundwater.
- All reported metals concentrations were below background.
- PAHs are addressed as part of the PAH Areas (Section 7.1.6).

7.2.6 AOC 8

Previous investigations identified a PCB, Aroclor 1254, in one shallow sample (0.5 foot bgs) at AOC 8 at a concentration above the PSC. The lateral extent was partially defined. The primary focus of the RI at this study area was to complete the definition of the extent. Soil samples were collected at up to 18 locations during previous investigations and the RI.

The primary chemical reported at AOC 8 was Aroclor 1254 in soil. The RI results completed the definition of the nature and extent of Aroclor 1254 in soil.

Results of the Tier 1 risk evaluation show a total cancer risk for soil of 3×10^{-6}. Only one COPC was identified (Aroclor 1254). There is no noncancer health effects guideline for Aroclor 1254; therefore, an HI was not calculated.

Data collected during previous investigations and the RI sufficiently characterized the nature and extent of PCBs to support a Tier 1 risk evaluation and decisions on the necessity for remedial actions at AOC 8.

No further action is recommended at AOC 8 for the following reasons.

- Cancer risk associated with PCBs in soil is within the risk management range of 10^{-6} to 10^{-4}.
- Groundwater impacts are not a concern because PCBs in soil are generally not soluble or mobile and do not readily migrate to groundwater.

7.2.7 AOC 9

The RI responded to a request by regulatory agencies to further assess whether pesticides are present in soil at AOC 9 due to the area's proximity to IR Site 8 and to evaluate

potential contaminants from a grease trap formerly located in AOC 9. Soil and groundwater samples were collected at up to seven locations during previous investigations and the RI.

No chemicals were reported in soil or groundwater at concentrations above PSCs at AOC 9.

Results of the Tier 1 risk evaluation show a total cancer risk for soil of 9×10^{-5} due to arsenic in soil; the noncancer HI is 0.001. Without arsenic, which was present at a concentration below background, there is no estimated cancer risk because arsenic is the only COPC at AOC 9 classified as a carcinogen.

Data collected during previous investigations and the RI were sufficient to perform a Tier 1 risk evaluation and support decisions on the necessity for remedial actions at AOC 9.

No further action is recommended for AOC 9. Further evaluation of the extent of the pesticide endrin and the metal arsenic in soil is not recommended for the following reasons.

- The noncancer HI is less than 1, and without metals below background, no carcinogenic COPCs were identified.
- Groundwater impacts are not a concern because pesticides in soil are generally not soluble or mobile and do not readily migrate to groundwater.
- All reported arsenic concentrations were below background.

7.2.8 AOC 11/EBS Parcels 78–79

AOC 11 and EBS Parcels 78–79 were addressed separately in the Work Plan and field effort. However, they have been combined in this RI/FS Report because their boundaries are contiguous and they are being addressed as one study area for risk assessment purposes.

The primary focus of investigations at AOC 11 was to assess whether soil and groundwater quality at this AOC was impacted by chemical storage at EBS Parcel 77, stains observed at Building 101 during the EBS, or pesticides associated with adjacent IR Site 8. Additionally, the RI addressed a request by regulatory agencies on behalf of the Alameda Point Collaborative to further assess soil and groundwater quality at EBS Parcels 78–79 because these parcels are being used by the community. Soil and groundwater samples were collected at up to 26 locations during previous investigations and the RI.

The only analytes reported above PSCs were metals and diesel-range TPH in soil samples. Iron and vanadium were reported above PSCs in soil at six borings; however, these metals are not believed to be associated with Navy activities based on the evaluation in Section 4.3. Arsenic was reported above the PSC in three groundwater samples; however, additional statistical analysis shows that the concentrations are below background (Appendix H). TPH exceedances appeared to be distributed randomly, were

in the upper 1 foot bgs of soil, and were defined to below detection limits vertically by deeper samples. TCE was reported in four groundwater samples at concentrations below the PSC (the MCL) but is mentioned here because the U.S. EPA cancer risk for inhalation of TCE vapors in indoor air is above 10^{-6}. The reported concentrations of TCE ranged from 0.45 J to 1.1 µg/L. Results of RI samples indicate that AOC 11 is not impacted by pesticides from IR Site 8.

TDS concentrations from eight groundwater samples collected during the RI at AOC 11/ EBS Parcels 78–79 ranged from 1,010 to 7,720 mg/L; the average TDS concentration was 3,754 mg/L.

Results of the baseline HHRA show a U.S. EPA and Cal/EPA total cancer risk of 3×10^{-3} and 8×10^{-3}, respectively, (above the risk management range) with an HI of 233. Without metals below background (arsenic, cadmium, and iron in soil and arsenic, iron, and manganese in groundwater), U.S. EPA and Cal/EPA cancer risks are 2×10^{-3} and 5×10^{-3}, respectively, with an HI of 222. The cancer risk and HI are largely due to only one report of Aroclor 1260 in ten groundwater samples at a concentration below the PSC (the MCL), and is likely an artifact of sampling (associated with suspended material due to turbidity) rather than representing a dissolved concentration. Because of their low solubility and tendency to sorb to organic matter in soil, PCBs are not typically found dissolved in groundwater. Without metals below background, residential use of groundwater, and PAHs in soil, U.S. EPA and Cal/EPA risks are 4×10^{-6} and 1×10^{-6}, respectively, with an HI of 2. The U.S. EPA cancer risk above 10^{-6} is due to potential migration of TCE in groundwater to indoor air. The HI above 1 is mostly due to iron (HQ of 1) in soil. There are no chemicals with a hazard value greater than 1, and the health effects of iron are not considered additive with other chemicals.

The data collected during previous investigations and the RI adequately defined the nature and extent of contamination and were sufficient to perform a baseline HHRA and support decisions on the necessity for remedial action at AOC 11/EBS Parcels 78–79. Diesel-range TPH in soil above the PSC appears to be limited in extent laterally and is defined vertically.

No further action is recommended at AOC 11/EBS Parcels 78–79. Further evaluation of the extent of TPH and metals in soil and metals, PCBs, pesticides, and TCE in groundwater is not recommended for the following reasons.

- Diesel-range TPH in soil above the PSC appears to be limited in extent laterally and is defined vertically. Additionally, it is not providing a significant, if any, source of soluble constituents to groundwater.
- Aroclor 1260 in groundwater, the primary risk driver at the study area, was reported only once in ten samples, and the concentration was below the PSC (the MCL). Aroclor 1260 is likely an artifact of sampling (associated with suspended material due to turbidity) rather than representing a dissolved concentration. Because of their low solubility and tendency to sorb to organic matter in soil, PCBs are not typically found dissolved in groundwater.

- The cancer risk and HI above risk management levels are largely due to the single report of Aroclor 1260 (at a concentration below the MCL) in groundwater that is likely an artifact of sampling. Without Aroclor 1260 and metals below background, the HI above 1 is due to iron (HI of 1) in soil. The health effects of iron are not considered additive with other chemicals.
- TCE was reported in four groundwater samples at concentrations below the PSC (MCL), and risk results indicated that U.S. EPA and Cal/EPA cancer risks associated with TCE were within the risk management range.
- Metals in soil in the area where an NTCRA was performed for LBP in soil are not risk drivers. The other metals above background in soil at AOC 11/EBS Parcels 78–79 are evenly distributed and associated with iron and manganese, and there are no unusually high concentrations suggesting a release. As discussed in Section 4.3.2, a strong positive correlation with iron suggests that the concentrations of metals are naturally occurring. In groundwater, there is no indication of a release of metals. Only chromium and selenium were reported at concentrations above background, in a limited number of samples, and are not risk drivers.

7.2.9 AOC 13

Previous investigations identified pesticides (4,4′-DDD, 4,4′-DDT, and dieldrin) in soil at three locations above PSCs. Additionally, soil samples were also analyzed for PAHs in the vicinity of a boring where the B(a)P equivalent concentration was above the PSC. The lateral extent of pesticides and PAHs was only partially defined. The primary focus of the RI at this area was to complete the definition of the extent. Soil samples were collected at up to 18 locations during previous investigations and the RI.

The primary chemicals reported at AOC 13 include the pesticides 4,4′-DDD, 4,4′-DDT, and dieldrin. Except for the concentrations of dieldrin at one deeper sampling location (103-0020), the lateral extent of pesticides was defined by samples collected during the RI, and the vertical extent was defined during previous investigations. Results of nearby samples (both laterally and vertically) suggest that the extent of 4,4′-DDT and 4,4′-DDD at the deeper sampling location is limited. B(a)P equivalent concentrations in soil above the PSC were considered within the PAH Areas, as discussed in Section 7.1.6.

Results of the Tier 1 risk evaluation show a total cancer risk for soil of 1×10^{-4} (at the upper end of the risk management range), due largely to arsenic in soil; the noncancer HI is 0.0007. Without arsenic, which is below background, the cancer risk is 6×10^{-6}, due primarily to 4,4′-DDT, 4,4′-DDD, and dieldrin.

Data collected during previous investigations and the RI sufficiently characterized the nature and extent of pesticides to perform a Tier 1 risk evaluation and support decisions on the necessity for remedial actions at AOC 13.

No further action is recommended at AOC 13 for the following reasons.

- Without arsenic below background, cancer risk associated with pesticides in soil is within the risk management range of 10^{-6} to 10^{-4} and the HI is less than 1.
- Groundwater impacts are not a concern because pesticides in soil are generally not soluble or mobile and do not migrate readily to or in groundwater.
- PAHs are addressed as part of the PAH Areas (Section 7.1.6).

7.2.10 AOC 17

The primary focus of investigations at AOC 17 was to assess whether historical activities at this study area or the adjacent IR Site 5 have impacted groundwater. Soil and groundwater samples were collected at seven locations during previous investigations and the RI.

The primary chemicals reported at AOC 17 were PAHs, TPH, and iron in soil and metals (aluminum, arsenic, chromium, and nickel) in groundwater. TPH in soil does not appear to be widespread or provide a source of soluble constituents to groundwater, because TPH was not reported in groundwater at concentrations above laboratory detection limits and the only other fuel-related constituent reported at the study area was toluene (one report of 0.29 µg/L) in groundwater. Metals in soil and groundwater are believed to be naturally occurring rather than results of Navy releases. Arsenic concentrations in groundwater are below background. Other metals concentrations above PSCs were identified in groundwater samples from previous investigations and appear to represent total rather than dissolved metals concentrations, since comparable concentrations of dissolved metals were not reported in RI groundwater samples. The B(a)P equivalent concentrations in soil above the PSC were considered under the PAH Areas, as discussed in Section 7.1.6.

Results of the Tier 1 risk evaluation show a total cancer risk of 2×10^{-3}, due primarily to arsenic in soil and groundwater and chromium in groundwater. The HI of 16 is due primarily to iron in soil and aluminum, iron, manganese, and vanadium in groundwater. While Tier 1 risk results indicate cancer risk (without metals below background) for both soil and groundwater (residential use) pathways is in the low risk management range (2×10^{-6}), the HI is greater than 1. In soil, this is driven by the maximum reported iron concentration (27,000 mg/kg; HQ of 1). This concentration is greater than the background 95th percentile concentration (22,280 mg/kg) but below the maximum concentration of 27,900 mg/kg. Iron in soil is not considered to be associated with Navy activities based on the evaluation in Section 4.3. In groundwater, the HI is driven by maximum concentrations of iron (64,900 µg/L), vanadium (124 µg/L), and aluminum (45,800 µg/L) (HQs of 6, 3, and 1, respectively) that likely represent total rather than dissolved concentrations.

Data collected during previous investigations and the RI were sufficient to perform a Tier 1 risk evaluation and support decisions on the necessity for remedial actions at

AOC 17. Significant concentrations of contaminants do not appear to have impacted soil or groundwater at AOC 17. While TPH exceedances have been identified in soil samples collected from 9 to 9.5 feet bgs and a high concentration of total recoverable petroleum hydrocarbons was reported in a surface sample, it appears that the TPH remaining in soil is likely weathered and not providing a source of soluble constituents to groundwater. Additionally, no other significant contamination has been identified that is indicative of a release from AOC 17 or the adjacent IR Site 5.

No further action is recommended at AOC 17. Further evaluation of the extent of TPH in soil, metals in soil and groundwater, and PAHs in soil is not recommended for the following reasons.

- TPH remaining in soil is likely weathered and not providing a source of soluble constituents to groundwater.
- Without metals below background, cancer risk associated with soil and residential use of groundwater is within the risk management range of 10^{-6} to 10^{-4}. Without iron, the HI for soil pathways is 1. Aluminum, iron, and vanadium have elevated groundwater concentrations that likely represent total rather than dissolved concentrations.
- PAHs are addressed as part of the PAH Areas (Section 7.1.6).

7.2.11 AOC 18

The primary focus of investigations at AOC 18 was to assess whether historical chemical storage associated with NAS GAP 23 has impacted soil and groundwater. Soil and groundwater samples were collected at up to 12 locations during previous investigations and the RI.

Organic chemicals at AOC 18 were not reported in soil or groundwater at concentrations above PSCs. Arsenic concentrations in soil were above the PSC but below background.

Groundwater at AOC 18 would not be a drinking water source, based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.

Results of the Tier 1 risk evaluation show a total cancer risk of 8×10^{-5} and an HI of 1 due to arsenic in soil and naphthalene in groundwater. Without metals below background and without residential groundwater use, there is no cancer risk presented because none of the remaining COPCs have risk-based guidelines for cancer. Naphthalene in groundwater is not a concern to indoor air since the ESL for naphthalene in groundwater for protection of indoor air (3,200 µg/L) is well above the reported level of 3.6 µg/L. The HI without metals below background is 0.04.

Data collected during previous investigations and the RI were sufficient to perform a Tier 1 risk evaluation and support decisions on the necessity for remedial actions at

AOC 18. Significant concentrations of contaminants do not appear to have impacted soil or groundwater at AOC 18.

No further action is recommended at AOC 18 for the following reasons.

- Risk results indicate that reported chemicals are not present in soil or groundwater at concentrations that pose a significant risk to human health; total risk is within the risk management range of 10^{-6} to 10^{-4}, with an HI of 1. Without metals below background and without residential groundwater use, no carcinogenic COPCs were identified and the HI is less than 1.
- All reported metals concentrations in soil and groundwater were below background.

7.2.12 AOC 20

The primary focus of investigations at AOC 20 was to assess soil and groundwater quality in the vicinity of two OWSs. Soil and groundwater samples were collected at up to four locations during previous investigations and the RI.

The only constituents reported above PSCs at AOC 20 were TPH and arsenic in groundwater and arsenic in soil. Diesel-range TPH and JP-5–range TPH in groundwater in one of two groundwater samples were above groundwater and surface water PSCs (TPH ESLs). Arsenic in groundwater (26.9 µg/L) was also above the PSC (MCL of 10) and the background 95th percentile concentration (20.72 µg/L), but below the maximum background concentration of 40.7 µg/L. Arsenic concentrations in soil were below background. Therefore, arsenic concentrations in soil and groundwater are considered to be naturally occurring because they are within the range of background concentrations. CAA-B is immediately south of AOC 20.

Groundwater at AOC 20 would not be a drinking water source, based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.

Results of the Tier 1 risk evaluation show a total cancer risk of 4×10^{-3} with an HI of 2. The total cancer risk and HI without metals below background are 4×10^{-3} and 1, respectively. The cancer risk is largely due to arsenic in groundwater (4×10^{-3}). Arsenic in groundwater is believed to be naturally occurring. Without residential use of groundwater and metals below background, cancer risk is 3×10^{-8}, with an HI of 0.4.

Data collected during previous investigations and the RI were sufficient to perform a Tier 1 risk evaluation and support decisions on the necessity for remedial actions at AOC 20. TPH in groundwater was the primary chemical reported above PSCs; arsenic in groundwater was reported above the PSC and above background, but is considered to be naturally occurring.

No further action is recommended at AOC 20 as part of IR Site 35. Further evaluation of the extent of TPH and arsenic in groundwater is not recommended for the following reasons.

- TPH data should be evaluated along with CAA-B under the TPH Program to see if the Water Board's criteria for closure of low-risk fuel sites are met.
- Without metals below background, cancer risk associated with soil and residential use of groundwater is 4×10^{-3} and the HI is 1. However, the cancer risk is due predominantly to arsenic in groundwater, and arsenic is considered to be naturally occurring because concentrations are within the range of background concentrations. Without metals below background and without residential use of groundwater, cancer risk is below the risk management range and the HI is below 1.
- Groundwater at AOC 20 would not be a drinking water source, based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.

7.2.13 AOC 21

The primary focus of investigations at AOC 21 was to assess soil and groundwater quality in an area historically used as a taxiway and parking apron and also for chemical storage. Previous investigations identified low concentrations of TCE in groundwater; the SI Report recommended this area for further assessment based on a screening-level cancer risk above 10^{-6} (BEI 2005b). Soil and groundwater samples were collected at up to seven locations during previous investigations and the RI.

The only chemical reported above PSCs at AOC 21 was TPH. Diesel-range TPH and gasoline-range TPH were reported at concentrations above PSCs (TPH ESLs) in soil and groundwater samples collected from one boring. Diesel-range TPH in groundwater above the PSC was also reported at a second boring. Reported TPH concentrations defined the lateral and vertical extent in soil, and downgradient RI groundwater samples did not have TPH above laboratory detection limits. These borings are located on the border or within CAA-B. TCE was reported in groundwater samples from RI borings at concentrations below the PSC (MCL of 5).

Groundwater at AOC 21 would not be a drinking water source based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.

Results of the Tier 1 risk evaluation show a cancer risk of 1×10^{-6} and a noncancer HI of 0.07 for all soil exposure pathways and for residential use of groundwater.

Data collected during previous investigations and the RI were sufficient to perform a Tier 1 risk evaluation and support decisions on the necessity for remedial actions at AOC 21. TPH in groundwater was the primary chemical reported above PSCs.

No further action is recommended at AOC 21 as part of IR Site 35. Further evaluation of the extent of TPH and TCE in groundwater is not recommended for the following reasons.

- TPH data should be evaluated along with CAA-B under the TPH Program to see if the Water Board's criteria for closure of low-risk fuel sites are met.
- Cancer risk associated with soil and residential use of groundwater is 1×10^{-6} and the noncancer HI is 0.07.

7.2.14 AOC 24

The primary focus of investigations at AOC 24 was to assess soil and groundwater quality in the vicinity of a former OWS. Soil and groundwater samples were collected at up to two locations during previous investigations and the RI.

Metals (arsenic and iron) and TPH were reported at concentrations above PSCs at AOC 24. Arsenic and iron were reported in soil at concentrations above PSCs and background at the same location; however, these metals are not believed to be a result of Navy activities, based on the evaluation in Section 4.3. The soil sample with reported arsenic and iron concentrations above background was collected at 5 to 6 feet bgs in the native BSU and also had concentrations of aluminum, barium, chromium, copper, lead, magnesium, mercury, nickel, potassium, sodium, vanadium, and zinc at concentrations above background. The depth of this sample, the type of sample material (i.e., clay), and the number of metals with concentrations above background support the conclusion that metals concentrations in this sample are naturally occurring. Arsenic was reported in groundwater at concentrations below background.

Diesel-range TPH was reported in groundwater at the same location at 110 µg/L, which is slightly above the PSC (100 µg/L). The laboratory qualified this result saying that it represents a wide range of hydrocarbons not indicative of diesel. Neither JP-5–range nor motor oil–range TPH was reported in the groundwater sample.

Results of the Tier 1 risk evaluation show a total cancer risk of 2×10^{-4} without metals below background and an HI of 10. Most of the cancer risk is from arsenic in soil (2×10^{-4}), and most of the noncancer hazard is from iron (HQ of 1) and vanadium (HQ of 0.8) in soil and iron (HQ of 3) and manganese (HQ of 3) in groundwater. Based on statistical analysis (Section 4.3), arsenic, iron, and vanadium identified in soil are believed to be naturally occurring rather than the result of releases from Navy activities. As discussed in Section 4.3, the concentrations of iron and manganese in groundwater result from dissolution of iron in soil due to reducing conditions. A source of organic material that could cause these conditions was not identified, but could be related to the presence of BSU sediment within the interval from which groundwater was collected and the likely presence of the Marsh Crust beneath AOC 24.

Data collected during previous investigations and the RI were sufficient to perform a Tier 1 risk evaluation and support decisions on the necessity for remedial actions at

AOC 24. TPH in groundwater was the primary chemical reported slightly above PSCs; arsenic and iron in soil are present above PSCs and background, but are considered to be naturally occurring.

No further action is recommended at AOC 24. Further evaluation of the extent of TPH in groundwater, and arsenic and iron in soil is not recommended for the following reasons.

- Diesel-range TPH was reported at a concentration only slightly above the PSC, and the laboratory noted that the TPH reported in the sample represents a wide range of hydrocarbons and is not indicative of diesel.
- Arsenic in soil is believed to be naturally occurring. Without arsenic in soil or groundwater, the total cancer risk is 1×10^{-9} and the HI is 10. The HI of 10 is due primarily to iron and vanadium in soil, and iron and manganese in groundwater. The concentrations of iron and vanadium in soil are considered naturally occurring. In groundwater, concentrations of these metals are indicative of reducing conditions and are considered to result from dissolution of metals in soil; however, a source of organic material was not identified.

7.2.15 AOC 25

Previous investigations identified metals in groundwater, notably thallium, cadmium, and arsenic at concentrations above PSCs north of Building 503 and arsenic above the PSC in the southern portion of AOC 25. Previous investigations also identified TPH above PSCs in soil and groundwater in the northern portion of AOC 25, near CAA-3C, and motor oil–range TPH above the PSC in soil in the southern portion of the AOC. TPH was not consistently reported above PSCs in groundwater samples collected from two monitoring wells in the southern portion of the AOC. The primary focus of the RI at this area was to assess the distribution of metals in soil and groundwater. Additionally, the RI assessed the impact, if any, of TPH on groundwater downgradient of the TPH identified above a PSC in soil in the southern area. Soil and groundwater samples were collected at up to 21 locations during previous investigations and the RI.

The primary chemicals reported at concentrations above PSCs at AOC 25 were TPH (motor oil–range and diesel-range) and metals (arsenic, iron, and lead) in soil, and TPH (motor oil–range and diesel-range) and metals (arsenic, cadmium, and thallium) in groundwater. TPH in soil in the southern portion of AOC 25 does not appear to be providing a source of soluble constituents to groundwater, since TPH was not consistently reported above PSCs in groundwater samples from the two monitoring wells located within this AOC and was not reported above laboratory detection limits in an RI groundwater sample. It is likely that the historical groundwater samples from these wells did not undergo silica gel cleanup prior to analysis and that the TPH concentrations result from positive interference from nonpetroleum organic matter in the sample. TPH concentrations were reported above PSCs in the northern portion of AOC 25; this sampling location is close to CAA-3C and the TPH was likely associated with this CAA.

The concentrations of arsenic and iron in soil at AOC 25 are not believed to be associated with Navy activities, based on the evaluation in Section 4.3. Zinc and copper at

concentrations above background in soil were identified as outliers in Section 4.3.1.2. Zinc was present at 316 mg/kg in a sample collected from boring MBG-3. There are seven sampling locations in the surface in the vicinity of this boring, and only one sample had a concentration of zinc above background. There is no indication of a widespread release of zinc. Copper was reported at a concentration of 230 mg/kg in sample 135-0009M. This sample was considered an outlier during the review of the metals data without iron or aluminum analysis. Lead in soil above background and above the PSC was reported in only 1 of 30 samples and does not represent a widespread concern. Additionally, the maximum concentration of lead in soil is greater than background but is below the site-specific PRG for lead.

Cadmium and thallium in groundwater are believed to have resulted from the sampling technique (likely unfiltered HydroPunch or equivalent samples) and represent cadmium and thallium in particulates in the sample, rather than dissolved concentrations. Concentrations of arsenic, iron, and manganese in groundwater are believed to result from dissolution of naturally occurring metals in soil due to reducing conditions.

Results of the Tier 1 risk evaluation show a cancer risk of 3×10^{-3} and an HI of 35, considering both soil and residential use of groundwater. Cancer risk is 1×10^{-6} and the HI is 34 without metals below background and without arsenic in groundwater. Most of the HI is due to thallium in groundwater. The thallium result is not representative of conditions at the study area and was reported in only 1 of 14 samples. Without thallium, the HI is 12 for soil and groundwater with the majority (HQ of 9) from iron and manganese. Without groundwater use and without metals below background, the cancer risk is 1×10^{-6} and the HI is 5, due largely to cadmium, iron, and vanadium; however, the maximum concentration of cadmium is only marginally above the background 95th percentile concentration.

As discussed in Section 4.3, the concentrations of iron and vanadium in soil are likely naturally occurring. Arsenic in soil is considered consistent with background, and manganese in soil is below background. In groundwater, the arsenic, iron, manganese, and vanadium concentrations result from dissolution of these metals in soil due to reducing conditions. Potential sources of organic material include TPH from CAA-3C and natural conditions associated with the presence of BSU sediment in the interval from which groundwater was collected.

The data collected during the RI were sufficient to perform a Tier 1 risk evaluation and support decisions on the necessity for remedial action at AOC 25.

Based on study area conditions and results of the Tier 1 risk evaluation, no further action is recommended for AOC 25. Further evaluation of the extent of TPH and metals in soil and groundwater is not recommended for the following reasons.

- Motor oil–range TPH was reported in the upper 0.5 foot of soil near Main Street and has not significantly impacted groundwater. Groundwater samples from two downgradient monitoring wells had TPH concentrations that exceeded PSCs during one sampling event (December 2004), but TPH was not reported

above laboratory detection limits in any other samples collected from these wells. The downgradient groundwater sample collected during the RI did not have reported concentrations of TPH in the sample.

- Historical TPH soil and groundwater samples were probably not analyzed using silica gel cleanup, and the results may include a contribution from nonpetroleum chemicals present in the samples.
- The two locations in the northern portion of AOC 25 with TPH exceedances in both soil and groundwater are likely associated with adjacent CAA-3C and should be assessed under the TPH Program.
- Iron and vanadium in soil are likely naturally occurring. Arsenic in soil is considered consistent with background. Lead in soil above background and above the PSC was reported in only 1 of 30 samples and does not represent a widespread concern. Additionally, the maximum concentration of lead in soil is greater than background but is below the site-specific PRG for lead.
- Cadmium and thallium were reported in only one older grab groundwater sample from the SWBZ collected prior to the 2005 RI sampling. Their presence is believed to be due to suspended soil particles in the sample rather than to dissolved concentrations. Neither cadmium nor thallium was reported in the filtered groundwater samples collected during the 2005 RI.
- Concentrations of arsenic, iron, manganese, and vanadium in groundwater result from dissolution of these metals under reducing conditions. Potential sources of organic material include TPH from CAA-3C and natural conditions associated with the presence of BSU sediment in the interval from which groundwater was collected.

7.2.16 EBS Parcel 205

The RI addressed a request by regulatory agencies to assess soil and groundwater quality near NADEP GAP 73. Since it is uncertain whether it was located north or east of Building 523, samples were collected during the RI at two locations. Soil and groundwater samples were collected at six locations during previous investigations and the RI.

The chemicals reported above PSCs at EBS Parcel 205 include cis-1,2-DCE, vinyl chloride, and TPH in groundwater. VOCs were reported slightly above MCLs, but not above surface water PSCs at one of two groundwater sampling locations. Reported gasoline- and JP-5–range TPH concentrations in a groundwater sample from one boring were above the groundwater PSC, but were below the surface water PSCs. Arsenic was also reported in one groundwater sample above the PSC, but below the background concentration. Chemicals were not reported in soil above PSCs at EBS Parcel 205.

Results of the baseline HHRA show a U.S. EPA and Cal/EPA total cancer risk of 4×10^{-4} and 2×10^{-3}, respectively, due to arsenic and VOCs. The HI is 6, due largely to arsenic in soil and groundwater. Without arsenic, which is present in soil and groundwater at concentrations below background, U.S. EPA and Cal/EPA total cancer risks are 8×10^{-5} and 6×10^{-5}, respectively, due to VOCs in groundwater. The HI is 0.9.

Data collected during previous investigations were sufficient to perform a baseline HHRA and support decisions on the necessity for remedial actions at EBS Parcel 205. The extent of VOCs in groundwater is not completely defined; however, the relatively low concentrations of VOCs and analytical results for other groundwater samples (which were below PSCs) suggest that NADEP GAP 73 did not significantly impact soil or groundwater.

No further action is recommended at EBS Parcel 205. Further evaluation of the extent of arsenic, VOCs, and TPH in groundwater, or of arsenic in soil and groundwater is not recommended for the following reasons.

- Arsenic concentrations in soil and groundwater were below background.
- Without the background metal arsenic, risk results indicate that VOCs are not present in groundwater at concentrations that pose a significant risk to human health; cancer risk is within the risk management range of 10^{-6} to 10^{-4} and the HI is less than 1.
- Although VOC concentrations were slightly above MCLs, groundwater at EBS Parcel 205 would not be a drinking water source, based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets the exemption criteria for municipal and domestic water supply designation. Additionally, it is unlikely that groundwater would be used as a drinking water source due to likely saltwater intrusion from sustained pumping, since EBS Parcel 205 is adjacent to Seaplane Lagoon.
- TPH concentrations were above groundwater PSCs. As discussed above, it is unlikely that the groundwater at this parcel would be used as a drinking water source. TPH data should be evaluated along with CAA-B under the TPH Program to see if the Water Board's criteria for closure of low-risk fuel sites are met.
- VOCs in groundwater samples were not reported above surface water PSCs. While arsenic was reported above a surface water PSC in one sample, the concentration was below background.

7.2.17 Solid Waste Management Units

The regulatory agencies requested further evaluation of nine SWMUs (OWS 017; ASTs 016, 039, 152, 173A, 173B, 173C, and 392; and former UST[R]-11) as part of the IR Site 35 RI.

The Navy wrote a letter dated July 26, 2005, to DTSC and the Water Board requesting that ASTs 016, 039, 152, 173A, 173B, 173C, and 392 be removed from the list of SWMUs evaluated in Transfer Parcel EDC-5 because they were known to contain only petroleum hydrocarbons rather than waste material, and thereby met the CERCLA petroleum exclusion criteria. The DTSC responded in a letter dated August 25, 2005, and acknowledged that this issue falls under the jurisdiction of the Water Board.

However, the timing for resolving the Navy's request was not known when the Work Plan was published (BEI 2006). Thus, the Navy opted to collect and analyze soil and grab groundwater samples to assess possible impact from these ASTs. Soil and groundwater samples were collected near these SWMUs during previous investigations and the RI.

Chemicals in soil or groundwater samples collected adjacent to OWS 017 or ASTs 016, 039, and 392 were not reported above PSCs. Diesel-range TPH was reported in groundwater samples above TPH ESLs near ASTs 173A, 173B, and 173C; and slightly above the TPH ESL in groundwater samples collected adjacent to AST 152 and former UST(R)-11. Motor oil–range TPH was also reported slightly above the TPH ESL in soil and groundwater samples collected adjacent to ASTs 173A, 173B, and 173C and in a groundwater sample collected near former UST(R)-11. The only other chemicals reported above PSCs were metals in samples collected adjacent to former UST(R)-11. Iron was reported above background in one soil sample, and arsenic was reported above the MCL in two groundwater samples; however, arsenic concentrations were below background. As discussed in Section 7.1.5, iron is believed to be naturally occurring based on the evaluation in Section 4.3.

Risk evaluations were not performed on the OWS and AST SWMUs. Data associated with UST(R)-11 were included in the baseline risk assessment for AOC 23.

Data collected during previous investigations were sufficient to assess the impact to soil and groundwater quality from the nine SWMUs and to support recommendations.

Recommendations for the nine SWMUs are as follows.

- No further action is recommended for OWS 017 and ASTs 016, 039, and 392 because chemicals were not reported at concentrations above PSCs in any of the soil or groundwater samples collected.
- No further action is recommended for AST 152 because the TPH concentration (at 110 µg/L) was only slightly above the PSC of 100 µg/L.
- No further action is recommended for former UST(R)-11 because TPH concentrations reported in groundwater (up to 240 µg/L) were not much greater than the PSC of 100 µg/L. Also, reported arsenic concentrations in groundwater were below background, and the concentration of iron in soil above the PSC is considered naturally occurring.
- Exceedances reported at ASTs 173A, 173B, and 173C should be reviewed under the TPH Program to determine whether the Water Board's criteria for closure of low-risk fuel sites are met.

Section 8
REMEDIAL ACTION OBJECTIVES

This section presents the RAOs and site-specific preliminary remediation goals (preliminary RGs) for soil and groundwater at IR Site 35. Factors considered in determining RAOs and RGs include the affected media (e.g., soil, sediment, surface water, and groundwater), COCs, potential human-health risks, and ARARs.

U.S. EPA defines RGs as medium-specific goals for protecting human health and the environment (U.S. EPA 1988). As stated in the NCP, RAOs focus the FS and define the scope of potential cleanup activities, thereby guiding the development and evaluation of cleanup alternatives (40 C.F.R. § 300.430[e][2][i]).

General response objectives are used in the development of RGs. The general response objectives for IR Site 35 are as follows.

- Protect existing beneficial uses of groundwater underlying IR Site 35.
- Protect existing beneficial uses of surface water for those portions of IR Site 35 that are adjacent to surface water.
- Protect human health by preventing unacceptable exposure to impacted soil.
- For those areas where groundwater is considered a potential drinking water source for CERCLA decision-making purposes, protect human health by preventing exposure to concentrations of COCs that present unacceptable risk for domestic use and other complete pathways.
- For those areas where groundwater is not considered a potential drinking water source for CERCLA decision-making purposes, protect human health by preventing unacceptable exposure to VOCs via inhalation of indoor air vapors that may migrate from groundwater.

8.1 AFFECTED MEDIA AND CHEMICALS OF CONCERN

Specific COCs and study areas (AOCs and PAHs in soil) at IR Site 35 to be carried forward to the FS portion of this RI/FS Report were identified in Section 7. For each area carried forward, COCs and the affected media are summarized in this section. According to U.S. EPA (U.S. EPA 1988), COCs may be selected because of their toxicological properties, because they are present in large quantities, or because they are presently in or potentially may move into critical exposure pathways (e.g., the drinking water supply).

8.1.1 Media of Interest

Exposure scenarios for IR Site 35 and data from the RI process indicate that the media of interest for which remediation scenarios will be evaluated in this RI/FS Report are soil and groundwater.

8.1.2 Soil

The following four soil areas were identified for consideration in the FS portion of this RI/FS Report:

- AOC 3 – heptachlor in soil
- AOC 10 – lead (from LBP) in soil
- AOC 12 – lead (from LBP) in soil
- PAHs – PAHs in soil at various locations across Transfer Parcel EDC-5 including IR Site 35

8.1.2.1 HEPTACHLOR IN SOIL AT AOC 3

Heptachlor in soil at AOC 3 was carried forward to the FS for the reasons set forth in Section 7.1.2. One shallow soil sample in this study area had heptachlor reported at a concentration of 18,000 µg/kg. Based on the interpretation of the RI results, the lateral extent of heptachlor is partially defined, and the vertical extent appears to be limited; the maximum vertical extent of heptachlor-impacted soil is 0 to 2 feet bgs. Refinement of the lateral extent of heptachlor in soil will be included in active soil alternatives for AOC 3.

8.1.2.2 LEAD IN SOIL AT AOCs 10 AND 12

Lead (from LBP) in soil at AOCs 10 and 12 was carried forward to the FS for the reasons set forth in Sections 7.1.3 and 7.1.4, respectively. Previous NTCRAs at AOCs 10 and 12 removed most of the soil impacted with LBP in the vicinity of one former radio antenna tower at AOC 10 and two former water towers at AOC 12. Based on the interpretation of the RI results, the lateral and vertical extent of lead-impacted soil at AOCs 10 and 12 are defined and limited; the maximum vertical extent of lead-impacted soil is approximately 0 to 2 feet bgs.

Sediments in the storm sewer that drains AOC 12 will be addressed in active FS alternatives because a sediment sample concentration was above sediment screening levels for lead. Three locations with arsenic above PSCs will also be addressed in the FS for AOC 12 because these detections are in the same areas as the higher lead concentrations.

8.1.2.3 PAHs IN SOIL AT IR SITE 35

PAHs in soil at various locations across Transfer Parcel EDC-5 were carried forward to the FS, as described in Section 7.1.6. Previous removal actions focused on the removal of soil in unpaved areas in the 0- to 2-foot-bgs depth interval. As stated in the Work Plan (BEI 2006), an FS was to be performed in the PAH Areas to evaluate remedial action options to reduce or manage risks in some or all of these areas. The assumed exposure interval for PAHs in soil is 0 to 4 feet bgs.

8.1.3 Groundwater

Two study areas with impacted groundwater were identified for consideration in the FS portion of this RI/FS Report:

- AOC 1 – naphthalene in groundwater
- AOC 23 – vinyl chloride in groundwater

Groundwater remedies for these two AOCs are considered separately in this RI/FS Report.

8.1.3.1 NAPHTHALENE IN GROUNDWATER AT AOC 1

Naphthalene in groundwater at AOC 1 was carried forward to the FS for the reasons set forth in Section 7.1.1. Naphthalene was reported in one groundwater sample from AOC 1 (from boring A01SB03) at a concentration of 1,200 µg/L. OWS 63A is the suspected source of naphthalene in AOC 1 groundwater. Results reported for samples from two other nearby borings suggest that the lateral extent of naphthalene in groundwater is limited. Refinement of the lateral extent of naphthalene in shallow groundwater is included in active groundwater alternatives for AOC 1.

8.1.3.2 VINYL CHLORIDE IN GROUNDWATER AT AOC 23

Vinyl chloride in groundwater at AOC 23 was carried forward to the FS for the reasons set forth in Section 7.1.5. Groundwater samples collected from four borings in AOC 23 reported vinyl chloride at concentrations above the MCL. It is unlikely that vinyl chloride (reported at a maximum of 2.8 µg/L) would migrate approximately 150 feet in groundwater and result in a surface water concentration of concern. Refinement of the concentration levels of vinyl chloride above RGs in shallow groundwater will be included in active groundwater alternatives for AOC 23. Information will also be collected to evaluate whether groundwater quality meets exemption criteria for municipal and domestic water supply.

8.2 POTENTIAL RECEPTORS AND EXPOSURE PATHWAYS

The planned future use of IR Site 35 is mixed use (industrial, residential, commercial, and open space). The exposure pathways that are considered in this RI/FS Report include incidental soil ingestion, dermal contact, inhalation of particles, inhalation of vapors in indoor air, and ingestion of homegrown produce. For AOC 23 (east of Saratoga Street), exposure pathways associated with domestic use of groundwater (groundwater ingestion and dermal contact while showering) are also considered. For each study area carried forward to the FS, the potential receptor considered in the FS is the future resident. Risks associated with commercial/industrial and site worker receptors are therefore not evaluated in this RI/FS Report, and are considered sufficiently protected if soil and groundwater concentrations meet the RGs developed for the residential exposure scenario.

8.3 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Section 121(d)(1) of CERCLA (42 *United States Code* [U.S.C.] § 9621[d]) states that remedial actions on CERCLA sites must attain (or the decision document must justify the waiver of) any federal or more stringent state environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate.

The evaluation of potential ARARs for this RI/FS Report is presented in Appendix K. The potential chemical- and location-specific ARARs findings having key implications for this RI/FS Report are summarized below. Action-specific ARARs for FS alternatives are discussed in Section 11.

8.3.1 Overview of ARARs

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address conditions at a CERCLA site. The requirement is applicable if the jurisdictional prerequisites of the standard show a direct correspondence when objectively compared to the conditions at the site. An applicable federal requirement is an ARAR. An applicable state requirement is an ARAR only if it is more stringent than the federal ARAR.

If the requirement is not legally applicable, then the requirement is evaluated to determine whether it is relevant and appropriate. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not applicable, address problems or situations similar to the circumstances of the proposed response action and are well suited to the conditions of the site (U.S. EPA 1988). A requirement must be determined to be both relevant and appropriate in order to be considered an ARAR.

As the lead federal agency, the Navy has primary responsibility for identifying federal ARARs at Alameda Point. In a letter dated May 22, 2006, the Navy requested chemical-, location-, and action-specific state ARARs from DTSC for IR Site 35. A copy of this letter is included as Attachment K2 of Appendix K. The DTSC responded in a letter dated June 23, 2006 (Attachment K4 of Appendix K). In that response, DTSC stated that the California laws, regulations, and policies identified in DTSC's basewide ARARs letter dated November 13, 1996, (Attachment K1 of Appendix K) are appropriate for use by the Navy in considering ARAR selection.

8.3.2 Chemical-Specific ARARs

Chemical-specific ARARs for soil and groundwater are summarized in this section.

8.3.2.1 SOIL

RCRA requirements under the state-authorized program have been determined to be potential federal ARARs because they are federally enforceable. The soil has measured concentrations of chemicals that could exceed the toxicity characteristics and meet the definition of hazardous waste. Where waste is generated, pertinent RCRA requirements were evaluated and assumed to be potentially applicable federal ARARs.

8.3.2.2 GROUNDWATER

Groundwater beneath Alameda Point (including IR Site 35) is not currently used for drinking water, irrigation, or industrial supply.

One of the significant issues in identifying ARARs for groundwater under the Safe Drinking Water Act (SDWA) and RCRA is whether the groundwater at the site can be classified as a source of drinking water. U.S. EPA groundwater policy is set forth in the preamble to the NCP (55 *Federal Register* 8666, 8752–8756 [1990]). This policy uses the groundwater classification system set forth in the draft U.S. EPA Guidelines for Groundwater Classification Under the U.S. EPA Groundwater Protection Strategy (U.S. EPA 1986). Under this policy, groundwater is classified in one of three categories (Class I, II, or III) based on ecological importance, replaceability, and vulnerability considerations. A Class I groundwater is an irreplaceable source of drinking water or is ecologically vital. A Class II groundwater is a current or potential source of drinking water and a water that has other beneficial uses. A Class III groundwater is not a potential source of drinking water and is of limited beneficial use. The U.S. EPA guidelines define Class III groundwater as groundwater with TDS concentrations above 10,000 mg/L and a yield of less than 150 gallons per day (gpd) (U.S. EPA 1986). If an aquifer contains TDS below 10,000 mg/L and yields 150 gpd or more, it is a Class I or II aquifer. (The state of California criteria are 3,000 mg/L TDS and groundwater well yield of 200 gpd.) Class III groundwater can also be classified based on economic or technological treatability tests as well as on quality or quantity (only one set of criteria is needed, not both).

For the purposes of this RI/FS Report, it has been determined that groundwater west of Saratoga Street, including shallow groundwater at AOC 1, is not a potential drinking water source for CERCLA decision-making purposes. Shallow groundwater near shorelines at Alameda Point typically contains TDS at concentrations greater than 10,000 mg/L, making it Class III groundwater. Inland groundwater (more than 100 feet from a surface water body) east of Saratoga Street may be considered Class II groundwater and a potential drinking water source for CERCLA decision-making purposes unless saltwater intrusion and/or low yield make development of a sustainable water supply infeasible.

Federal MCLs and maximum contaminant level goals (MCLGs) developed by the U.S. EPA under the SDWA are generally considered potentially relevant and appropriate requirements for aquifers with Class I and Class II characteristics, and therefore are potential federal ARARs for inland groundwater east of Saratoga Street. The point of compliance for MCLs and MCLGs under the SDWA is at the tap. Therefore, the MCLs

and MCLGs are not applicable ARARs for Navy sites. However, MCLs and MCLGs are generally considered relevant and appropriate as RGs for current or potential drinking water sources. The inland groundwater at AOC 23 (which is east of Saratoga Street) is assumed for the purposes of this RI/FS Report to exhibit Class II characteristics and sufficient yield to qualify as a potential drinking water source for CERCLA decision-making purposes. Therefore, MCLs and MCLGs are potential relevant and appropriate ARARs for inland groundwater at AOC 23, assuming that TDS and yield criteria are met for shallow groundwater.

The Water Board prepared and is responsible for the implementation of the San Francisco Bay Basin Water Quality Control Plan (Basin Plan) (RWQCB 1995) for protection and enhancement of the quality of the waters in the San Francisco Bay Basin. The Basin Plan establishes location-specific beneficial uses and water quality objectives (WQOs) for the surface water and groundwater of the region and is the basis of the Water Board basin regulatory programs. The Basin Plan includes both numeric and narrative WQOs for specific groundwater subbasins. The WQOs are intended to protect the beneficial uses of the waters of the region and to prevent nuisance.

Beneficial use and reuse of water are key aspects of the Basin Plan for the San Francisco Bay basin. IR Site 35 is in the East Bay Plain groundwater subbasin. The current beneficial uses of this subbasin are discussed in Section 2.7.

Shallow groundwater underlying AOC 1 is not considered a current or potential source of drinking water supply, and therefore the municipal and domestic supply (MUN) beneficial use does not apply. In a letter dated July 21, 2003 (Attachment K3 of Appendix K), the Water Board concurred that groundwater in the FWBZ and SWBZ west of Saratoga Street is not a potential source of drinking water.

Various potential surface water ARARs and to-be-considered criteria, including the National Recommended Water Quality Criteria, the CTR, and the Basin Plan, are evaluated in Appendix K with respect to potential site-related submarine discharge of groundwater to surface water. Numerical water quality criteria for priority pollutants promulgated in the CTR (40 C.F.R. § 131.38) and implemented in the new Enclosed Bays and Estuaries Plan (SWRCB 2000) as a part of the Basin Plan for San Francisco Bay would constitute ARARs for remedial actions involving discharge of impacted groundwater to San Francisco Bay. However, because the groundwater impacts identified at AOC 1 and AOC 23 do not appear to extend to surface water, the above surface water requirements are not considered ARARs for IR Site 35.

8.3.3 Location-Specific ARARs

The resource categories relating to location-specific requirements potentially affected by the IR Site 35 response actions are as follows:

- cultural resources
- wetlands protection

- floodplain management
- hydrologic resources
- biological resources
- coastal resources
- other natural resources
- geologic characteristics

There are no potential ARARs identified related to wetlands protection, floodplain management, hydrologic resources, biological or coastal resources, or geologic characteristics.

The historic district of NAS Alameda, including a series of buildings referred to as the "Big Whites" (former Senior Officers' Houses), has been identified as historically significant and may be eligible for the National Register of Historic Places (NRHP). The Navy has concluded that these buildings may be significant, retain integrity, and meet the criteria for listing in the NRHP. Therefore, substantive provisions of Section 106 of the National Historic Preservation Act (16 U.S.C. §§ 470–470x-6, and its implementing regulations [36 C.F.R. Part {pt.} 800]), as amended, are potentially relevant and appropriate cultural resource ARARs.

Migratory birds have been observed at Alameda Point and in the vicinity of IR Site 35. Accordingly, the substantive provisions of the Migratory Bird Treaty Act (16 U.S.C. § 703) have been identified as potentially relevant and appropriate ARARs.

8.4 PRELIMINARY REMEDIATION GOALS

RGs are site-specific, qualitative goals that define the purpose of site cleanup. RGs specify the following:

- COCs
- exposure route(s) and receptor(s)
- an acceptable contaminant level or range of levels for each exposure route (i.e., a remediation goal)

Because RGs typically involve preserving or restoring a resource (e.g., groundwater or surface soil), they are expressed in terms of the medium of interest and target cleanup levels whenever possible. Preliminary RGs for each area carried forward to the FS are discussed below.

8.4.1 Soil

Soil preliminary RGs are developed to protect human health for future residents. These preliminary RGs reflect the current and planned future residential use of IR Site 35.

8.4.1.1 HEPTACHLOR IN SOIL AT AOC 3

The preliminary RG for heptachlor in soil at AOC 3 is 110 µg/kg, the U.S. EPA Region 9 residential PRG for heptachlor. The vertical extent of heptachlor-impacted soil is 0 to 2 feet bgs.

8.4.1.2 LEAD IN SOIL AT AOCs 10 AND 12

The preliminary RG for lead in soil at AOCs 10 and 12 is 184 mg/kg. This value is based on LeadSpread modeling for Alameda Point, including the homegrown produce pathway. The vertical extent of lead-impacted soil is approximately 0 to 2 feet bgs.

8.4.1.3 PAHs IN SOIL AT PAH AREAS

At the time of writing this RI/FS Report, the Navy and the regulatory agencies are actively discussing appropriate RGs and exposure depth intervals for PAHs in soil at IR Site 35. The preliminary RG for PAHs in soil at Transfer Parcel EDC-5 is 1,000 µg/kg B(a)P equivalent; this is the same preliminary RG that was used for previous TCRA activities within Transfer Parcel EDC-5, including IR Site 35. The exposure interval considered for PAHs in soil for FS purposes is 0 to 4 feet bgs.

8.4.2 Groundwater

CERCLA remedial actions for groundwater are driven by the expectation that aquifers will be returned to beneficial uses wherever practicable (40 C.F.R. § 300.430[a][1][iii][F]). Preliminary RGs for the two groundwater areas carried forward to the FS (naphthalene at AOC 1 and vinyl chloride at AOC 23) are described below.

8.4.2.1 PRELIMINARY REMEDIATION GOAL FOR NAPHTHALENE AT AOC 1

Naphthalene in groundwater is the only COC carried forward to the FS for AOC 1. Excluding domestic use of groundwater (groundwater ingestion and dermal contact while showering), the Cal/EPA cancer risk for groundwater at AOC 1 is 5×10^{-5} (within the risk management range) with an HI of 2. The cancer risk and hazard value are due to the presence of naphthalene in indoor air.

The preliminary RG for naphthalene in shallow groundwater at AOC 1 is 100 µg/L, and it is based on a drinking water advisory. This preliminary RG has been selected and approved previously for shallow groundwater at another Alameda Point site, OU-5/ IR Site 2. While the preliminary RG is based on a drinking water advisory, it is considered protective for inhalation of indoor air under a residential exposure pathway. A preliminary RG based on MCLs and/or MCLGs was not considered for AOC 1 for the reasons set forth in Section 8.3.2.2.

8.4.2.2 PRELIMINARY REMEDIATION GOAL FOR VINYL CHLORIDE AT AOC 23

Vinyl chloride in groundwater is the only COC carried forward to the FS for AOC 23. Because AOC 23 is east of Saratoga Street, the preliminary RG is based on MCLs and/or

MCLGs. Specifically, the preliminary RG for vinyl chloride in shallow groundwater at AOC 23 is the lowest of the following:

- a federal primary MCL (2 µg/L)
- a nonzero federal MCLG (the MCLG is zero)
- a state primary MCL (0.5 µg/L)

The preliminary RG for vinyl chloride in shallow groundwater at AOC 23 is 0.5 µg/L.

8.4.3 Preliminary Remediation Goal Conclusions

Preliminary RGs for IR Site 35 soil and groundwater have been identified for this RI/FS Report only, and should not be construed as an acceptance by the Navy of final RGs for IR Site 35. The Navy believes that establishing final RGs should take into account site-specific factors such as future use of the property at IR Site 35, new information, additional data, background concentrations of COCs, and other risk management considerations. The remediation goals developed in this RI/FS Report are as follows:

- preliminary RGs for soil
  - heptachlor at AOC 3: 110 µg/kg
  - lead at AOCs 10 and 12: 184 mg/kg
  - PAHs in PAH Areas: 1,000 µg/kg B(a)P equivalent
- preliminary RGs for groundwater
  - naphthalene at AOC 1: 100 µg/L
  - vinyl chloride at AOC 23: 0.5 µg/L

Final RGs will be determined when the remedy is selected, in accordance with Section 300.430(e)(2)(i) of the NCP.

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Section 9
IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES

This section discusses general response actions, process options, and associated technologies potentially capable of addressing impacted soil and groundwater at IR Site 35. The remedial technologies have been screened for effectiveness, implementability, and relative cost. Technologies retained after the screening evaluation have been assembled into remedial alternatives; these alternatives are screened in Section 10.

9.1 GENERAL RESPONSE ACTIONS

General response actions are broad categories of remedial approaches. Some response actions may stand alone as complete remedial alternatives. However, in most cases, combinations of response actions are required to effectively address impacted soil and groundwater and meet the RGs.

Potential general response actions were developed for soil and groundwater at IR Site 35 because the NCP requires consideration of a broad range of alternatives. According to 40 C.F.R. § 300.430(e), the FS must evaluate the following:

- the no action alternative
- source control alternatives that reflect varying degrees of treatment, containment, and ICs
- groundwater restoration alternatives that attain RGs within different time periods using one or more technologies

9.1.1 Soil

The following general response actions are considered for soil at IR Site 35.

- **No action** entails no further response actions of any type, including administrative controls and monitoring. The NCP and CERCLA require consideration of a no action alternative as a basis for comparison with other remedial alternatives.
- **ICs** reduce potential hazards by limiting public exposure to impacted soil, primarily through legal and administrative measures. ICs do not reduce the volume, mobility, or toxicity of contaminants in soil. Examples of ICs for soil include restrictions on future excavations, access limitations, and future land-use restrictions placed in property titles if transferred.
- **Containment** technologies control risk by eliminating routes of exposure to soil. Containment may reduce contaminant mobility, but does not provide any treatment and would not necessarily reduce the toxicity or volume of the impacted soil. These technologies require continued monitoring and ICs to confirm that the containment measures are performing successfully. Containment technologies include technical measures such as the installation of

a temporary or permanent cover (e.g., asphalt, concrete, or synthetic materials) or the installation of a multilayer or RCRA cover over impacted areas.

- ***In situ* treatment** refers to technologies used to treat impacted soil through the use of *in situ* or below-grade processes using physical, thermal, biological, or chemical treatment technologies.
- **Removal and treatment/disposal** involves the excavation of impacted material. The medium (soil) is removed and either stockpiled on-site for treatment or transported to a permitted off-site treatment and disposal facility. If off-site disposal is considered, some pretreatment may be required to meet land disposal restrictions.
- ***Ex situ* treatment** technologies involve above-grade engineered processes to stabilize, separate, or destroy contaminants identified in the soil.

9.1.2 Groundwater

The following general response actions are considered for groundwater at IR Site 35.

- **No action** entails no further response actions of any type, including administrative controls and monitoring. The NCP and CERCLA require consideration of a no action alternative as a basis for comparison with other remedial alternatives.
- **ICs** reduce potential hazards by limiting public exposure to impacted groundwater through legal and administrative measures. ICs do not reduce the volume, mobility, or toxicity of contaminants in groundwater. Examples of such controls include restrictions or prohibitions on the uses of shallow groundwater, requirements for permits to install new water supply wells, and future land-use restrictions placed in property deeds or titles.
- **Groundwater monitoring** may include technical measures such as groundwater sampling and analysis to evaluate the extent and migration of contaminants, potential risks, and/or changes in site conditions over time.
- **MNA** relies on naturally occurring *in situ* processes (e.g., biodegradation, chemical transformation, volatilization, dilution, dispersion, and adsorption) to achieve RGs within a reasonable time frame (U.S. EPA 1999). Under certain conditions, these natural processes act to reduce the mass, toxicity, mobility, or volume of impacted groundwater. Groundwater monitoring typically is performed in conjunction with MNA to evaluate contaminant concentration trends, suitability of conditions for *in situ* biodegradation (ISB), potential risks, and changes in site conditions over time.
- **Containment** technologies control risk by eliminating routes of exposure and migration or reducing exposures to acceptable levels through physical or hydraulic control of groundwater. Containment may reduce contaminant mobility, but does not provide any treatment and may not necessarily reduce the toxicity or volume of contaminants. Monitoring may be performed to check containment progress.

- **Groundwater extraction and *ex situ* treatment** involves removal of impacted groundwater followed by above-grade engineered processes to separate or destroy contaminants. Separation technologies transfer contaminants from one medium to another, generally creating a more concentrated waste stream for off-site treatment/disposal. Destruction technologies transform site-related contaminants into generally benign by-products, although they may produce other nontarget contaminants in residual streams. Destructive treatment often involves planned or inadvertent releases to the environment (e.g., air emissions). Treated groundwater typically is discharged to surface water or a publicly owned treatment works (POTW) facility in compliance with substantive requirements of environmental permits. Off-site management of treatment residuals must meet stringent state and federal regulations governing the treatment, storage, and disposal (TSD) of solid and hazardous wastes.
- **Source removal and disposal** involves the excavation of impacted soil in the source area as a general response action for groundwater. The soil and any entrained NAPL (if present) are removed and either stockpiled for on-site treatment or transported to a permitted off-site treatment and disposal facility. If off-site disposal is considered, some pretreatment may be required to meet land-disposal restrictions (LDRs). Off-site disposal of impacted soil must meet stringent state and federal regulations governing the TSD of solid and hazardous waste.
- ***In situ* treatment** involves using in-place biological, physical, thermal, or chemical processes to destroy contaminants in groundwater. These processes may be used to break down contaminants and/or alter their properties so they can be easily extracted, destroyed, or immobilized.
- **Disposal** technologies involve on-site or off-site transfers of impacted media (groundwater) or treatment residuals. Groundwater disposal may include discharges to sewer or surface water, reinjection, or off-site disposal of groundwater and/or treatment residuals. Off-site management of impacted media must meet stringent state and federal regulations governing the TSD of solid and hazardous waste.

9.2 IDENTIFICATION OF REMEDIAL TECHNOLOGIES

Since the inception of CERCLA in 1980, the U.S. EPA has found that certain categories of sites share similar characteristics, including types of contaminants present, past disposal practices, affected environmental media, and preferred remedial technologies. Several initiatives have been undertaken to incorporate this information and streamline the CERCLA FS process based on historical patterns of CERCLA remedy selection and site performance data. Tables 9-1 and 9-2 list the general response actions, remedial technologies, and process options identified for consideration to address impacted soil and groundwater, respectively, at IR Site 35.

An important part of the CERCLA streamlining effort involves reducing the level of documentation required in an FS report. Earlier guidance (U.S. EPA 1988) suggested that a two-step screening process was necessary to identify and select remedial

technologies and process options before the development of remedial alternatives for detailed analysis. The initial screening step involved technology identification and preliminary screening based only on technical implementability. In lieu of this initial screening step, the Federal Remediation Technology Roundtable's remediation treatment technology screening matrix (FRTR 2004d) was reviewed for soil and groundwater technologies graded "average" or "better" for contaminants identified as requiring action at IR Site 35. Results of this preliminary screening, combined with engineering judgment, were used to identify viable technologies for screening at IR Site 35.

9.3 SCREENING OF REMEDIAL TECHNOLOGIES

In this section, the remedial technologies and associated process options identified as potentially applicable for use are screened on the basis of effectiveness, implementability, and cost. The objective of this technology screening is to select representative process options for each technology and thereby simplify the subsequent development and evaluation of alternatives.

9.3.1 Screening Criteria

The process-option screening criteria (effectiveness, implementability, and cost) have been applied on the basis of their relative importance to the FS process (U.S. EPA 1988). The criterion of effectiveness is given the most weight, followed by implementability, and then cost. When two or more process options yield comparable results, cost determines the higher-ranked option.

9.3.1.1 EFFECTIVENESS

The following criteria were considered when options were screened for effectiveness:

- ability to achieve RGs for the protection of human health and the environment; technologies incapable of attaining chemical-specific ARARs or health-based cleanup goals or those that would not effectively contribute to the protection of public health or the environment are not considered further
- permanent reduction in toxicity, mobility, or volume of contaminants in affected soil and groundwater through treatment; technologies that permanently reduce contaminant toxicity, mobility, or volume through treatment are preferred
- long-term risks of treatment residuals or containment systems; technologies with significantly lower long-term risks are preferred
- risks to the public, workers, or the environment during technology implementation; technologies posing less risk during implementation are preferred

9.3.1.2 IMPLEMENTABILITY

The following criteria were considered when options were screened for implementability:

- site characteristics limiting the construction or effective functioning of technology elements; technologies limited by site conditions were eliminated
- waste or media characteristics that limit the use or effective functioning of a technology; technologies limited by waste or media characteristics were eliminated
- availability of equipment needed to implement a technology and the capacity of required off-site treatment or disposal facilities; commercially developed technologies that are readily available or innovative technologies that have been pilot tested were preferred
- administrative feasibility of obtaining permits and approvals from regulatory agencies and other offices; administrative feasibility is an important component of implementability because it could be difficult or impossible to obtain permits for a technically feasible option (or to comply with the substantive requirements of the permit process); technologies were eliminated if the permitting process was judged to be prohibitively difficult

9.3.1.3 COST

Criteria used to screen remedial technologies for cost are qualitative and based on engineering judgment, unless otherwise noted. The relative magnitude of capital costs, pilot-scale testing and mobilization costs, as well as operation and maintenance (O&M) costs is considered when process options within a technology are compared. Process options with lower costs are preferred if the effectiveness and implementability criteria are comparable.

9.3.2 Screening Results for Soil Technologies

The following subsections discuss screening results for technologies considered for application to soil at IR Site 35, as summarized in Table 9-3. Results for process options are grouped by general response action (Section 9.1.1) and technology. Soil technologies are screened in this section for their applicability sitewide.

9.3.2.1 NO ACTION

The no action process option for soil does not include response actions of any type, and includes neither administrative controls nor monitoring. The NCP and CERCLA require consideration of the no action alternative as a basis for comparison with other remedial alternatives developed during the FS. No action, for the purposes of this RI/FS Report, would represent existing conditions at the site.

Effectiveness

The no action alternative does not include any sampling or remediation activities, and does not restrict future site uses. This alternative would not include monitoring to verify its protectiveness.

Implementability

The no action process option is rated high in implementability because no action is required.

Cost

There is no direct cost associated with the no action process option.

Conclusion

The no action process option for soil is retained for consideration in accordance with requirements of CERCLA and the NCP, and serves as the baseline for comparison with other response actions.

9.3.2.2 INSTITUTIONAL CONTROLS

ICs are legal and administrative mechanisms used to implement land-use and access restrictions to limit the exposure of future landowner(s) and/or user(s) of the property to hazardous substances. ICs for soil may include restrictions on future soil excavations, future land-use limitations, or restrictions on activities that may result in unacceptable exposure. ICs for IR Site 35 would be designed to minimize or prohibit human exposure to soil posing potentially unacceptable risk or to protect features of certain remedies.

ICs would not treat impacted soil, but would prohibit unacceptable exposure to constituents in the soil. ICs might also be effective as a short-term measure until the property is suitable for unrestricted use.

Legal mechanisms include proprietary controls such as restrictive covenants, negative easements, equitable servitudes, and deed notices. Administrative mechanisms include notices, adopted local land-use plans and ordinances, construction permitting, and other existing land-use management systems that may be used to ensure compliance with use restrictions.

ICs are frequently effective if they are layered or implemented in series. Layering means using several ICs at the same time to enhance the protectiveness of the remedy. Implementation of ICs in series may be applied to enhance both the short- and long-term effectiveness of the remedy. Monitoring and inspections are conducted to ensure that the land-use restrictions are being followed.

At Alameda Point and other California BRAC bases, the Navy has determined that it will rely upon proprietary controls in the form of environmental restrictive covenants as provided in the Memorandum of Agreement (MOA) Between the United States Department of the Navy and the California Department of Toxic Substances Control

(DTSC) (Appendix N) and attached covenant models (2000) (hereinafter referred to as "Navy/DTSC MOA").

More specifically, land-use restrictions would be incorporated into and implemented through two separate legal instruments, as provided in the Navy/DTSC MOA:

1. restrictive covenants included in one or more quitclaim deeds from the Navy to the property recipient
2. restrictive covenants included in one or more Covenants to Restrict the Use of Property entered into by the Navy and DTSC, as provided in the Navy/DTSC

A Covenant to Restrict Use of Property would incorporate the land-use restrictions into environmental restrictive covenants that run with the land and are enforceable by DTSC against future transferees. The quitclaim deed(s) would include the identical land-use restrictions in environmental restrictive covenants that run with the land and would be enforceable by the Navy against future transferees.

The Navy also addresses IC implementation and maintenance actions, including periodic inspections, in the preliminary and final remedial design reports developed and submitted to the Federal Facility Agreement (FFA) signatories for review, pursuant to the FFA. These actions are described in "Navy Principles and Procedures for Specifying, Monitoring and Enforcement of Land-Use Controls and Other Post-ROD Actions" (hereinafter referred to as "Navy Principles") (Appendix O) attached to a January 16, 2004, Department of Defense (DoD) Memorandum entitled CERCLA ROD and Post-ROD Policy. The preliminary and final remedial design reports are primary documents as provided in Section 7.3 of the FFA.

According to the Navy Principles, the following issues related to ICs would be addressed in the ROD and remedial design for IR Site 35:

- description of the risk(s) necessitating the ICs
- documentation of risk exposure assumptions and reasonably anticipated land uses
- general description of the ICs, the logic for their selection, and related deed restrictions/notifications
- statement of the IC performance objectives
- list of the parties responsible for monitoring, reporting, and enforcing the ICs
- description of the area/property covered by the ICs
- expected duration of the ICs
- reference to an IC remedial design for implementation actions, because these details may have to be adjusted periodically on the basis of site conditions and other factors

The remedial design documentation for the selected remedy at IR Site 35 would describe implementation actions and responsibilities for those actions in order to enhance the

long-term viability of ICs. Depending on the ICs and site conditions, these could include the following actions:

- CERCLA 5-year review for the IC portion of the remedy
- periodic inspections
- reporting
- notifications of changes in the risk, remedy, or land use
- inclusion of a map of the site where ICs are to be implemented
- development of internal Navy policies and procedures with respect to IC monitoring, reporting, and enforcement

Effectiveness

ICs are effective, not through actively treating contamination, but through prevention of human exposure to contaminants. ICs should be effective in preventing or limiting access or exposure to impacted soil. ICs may also be effective as an interim strategy with other remedial process options by preventing exposure to or removal of impacted soil until RGs are achieved.

Implementability

ICs are readily implementable at IR Site 35. There is a precedent for the use of ICs at Alameda Point.

Cost

ICs are expected to be low in cost compared to other process options.

Conclusion

ICs are effective, implementable, and low in cost. Therefore, they are retained for further consideration as a component of soil alternatives.

9.3.2.3 CONTAINMENT

Containment involves isolating impacted soil from potential receptors. Generally, impacted soil is contained using a soil cover, engineered cap, or other cover such as asphalt or concrete. Containment is among the more common response actions employed for vadose zone soils because it is generally less expensive than other technologies and effectively manages the human-health risks associated with a remediation site.

Three types of containment are considered for use at IR Site 35: an asphalt cover, a soil cover, and an engineered alternative cap (soil/synthetic membrane). These three containment options are briefly described as follows.

- **Asphalt cover**. Bituminous asphalt or concrete covers are typically the most cost-effective asphalt covers. An asphalt cover is used as a surface barrier

between the impacted soil and the environment, and acts as a barrier for infiltration of surface water.

- **Soil cover**. Soil covers consist of a single layer of compacted soil to act as a physical barrier. Preventing infiltration of precipitation is not an objective of a soil cover.
- **Engineered alternative cap (soil/synthetic membrane)**. A flexible synthetic membrane liner over a sloped soil base is covered with a layer of soil to form a cap. The engineered alternative cap also prevents infiltration of surface water and the vertical migration of soil gas.

Screening results for these soil containment process options are summarized below.

Effectiveness

Containment prevents exposure to underlying impacted soil. Containment options do not treat contaminants. The most appropriate containment process option depends on the objectives of the cover. By itself, a cover cannot prevent the horizontal flow of groundwater through impacted capillary fringe or saturated zone soil. A cover can reduce or prevent the vertical entry of surface water into the impacted soil.

Asphalt cover. Asphalt and concrete covers are considered an effective means of providing short-term, asphalt containment to prevent unacceptable exposure to underlying soil and to prevent precipitation and surface water infiltration. Periodic maintenance of an asphalt cover is required to reduce the effects of weathering and cracking. Asphalt covers are generally effective when implemented in conjunction with long-term maintenance and ICs to prohibit actions that may damage the cover.

Soil cover. A soil cover of suitable thickness would be effective to shield potential receptors from underlying impacted soil. A soil cover would not prevent infiltration of precipitation to groundwater. A soil cover typically is graded to drain, thus preventing ponding and minimizing infiltration. A soil cover is considered to be effective for low-mobility contaminants, provided that it is implemented with ICs to prohibit actions that could reduce the effectiveness of the cover, and assuming that groundwater protection is not required.

Engineered alternative cap. Soil/synthetic-membrane barriers incorporate a low-permeability layer under a vegetated soil cover, preventing surface water intrusion into impacted zones. The chemical-resistant and weather-resistant properties of synthetic materials must be evaluated to determine long-term effectiveness. An engineered alternative cap would be appropriate if prevention of surface water infiltration and vertical migration of soil gas were identified as objectives of the remedial action.

Implementability

Covers are relatively easy to install but require strict quality control inspection during installation. The primary limitations of containment options are the need for long-term maintenance and uncertain design life. In addition, existing roads, site features, and

underground utilities at IR Site 35 would have to be taken into consideration during cover construction. The implementability of each containment option is discussed below.

Asphalt cover. The technology required for asphalt or concrete cover construction is commercially available. No specialized equipment is required, and bituminous asphalt and concrete are common construction materials. Asphalt covers are considered moderately implementable; they are only implementable for localized areas and are not considered practical for extremely large areas.

Soil cover. The technology required for a soil cover is readily available. No specialized equipment is required. A soil cover is readily implementable at IR Site 35.

Engineered alternative cap. Synthetic membranes are commercially available and are manufactured in a range of thicknesses and widths. They can be reinforced, have ultraviolet protection, and have smooth or roughened surfaces. Specialized installation methods are required for their construction. Sumps with electrical sump pumps may be required for this process option depending on the size of the area capped. Liner deterioration is likely to require the replacement of the membrane at some point in the future. An engineered alternative cap is rated low to moderate in implementability due to potential drainage difficulties, and the need for repairs if the liner is penetrated during future investigations or site development.

Cost

Covers are generally the least expensive way to manage human-health risks associated with large areas of impacted soil. Costs are highly dependent on the local availability of soils suitable for construction and the requirements for monitoring, maintenance, and leachate collection (if required).

Asphalt cover. Installation of an asphalt or concrete cover would incur minimal costs. Pavement maintenance costs are routine and not expected to be a significant cost.

Soil cover. If clean, imported fill is used, costs would be comparable to other covering options.

Engineered alternative cap. The costs associated with a soil/synthetic-membrane cap are also considered to be low, but higher than other containment options.

Conclusion

Each covering option, except the engineered alternative cap, is potentially effective and implementable at IR Site 35. The engineered alternative cap is eliminated from further consideration as a process option for soil because controlling soil gas and preventing surface water infiltration are not objectives of the remedial actions for soil at IR Site 35. Asphalt cover and soil cover options are retained for further consideration on the basis of their effectiveness, implementability, and cost. These options should be effective in preventing exposure to underlying impacted soil. Containment would likely be a component of other remedial process options to ensure their long-term protectiveness.

9.3.2.4 *IN SITU* TREATMENT

In situ treatment is accomplished without removing impacted soil from the geologic formation. Several representative options for *in situ* treatment are described below.

In Situ Solidification/Stabilization

In situ solidification/stabilization (S/S) processes generally use a chemical additive such as Portland cement, kiln dust, or fly ash to chemically bind and immobilize or encapsulate chemicals in a matrix to prevent physical mobility. *In situ* S/S involves injecting or mixing of stabilizing agents into subsurface soils. Using a large-diameter rotary auger, slurry chemicals and water (if needed) are injected into subsurface soils through auger flights. The auger bores and mixes a plug of the impacted soil. The auger is advanced to slightly overlap the last plug, and the process is repeated over the entire area. *In situ* S/S is a proven means for immobilizing metals-impacted soil. However, this process is not considered a routine alternative for immobilizing organic chemicals because in some cases, organic chemicals have leached out of the stabilized matrix within a few years (USACE 2003).

In situ S/S typically is used to prevent the mobility of inorganic chemicals. It is considered for IR Site 35 as a means of minimizing or preventing ingestion, inhalation, and dermal contact with surface and near-surface soil in which metals concentrations exceed RGs. Depth of the impacted soil in some cases limits the application of this process because large-diameter augering technology is limited to a certain depth.

Effectiveness. Creating a stabilized mass, as with *in situ* S/S, would effectively prevent inhalation or ingestion of metals-impacted soil at IR Site 35. This process would minimize airborne dust because soil and contaminants would be bound in a solidified matrix. *In situ* S/S treatment would not be effective in reducing the mass of metals-impacted soil and would result in a substantial increase in overall volume (about 30 to 50 percent) (FRTR 2004c).

Implementability. *In situ* S/S is rated low in implementability. *In situ* S/S would likely be difficult to implement because of the heterogeneous nature of the fill material and because of the limited volumes of metals-impacted soil at IR Site 35. Existing roads, site features, and underground utilities at IR Site 35 would have to be taken into consideration during implementation of *in situ* S/S. In addition, *in situ* S/S could substantially increase the volume of impacted material, depending on the soil characteristics and reagent usage.

Cost. Costs for auger/caisson and reagent/injector-head system processes vary widely depending on the type of materials or reagents used and their availability, project size, and the chemical nature of contaminants. Costs are expected to be significantly higher than other process options.

Conclusion. *In situ* S/S is eliminated from further consideration, based on implementability and cost. Costs of this option would be significantly higher than other options.

Phytoremediation

Phytoremediation was identified as an *in situ* biological treatment alternative for soil impacted with metals at IR Site 35 and PAHs at Transfer Parcel EDC-5, including IR Site 35. Phytoremediation is a plant-based technology that uses selected plant species to remove, transfer, stabilize, and/or destroy contaminants in soil. Phytoremediation may be applied to soils containing metals, pesticides, solvents, explosives, crude oil, PAHs, and landfill leachates (FRTR 2004a). Hyperaccumulator plants are capable of removing and storing large amounts of metallic contaminants. Hyperaccumulator plants could be potentially useful at IR Site 35 for the phytoremediation of shallow soil containing metals. Lead-accumulating plants such as *Armeria maritima* and *Zea mays* can be used for extracting lead from shallow soil (Fiegl et al. 2001, United States Army Environmental Center 2003). Lead is capable of forming a precipitate within the soil matrix, thus limiting the free lead available for uptake (Fiegl et al. 2001).

Phytoremediation processes have also been used for biodegradation of PAHs. The rhizosphere (soil surrounding plant root systems) of several plant species contains higher levels of PAH-degrading bacteria than are found in surrounding soils. Plant species such as mulberry, Osage orange, and apple stimulate the growth of bacteria that have PAH-degrading capabilities. Little has been done until recently in regard to PAH phytoremediation at the field scale (GTI 2002). Other research has identified certain PAHs including benzo(b)fluoranthene, benzo(g,h,i)perylene, B(a)P, and indeno(1,2,3-cd)pyrene that do not readily undergo biodegradation by phytoremediation (Ferro et al. 1999).

For remediation of shallow soil at IR Site 35, the maximum expected typical root-penetration depth is approximately 2 feet bgs. Phytoremediation would require pilot-scale testing to assess effectiveness in removal of metals and PAHs from impacted shallow soil. The area undergoing treatment would need to be secured with fencing and signs (temporary ICs) during phytoremediation. However, all vegetation generated from the pilot-scale test or full-scale implementation would require characterization for disposal, and likely would be hazardous waste.

Effectiveness. Phytoremediation can be applied over large surface areas. The method can eliminate the need for excavation of soil. However, remediation may take decades to treat moderately-to-heavily impacted soil. Plants do not provide a perfect barrier against leaching; highly soluble contaminants have a tendency to leach out from the root zone and migrate to the saturated zone, particularly if any overwatering of the plants occurs. In addition, penetration depth of the specific plant roots limits the depth of the treatment. Additional remediation, disking, or excavation and spreading for land treatment may be required if the contamination is deeper than the root zone (Interstate Technology and Regulatory Cooperation Work Group 1997).

Pilot-scale testing would be required to assess effectiveness and time to achieve RGs. Crop replanting would be required to treat shallow soil to achieve RGs. Phytoremediation is rated low in implementability because crop replanting would be required, and

harvesting and replanting would be needed every few months for an as-yet-unknown duration.

Implementability. Phytoremediation is rated low in implementability. Different plant species would be required for phytoremediation of different metals and organic chemicals. Research and pilot-scale testing would be required. If effective, the plants would accumulate the site contaminants and, therefore, proper controls would be needed to prevent contaminants from entering the food chain. Harvesting and replanting would be required every few months for several years. Harvested plants could require off-site disposal as hazardous waste.

Cost. Phytoremediation costs are expected to be lower than the cost of excavating and landfilling the same volume.

Conclusion. Phytoremediation is eliminated from further consideration as an *in situ* treatment option for soil at IR Site 35, based on uncertain effectiveness and low implementability.

9.3.2.5 REMOVAL AND DISPOSAL

Removal can be accomplished by mechanical excavation of soil, which would be followed by *ex situ* treatment or off-site disposal. Mechanical excavation was evaluated as the specific process option for IR Site 35.

Soil excavation entails removing impacted material with heavy equipment. Excavated soil would be transported to permitted off-site treatment and disposal facilities. If off-site disposal is considered, some pretreatment may be required in order to meet LDRs. Excavations typically are backfilled with clean and/or remediated soil.

Effectiveness

Excavation and off-site disposal constitute a process option that is considered effective and applicable to the complete range of contaminant groups at IR Site 35. Excavation allows relocation of impacted soil to a safer location (e.g., off-site disposal facility) where future contact or exposure would be prevented.

Implementability

Factors that may limit implementability of this process option include 1) generation of fugitive emissions during excavation, and 2) depth and composition of the media requiring excavation. Excavations extending below the water table are less implementable than shallower excavations, due to the added complexities of dewatering and water treatment. Fugitive emissions are controlled with standard dust control measures. Soil excavation implementability is rated moderate. Smaller excavations are more implementable than larger excavations.

Cost

Disposal costs for excavated soil can be high, depending on volume. The costs of excavation and removal, equipment maintenance, transportation, and disposal at a RCRA-permitted facility must be considered. RCRA hazardous waste would need to meet LDRs prior to disposal. This treatment would be performed by the receiving facility as required. Excavation and off-site disposal are labor-intensive. Capital costs are considered to be moderate. The disposal costs can be high depending on the volume.

Conclusion

Soil excavation is retained for further consideration on the basis of its effectiveness and implementability. For small volumes of impacted soil, excavation and off-site disposal are more cost-effective than the design and construction of an on-site remediation process.

9.3.2.6 *EX SITU* TREATMENT

Ex situ treatment involves excavation and aboveground treatment conducted at the site for impacted soil using biological, physical, chemical, or thermal technologies. *Ex situ* technologies generally require a shorter time period than *in situ* treatments. *Ex situ*–treated soil is more uniform because material can be homogenized, screened, and continuously mixed. However, *ex situ* treatments require engineering for equipment, meeting permitting requirements, and material handling. *Ex situ* treatment options for impacted soil include biological treatment, physical treatment, chemical treatment, and thermal treatment. On-site biological and thermal treatment for impacted soil were not considered to be applicable to IR Site 35 soil because they are not considered feasible for addressing PAHs or heptachlor in soil at IR Site 35, and do not address metals, the primary risk drivers in several areas. These *ex situ* technologies that could not be implemented on-site were eliminated, although they may be employed by the TSD facility as required prior to disposal. Physical treatment and chemical treatment are considered for applicability at IR Site 35, as summarized below.

Physical Treatment

Ex situ physical treatment involves physical separation to remove contaminants from extracted soil. Soil washing is evaluated as a physical treatment process option.

Soil washing is an aqueous-based separation process that removes or separates the fines fraction of soil, which tends to be the most impacted; this reduces the amount of soil that requires further treatment or disposal as hazardous waste. Soil washing usually is combined with mechanical screening methods to remove debris. Wash fluid containing high heavy-metal concentrations must be treated to meet industrial discharge requirements or be hauled off-site for disposal.

Soil washing removes contaminants from soil either by dissolving or suspending them in a surfactant wash solution (which can be sustained by chemical manipulation of pH for a period of time) or by concentrating them into a smaller volume of soil through particle-

size separation, gravity separation, and attrition scrubbing. Particle-size separation separates the fine clay and silt particles from the coarser sand and gravel soil particles. This would separate and concentrate the impacted soil into a smaller volume of soil (clay and silt) because most organic and inorganic contaminants tend to bind to clay, silt, and organic soil particles (FRTR 2004b). Bench-scale treatability testing is usually conducted on soils prior to full-scale implementation of soil washing.

Effectiveness. A soil-washing system that includes most of the removal techniques (e.g., suspending or dissolving soil in a wash solution, particle-size separation, gravity separation, or attrition scrubbing) could be effective in treating impacted soil at IR Site 35. Gravity separation is effective in removing high- or low-specific-gravity particles such as heavy-metals-containing compounds; therefore, the method is a suitable application for removing lead-impacted soil at IR Site 35. Effectiveness of this process option for lead-impacted soil is well documented; however, the ability of soil washing to address more hydrophobic organic compounds like PAHs would likely be limited.

When a site has a complex mixture of contaminants (e.g., a mixture of metals, nonvolatile organic chemicals, and SVOCs) and a heterogeneous distribution of contaminants throughout the soil, it is difficult to formulate a single washing solution for all these cases; difficult cases may require sequential washing, several wash formulas, and/or different soil-to-wash-fluid ratios (FRTR 2004b).

Implementability. Soil washing is rated low in implementability for soil at IR Site 35. Multiple techniques such as suspending/dissolving soil in a wash solution, particle-size separation, gravity separation, and/or attrition scrubbing may be required because of expected heterogeneity in excavated soil. Treated soil may contain hazardous levels of washing solvent and require additional treatment. In addition, the aqueous stream generated from water-based washing treatments should be demobilized before soil placement back in the site (FRTR 2004b). Bench-scale testing is needed before full-scale implementation.

Cost. Capital costs for soil washing installation and equipment would be high compared to other process options. Operation and maintenance (O&M) costs are considered to be high because operation is complex, requiring skilled operators. O&M costs would also be high because of significant posttreatment of process liquid and sludge wastes. Soil washing often requires thousands of cubic yards of soil to be cost-effective. The volume of impacted soil at IR Site 35 is not believed to be sufficient to make this process option cost-effective compared to other options.

Conclusion. Physical treatment using the soil-washing process option is eliminated from further consideration on the basis of anticipated limited effectiveness and high cost compared to other process options.

Chemical Treatment

Ex situ chemical treatment involves processes in which contaminants are physically bound or enclosed within a stabilized mass (solidification) or chemical reactions are

induced among the stabilizing agent, contaminants, and media to reduce contaminant mobility (stabilization). *Ex situ* S/S is generally proven for immobilizing metals-impacted soil. It is less proven for the immobilization of organic compounds. At IR Site 35, *ex situ* S/S would involve the use of above-grade batch plant vessels and mixing equipment. Impacted soil containing metals at concentrations above the RGs would be excavated and processed with S/S, and the solidified monoliths would then be backfilled or sent off-site for disposal.

Ex situ S/S was evaluated on its ability to meet the RGs for metals (i.e., to prevent contact, inhalation, and/or ingestion of soil containing metals at concentrations above the RGs). *Ex situ* S/S also could be applied to meet RCRA LDRs prior to off-site disposal.

Effectiveness. By creating a stabilized mass, *ex situ* S/S should be effective in preventing inhalation and/or ingestion of metals-impacted soil. *Ex situ* S/S also reduces the mobility of soluble chemicals. Because the soil and contaminants are bound in a solidified matrix, airborne dust should be minimized. Also, stabilizing the material should minimize the possibilities of ingesting the soil. ICs could be used to prevent direct contact with the stabilized mass; however, should direct contact occur, there would be less risk because the contaminants would be immobilized in the S/S matrix. S/S should discourage animals from burrowing into the matrix because of its strength and hardness characteristics.

Implementability. *Ex situ* S/S is rated moderate to low in implementability. Vendors with mobile equipment are available in the San Francisco Bay Area. The *ex situ* S/S batch processes can be monitored for quality assurance/quality control.

Cost. Capital costs for mobilization and installation of equipment related to *ex situ* S/S would be moderate if a sufficient volume of soil required treatment. Labor and chemical O&M costs would also be moderate.

Conclusion. *Ex situ* S/S of metals-impacted soil is eliminated from further consideration because the anticipated volume of soil at IR Site 35 is not sufficient to make this process cost-effective when compared with off-site disposal.

9.3.3 Screening Results for Groundwater Technologies

The following subsections discuss screening results for groundwater technologies considered for application to shallow groundwater at IR Site 35, as summarized in Table 9-4. Results for process options are grouped by general response action (Section 9.1.2) and technology. For the purposes of this evaluation, the top and bottom depths of the FWBZ at IR Site 35 are estimated to be 5 and 14 feet bgs, respectively, based on available information.

9.3.3.1 NO ACTION

The no action process option for groundwater is similar to that described for soil in Section 9.3.2.1. The no action option is included in the screening process for

groundwater technologies based on NCP and CERCLA requirements. It is automatically retained as the baseline for comparison with other response actions.

9.3.3.2 INSTITUTIONAL CONTROLS

ICs for groundwater are legal and administrative controls, as described in Section 9.3.2.2. The general objective of ICs for groundwater would be to prevent transferee exposure to groundwater (prohibit extraction of groundwater for domestic purposes) or vapors from groundwater posing unacceptable risk until the Navy, U.S. EPA, DTSC, and the Water Board concur that there is no longer an unacceptable risk from such exposure. ICs for groundwater would also protect groundwater monitoring wells and remediation equipment. The processes used to develop and implement ICs at IR Site 35 are described in Section 9.3.2.2.

Effectiveness

ICs would not actively treat groundwater contaminants. However, implementation of ICs could prevent exposure of the general public to groundwater contaminants and indoor vapors from groundwater. Implementation of ICs might also be effective as an interim strategy, in conjunction with other remedial process options, to prohibit domestic use of impacted groundwater and/or restrict the construction of buildings on the site until unrestricted use is possible.

Implementability

ICs are implementable at IR Site 35. There is a precedent for the use of ICs at Alameda Point.

Cost

Costs associated with ICs are expected to be low compared to other groundwater options.

Conclusion

ICs are retained as a component of groundwater alternatives. By preventing unacceptable exposure to groundwater contaminants, protection of human health and the environment can be achieved.

9.3.3.3 GROUNDWATER MONITORING

The groundwater monitoring process involves regular site inspections, groundwater sampling, and compliance reporting. Groundwater would be sampled periodically and analyzed to assess plume stability and variations in contaminant concentrations.

Effectiveness

Groundwater sampling and analysis as a stand-alone action is not effective at reducing the mass, volume, or toxicity of contaminants in groundwater. It is effective as a means of verifying groundwater conditions in groundwater and assessing remediation progress.

Implementability

Groundwater sampling and analysis is readily implementable, as demonstrated by previous investigations at Alameda Point. Groundwater monitoring wells would need to be installed at selected locations in order to implement the monitoring process option at IR Site 35.

Cost

Capital costs associated with groundwater monitoring are low. O&M costs associated with groundwater sampling and analysis can be moderate to high depending on the number of wells and frequency and duration of the monitoring program. To manage costs, this process option must be planned and executed effectively and the monitoring program must be of a fixed duration.

Conclusion

When combined with other process options, groundwater monitoring is a practical method of tracking the effectiveness of groundwater remediation technologies. This process option is, therefore, retained as a component of remedial alternatives.

9.3.3.4 MONITORED NATURAL ATTENUATION

MNA is a process option that employs groundwater monitoring to confirm the effectiveness of naturally occurring *in situ* processes (e.g., biodegradation, chemical transformation, volatilization, dilution, dispersion, and adsorption) in achieving RGs within a reasonable time frame. Under certain conditions, these natural processes act to reduce the mass, toxicity, mobility, or volume of impacted soil and groundwater. Monitoring is performed to check the progress of attenuation processes.

MNA is generally applied as a stand-alone technology when it can be used in a reasonable and predictable time frame (relative to other remedial options) to restore an aquifer to its designated beneficial uses (U.S. EPA 1999). Beneficial uses of groundwater underlying IR Site 35 are summarized in Section 2.7 of this RI/FS Report.

Multiple, distinct, but diverging lines of evidence have been used in recent years to demonstrate natural attenuation mechanisms (Wiedemeier et al. 1998; U.S. EPA 1998, 1999). The most common lines of evidence used to demonstrate natural attenuation of dissolved VOCs in groundwater include the following:

- historical trends
- mass reduction
- microbiological data
- modeling
- oxidation-reduction conditions

Effectiveness

MNA could be an effective mechanism to reduce VOC contaminant mass in groundwater. Where baseline data are limited, the duration and effectiveness of MNA are difficult to predict. At IR Site 35, sufficient data have not been collected at this time to evaluate lines of evidence and the potential effectiveness of MNA. Additional groundwater data would need to be collected in order to evaluate the effectiveness and duration of MNA as a process option at IR Site 35. Under suitable conditions, MNA should be effective in reducing concentrations of organic chemicals in groundwater over the long term. The effectiveness of MNA as a component of an alternative would be enhanced by implementing source control or source removal activities to reduce the potential of an area continuing to serve as a source of groundwater contamination.

Implementability

MNA is readily implementable. The primary limitation on natural attenuation is that it is controlled by ambient flow conditions in the subsurface. Heterogeneity of aquifer materials also complicates both the extent and the rate of natural attenuation processes. Groundwater monitoring wells would need to be installed to evaluate the effectiveness of MNA. Well installation and groundwater sampling and analysis are well proven techniques at Alameda Point.

Cost

Potential capital costs associated with MNA are low. However, the present value of O&M costs can be moderate to high, depending on the duration required. The cost of MNA is, therefore, dependent upon its effectiveness and duration.

Conclusion

MNA is retained as a process option for IR Site 35. MNA could potentially be used as a stand-alone process option, but additional investigation would be needed in order to evaluate its effectiveness. Where baseline data are limited, the duration and effectiveness of MNA are difficult to predict. MNA would not be effective in meeting RGs in the short term. MNA may be effective in reducing contaminant concentrations; however, an extended period of time could be required to achieve RGs.

9.3.3.5 CONTAINMENT

Containment involves isolating impacted groundwater from potential receptors. Generally, impacted groundwater is contained using vertical subsurface barriers or hydraulic controls (e.g., pump and treat systems). Both of these containment technologies are screened below.

Vertical Subsurface Barriers

Vertical subsurface barriers may be installed on both the upgradient and downgradient sides of a source area. Physical barriers such as sheet piling, biobarriers, deep-soil

mixing (DSM) walls, and slurry walls are considered below for IR Site 35. These process options have common advantages and limitations; therefore, they are screened as one process.

Sheet piling is a barrier usually made of wood, reinforced concrete, polyethylene, or steel. Steel is most commonly used for groundwater sheet pile barriers. These piles are connected along the edges using interlocking joints.

Biobarriers are formed by stimulating the growth of biofilm-forming microbes in subsurface soil; the microbial biomass reduces hydraulic conductivity and mass transport properties by plugging the free pore space in porous media (Chen and Kojouharov n.d.).

DSM can be used to construct a groundwater containment barrier. This technology involves in-place solidification and stabilization of saturated soil to form a low-permeability vertical subsurface barrier to contain impacted groundwater. DSM employs large-diameter specially equipped auger drilling rigs that are advanced into the ground while reagent slurry is pumped down the shaft. The slurry acts as an aid to drilling and is mixed into the drilled soil column, creating a soilcrete mass. A batch plant is mobilized to mix and deliver the slurry to the augers. Soil mixing is used to create structural elements for foundations, soil improvement, and retaining-wall systems. It is also used with specialized cementing and chemical reagents for fixation of hazardous wastes, stabilization of lagoons, and construction of underground vertical barriers for groundwater containment.

A slurry wall is a type of physical barrier that isolates the contaminant source zone and groundwater plume from the surrounding environment. These walls usually consist of soil, bentonite, or a cement mixture. Cement and bentonite slurry walls are capable of absorbing and retarding the movement of larger organic molecules and heavy metals, but are not capable of completely stopping water movement.

Effectiveness. Physical barriers might be an effective containment process for IR Site 35. However, it is unlikely that a downgradient vertical barrier alone would be fully effective in containing a groundwater plume. Hydraulic head would accumulate upgradient of a wall and would tend to dissipate by lateral movement of groundwater around the wall. Some type of long-term groundwater pumping would likely be required to prevent bypass of impacted groundwater at the perimeter of the wall.

Implementability. Implementability at IR Site 35 would be dependent on the location of the vertical barrier, and would likely be low. Installation of a wall might be extremely difficult because of buildings, underground utilities (which may need to be removed or relocated), and other obstructions.

Cost. Installation of a vertical physical barrier is expected to be higher in costs than other process options for IR Site 35.

Conclusion. Vertical subsurface barriers are eliminated from further consideration for IR Site 35 due to low implementability and high potential cost compared to other remedial options.

Hydraulic Controls

Hydraulic controls prevent vertical and/or lateral migration of chemical contaminants or modify the hydraulic properties of an aquifer. With hydraulic controls, groundwater flow or contaminant transport is controlled by using extraction and/or injection wells to modify the hydraulic gradient.

Effectiveness. Hydraulic controls are generally an effective method for modifying a hydraulic gradient to control groundwater flow or contaminant transport. Hydraulic control is typically used to protect a specific receptor (e.g., a downgradient drinking-water supply well) from a groundwater plume. The hydraulic conductivity of the subsurface soil at IR Site 35 is generally amenable to pumping. However, hydraulic controls alone are not expected to be effective at reducing the concentrations of contaminants in groundwater within a reasonable time frame.

Implementability. Hydraulic controls are implementable, although long-term treatment and disposition of extracted groundwater might pose technical and administrative challenges. A hydraulic containment system could be constructed using standard drilling and well-installation techniques and materials. Pump testing might be necessary to optimize the system design. Aquifer heterogeneity could be addressed through proper planning and remedial design. Properly designed monitoring and extraction wells would typically need to be installed to implement a hydraulic control system.

Cost. Capital costs associated with hydraulic controls are expected to be moderate, and O&M costs associated with treatment, monitoring, and discharge of extracted groundwater are expected to be high over a typical project life. Unless hydraulic controls were to be implemented with other technologies to reduce the mass of contamination, the duration required for extraction could result in significant O&M costs.

Conclusion. Hydraulic controls are eliminated as a process option for containment of impacted groundwater at IR Site 35 because of high costs. The construction, monitoring, and maintenance costs of a hydraulic-control-based physical containment system are expected to be higher than costs for other remedial options.

9.3.3.6 GROUNDWATER EXTRACTION AND *EX SITU* TREATMENT

Groundwater extraction would be used to remove dissolved contaminants in groundwater at IR Site 35 for *ex situ* treatment. This technology is sometimes referred to as "pump and treat" technology. *Ex situ* treatment utilizes aboveground chemical, physical, or biological processes to remove or destroy dissolved contaminants in extracted groundwater. The *ex situ* treatment processes discussed below for IR Site 35 could also be used to treat groundwater extracted during dewatering if source removal is conducted.

The difference between extraction and *ex situ* treatment and extraction for hydraulic control is that the former has the additional objective of contaminant mass removal. Groundwater extraction using extraction wells and pumps to collect impacted groundwater prior to *ex situ* treatment is evaluated in conjunction with physical and chemical *ex situ* treatment technologies for IR Site 35. Adsorption/absorption treatment

processes and advanced oxidation processes are considered in this RI/FS Report for use with groundwater extraction.

Adsorption involves the association of an adsorbate compound onto a surface (sorbent), while absorption involves the redistribution of a compound from the aqueous phase into a volume of material. An example of a commonly used adsorbent for *ex situ* groundwater treatment is activated carbon.

One advanced oxidation process uses ozone and hydrogen peroxide to create hydroxyl free radicals with extremely high oxidizing potentials. The hydroxyl free radicals oxidize contaminants into nonhazardous compounds such as carbon dioxide and water.

Effectiveness

Use of extraction wells for pump and treat operations is applicable to most dissolved-phase contaminants. The primary factors affecting the applicability of this technology at IR Site 35 are site geology and hydrogeology. Use of wells for pump and treat operations is expected to be partially effective for mass removal of dissolved-phase contaminants. The hydraulic conductivity of the subsurface soil at IR Site 35 is generally amenable to pumping.

Although contaminant mass may be reduced using extraction methods, this technology has been shown to be an inefficient and high-cost method for removing contaminants to low levels (API 1993, Bartow and Davenport 1992, Doty and Travis 1991, MacDonald and Kavanaugh 1994, Mackay and Cherry 1989, NRC 1994, U.S. EPA 1993).

Implementability

Extraction of groundwater and *ex situ* treatment of contaminants by adsorption/absorption and advanced oxidation processes (ozone and hydrogen peroxide) are implementable at IR Site 35. Extraction wells and a groundwater pump and treat system would need to be installed to extract groundwater. A National Pollutant Discharge Elimination System permit could be obtained from the Water Board to discharge treated water into the storm drain system and San Francisco Bay. However, extensive long-term groundwater extraction could induce the settling of fill soils at IR Site 35 or nearby roads or parking lots, interfering with future land uses.

Cost

Costs for pump and treat systems are difficult to predict, primarily due to the uncertain end point of the remedy. Factors affecting cost include the number and depth of wells required for extraction and the time frame for remediation. Also, the cost of addressing the substantive requirements of permitting, procuring, and operating treatment systems is high. The *ex situ* technologies are expected to have high O&M costs. Some short-term groundwater extractions may be considered as a component of groundwater alternatives.

Conclusion

Long-term groundwater extraction and *ex situ* treatment were eliminated from further consideration due to the high cost, long duration, and limited implementability associated with pump and treat systems. Some short-term groundwater extraction and treatment may be considered as a component of groundwater alternatives. However, *ex situ* treatment using either adsorption/absorption or advanced oxidation processes is retained for consideration for treatment of groundwater extracted during the dewatering processes during potential construction activities.

9.3.3.7 SOURCE REMOVAL

Source removal by mechanical excavation and disposal of the source material refers to technologies typically used to remove impacted soil. One process option for groundwater, source removal by mechanical excavation of soil, was evaluated for AOC 1 at IR Site 35. (This process option was not considered feasible at AOC 23.) The excavation would be dewatered as required and the groundwater would be treated for discharge to the sanitary sewer or storm drain systems. Excavated soil may need to be treated to meet LDRs prior to off-site disposal.

Effectiveness

Mechanical excavation and the associated dewatering would be effective in removing the source of the impacted groundwater, assuming that the source area could be defined. Additional soil and/or groundwater investigations might be needed to better delineate the extent of impacted soil for removal and to increase the effectiveness of the removal process.

Implementability

Source removal is expected to be implementable. Utilities in the excavation area may need to be removed and replaced. Excavations that extend below the water table are less implementable than shallower excavations, due to the added complexities of the dewatering and treatment of the groundwater.

Cost

Capital and O&M costs for this process option are considered to be moderate and low, respectively.

Conclusion

Source removal is retained for further evaluation. It could be combined with other treatment technologies to address groundwater at IR Site 35.

9.3.3.8 *IN SITU* TREATMENT

In situ treatment of groundwater is accomplished without removing impacted groundwater from the geologic formation. Three general process options are screened for IR Site 35: biological treatment, thermal treatment, and chemical treatment.

Biological Treatment

In situ biological treatment involves enhancing conditions for microbial activity in the saturated zone to accelerate natural attenuation processes. Two biological treatment process options have been identified for IR Site 35: biosparging and enhanced bioremediation.

Biosparging. Biosparging is an *in situ* technology in which air and nutrients (typically oxygen and/or nitrogen) are injected into a contaminated aquifer to promote aerobic biodegradation. Biosparging is an enhanced form of air sparging. Remediation of contaminants via biosparging can occur by two processes: 1) phase transfer of volatile contaminants from the groundwater to vapor, where they can be collected and treated, and 2) aerobic biological processes enhanced by the injection of air and nutrients.

Effectiveness. Biosparging is most effective in addressing contaminants that are amenable to aerobic bioremediation (e.g., fuels). Phase transfer of dissolved contaminants (volatilization) could be accomplished. Biosparging should be effective in treating fuel hydrocarbons, but not chlorinated VOCs. Biosparging has the same physical limitations as air sparging with regard to air distribution. The time frame to meet RGs would be difficult to predict at IR Site 35.

Implementability. Biosparging is expected to have a low rating for implementability. Pilot-scale testing would be recommended. Implementability concerns for biosparging in IR Site 35 include:

- sufficiently uniform distribution of air in the subsurface,
- vapor migration, and
- treatment of vapors to meet Bay Area Air Quality Management District (BAAQMD) requirements.

Properly designed monitoring and injection wells would need to be installed to deliver air and nutrients to the subsurface.

Cost. Biosparging would be moderate in cost relative to other technologies.

Conclusion. Biosparging is eliminated from further consideration based on low likelihood of meeting RGs within a reasonable time frame. Other more effective oxidation processes are available.

Enhanced *In Situ* Bioremediation. Enhanced ISB is a process that accelerates the natural biodegradation process of some contaminants by introducing DO (for aerobic ISB) or a carbon substrate (for anaerobic ISB) into shallow groundwater to provide a suitable habitat in which naturally occurring microorganisms can degrade pollutants into

less toxic by-products. Compounds such as magnesium peroxide produce a slow and sustained release of molecular oxygen when in contact with soil moisture or groundwater. Compounds such as molasses, corn syrup, and other proprietary compounds are often used for anaerobic ISB.

Effectiveness. Enhanced aerobic ISB is expected to be more effective than other aerobic *in situ* options for IR Site 35. ISB could be effective for aerobically degradable contaminants. Enhanced ISB may be effective in treating VOCs or fuel hydrocarbons. The time to reach RGs depends on the adequate distribution of injected compounds.

Implementability. Injection of material for enhanced ISB should be implementable at IR Site 35. Bench and/or pilot-scale testing may be needed. Groundwater monitoring wells and injection points would need to be installed to implement ISB at IR Site 35.

Cost. The capital costs for enhanced ISB injection should be moderate for the treatment area(s) considered at IR Site 35. O&M costs should be low, assuming a reasonable remediation time frame (5 years or less).

Conclusion. This process is retained for further consideration for IR Site 35.

Thermal Treatment

In situ thermal treatment involves heating soil and groundwater to strip VOCs and SVOCs from pore spaces in the aquifer. Two process options are available for this technology: electrical resistive heating (ERH) and thermal extraction. Each technology offers advantages and disadvantages, but both rely on thermal energy. As the soil and groundwater are uniformly heated to water's boiling point, the water turns to steam, stripping volatile and semivolatile contaminants from the pore spaces. This process is performed in conjunction with vacuum extraction or dual-phase extraction to strip contaminants from the aquifer and remove them by phase transfer. ERH was selected as a representative process option for the purposes of this RI/FS Report.

ERH, also called six-phase heating, is an innovative thermal volatilization technique that splits conventional electricity into six electrical phases for the resistive heating of soil and groundwater. Each electrical phase is delivered to one of six electrodes placed in a hexagonal array. The voltage gradient between phases causes an electrical current to flow through soil and groundwater. Resistivity causes the temperature to rise. Six-phase heating tends to preferentially treat lower-permeability layers as a result of the resistive heating process. Pilot-scale test data are available for ERH, and the technology has been pilot-tested at IR Site 5 at Alameda Point.

Effectiveness. ERH should be effective in stripping volatile contaminants. Site-specific treatability studies would be necessary to render a definitive conclusion regarding the potential effectiveness of ERH. This technology is typically used for DNAPL areas or other high-concentration source areas.

Implementability. ERH is rated low in implementability. Site-specific treatability studies would be necessary to determine the potential implementability of this

technology. Implementability would be limited by the need to capture and treat potentially high volumes of vapor. Properly designed wells would need to be installed to extract vapors from the subsurface. Buildings could also affect implementability. ERH is an energy-intensive technology. Heating of formational materials could take an extended period of time.

Cost. ERH is not cost-competitive for treatment of dissolved-phase, volatile contaminants. It is generally only a cost-effective measure for addressing DNAPL remediation. It would be considerably more expensive than other available options for remediation of dissolved contaminants at IR Site 35. The cost of ERH depends on the thermal conductance of the formation, duration of heating required, volume of the treatment area, prevailing cost of electrical energy, and capital and O&M requirements for treatment of the vapor stream. It is generally considered to be a capital- and energy-intensive technology.

Conclusion. Thermal treatment options are eliminated from further consideration on the basis of implementability and cost. Other *in situ* remediation technologies offer comparable potential for source reduction at a lower cost.

Chemical Treatment

Chemical treatment process options induce *in situ* chemical reactions that mobilize and/or chemically break down contaminants in groundwater. The ISCO process involves injection of chemical reagents into the groundwater where contaminants are present; these reagents produce oxidizing agents that oxidize organic chemicals to water and carbon dioxide. Several competing variations of the process are available, all of which are intended to oxidize organic contaminants *in situ*.

Several different oxidants have been used for ISCO. The most commonly used oxidants include: permanganate (MnO_4^-), activated persulfate ($S_2O_8^{2-}$), Fenton's reagent (hydrogen peroxide [H_2O_2] and ferrous iron [Fe^{+2}]) or catalyzed hydrogen peroxide, and ozone (O_3).

ISCO is potentially applicable for most organic contaminants over a range of concentrations, and can be used for source area mass reduction or intercepting dissolved plumes to remove mobile contaminants. Each oxidant has unique advantages and disadvantages depending on contaminant type, geology, and other factors. Table 9-5 contains results of a literature review of the suitability of ISCO oxidants for the IR Site 35 COCs naphthalene (AOC 1) and vinyl chloride (AOC 23).

The effectiveness of ISCO depends on the effective distribution of the reagents in the treatment zone and the reactivity of a particular oxidant with the contamination present.

Failure to account for subsurface heterogeneities or preferential flow paths can cause an uneven distribution of the oxidant, resulting in pockets of untreated contaminants. The applied reagents also consume natural organic matter (NOM) in the soil, some of which typically has sorbed contamination. The optimal oxidant loading, including both target and nontarget compounds, is determined before injection. Within the ISCO treatment zone, changes in oxidation states and/or pH may result in mobilization of metals.

Advantages of ISCO include its relatively low cost and the speed of reaction. Table 9-6 identifies some considerations for various ISCO treatment options.

ISCO may be used in conjunction with other technologies as part of a site closure strategy. ISCO has been used to supplement pump and treat, air sparging/soil vapor extraction, MNA, and *in situ* aerobic biodegradation technology applications.

Permanganate. There are two common forms of permanganate—potassium permanganate ($KMnO_4$) and sodium permanganate ($NaMnO_4$). The potential for higher concentrations in liquid sodium permanganate solutions gives more flexibility in the design of the injection volume, and the dusting hazards associated with dry potassium permanganate solids are eliminated. Permanganate is a stable oxidant and can persist in the subsurface for months. Permanganate has been shown to be effective with chlorinated ethenes (including vinyl chloride) and PAHs such as naphthalene.

Permanganate oxidation reactions tend to occur in the dissolved aqueous phase after contaminants desorb from aquifer soils. Because permanganate, like all oxidants, is nonselective, it also can oxidize NOM present in the soil. Since organic contaminants sorb to NOM in the soil matrix, they can be released as the NOM is oxidized by the permanganate. The application rate and the total mass introduced must be balanced with the subsurface oxidizable material.

The viability of applying permanganate should be determined on a case-by-case basis and depends on the extent of contamination, the contaminant oxidant demand, the presence of competing naturally reduced materials, and treatment goals.

Poor performance of permanganate is often attributed to injection of an inadequate volume of oxidant to contact the entire target zone, poor uniformity of oxidant delivery caused by low-permeability zones and site heterogeneity, excessive oxidant consumption by natural subsurface materials, and/or the presence of large masses of DNAPL or sorbed contaminants. The generation of manganese dioxide (MnO_2) precipitate in soil through permanganate treatment can reduce subsurface permeability and limit future injections. Background measurements of manganese concentration should be collected to establish existing conditions prior to injection of permanganate.

Activated Persulfate. Persulfate salts dissociate in water to persulfate anions ($S_2O_8^{2-}$) which, although strong oxidants, are kinetically slow in destroying many organic contaminants. For ISCO applications, the most common salt used is sodium persulfate. Potassium persulfate generally is not used as an ISCO reagent because it has a lower solubility in water.

Activated persulfate produces a sulfate radical ($SO_4^{-}\bullet$), which is a more powerful oxidant than hydrogen peroxide, permanganate, or ozone. Only the hydroxyl free radical is stronger. The addition of heat or a ferrous salt (Fe^{+2}) after sodium persulfate injection activates the ISCO process, producing the sulfate radical. Chelated iron effectively increases the iron solubility and longevity of Fe^{+2} in the groundwater.

Oxidation of VOCs in groundwater with activated persulfate also has the potential to lower the pH. In water, without soil present to buffer the pH, the pH generally drops to the range of 1.5 to 2.5, depending on the amount of persulfate used. This pH change could act to mobilize metals present in the soil.

The persulfate anion interaction with NOM has been observed to be limited and much lower than that for peroxide or permanganate. However, the presence of high concentrations of chloride, carbonate, and bicarbonate ions can reduce persulfate effectiveness. During ISCO treatment using persulfate, sulfate concentrations typically will increase.

Peroxides (Fenton's Reagent and Modified Fenton's Reagent). Hydrogen peroxide alone is an oxidant, but at low concentrations (< 0.1 percent) it is not kinetically fast enough to degrade many organic contaminants before decomposition occurs. However, the addition of a ferrous salt (Fe^{+2}) dramatically increases the oxidative strength of peroxide. Hydrogen peroxide and ferrous iron catalyst injected together, known as Fenton's reagent, generates a hydroxyl radical (OH•) that acts as the active oxidizing agent. The suite of reactions associated with Fenton's reagent is complex and very effective at destroying many organic compounds dissolved in groundwater, sorbed to soil particles, or existing as NAPLs in subsurface environments.

The hydroxyl radical generated by the Fenton's reagent is a powerful, nonselective oxidant. The oxidation of an organic compound by Fenton's reagent is a rapid and exothermic (heat-producing) reaction that is generally completed within minutes. The end products of oxidation are primarily carbon dioxide and water (plus the chloride ion in the case of chlorinated compounds). Unconsumed hydrogen peroxide naturally degrades to oxygen and water after injection.

The Fenton's reagent approach requires acidification of the aquifer, typically with sulfuric acid, to keep the iron catalyst in solution. Hence, the buffering capacity of the aquifer substrate and groundwater is an important design consideration for ISCO using traditional Fenton's reagent. Dissolved carbonates in highly buffered systems tend to consume the oxidant (hydroxyl radical). A qualitative evaluation of the potential buffering capacity of the aquifer substrate can be made by inspecting geologic boring logs and cross sections for the potential presence of shell layers and other formational materials containing calcium carbonate. Traditional Fenton's oxidation is generally less effective and less implementable for alkalinity levels above 500 mg/L than for lower levels.

Any deviation from the traditional low-concentration hydrogen peroxide/iron mixture is known as a "modified Fenton's" process. This includes the use of higher concentrations of hydrogen peroxide (H_2O_2) or calcium peroxide (Ca_2O_2), with or without chelating agents. The chemical reactions associated with this type of system are more complex than traditional Fenton's chemistry. Modified Fenton's processes that use proprietary chelated-iron catalysts and stabilized hydrogen peroxide have been developed with the goal of improving on the traditional Fenton's process. The biggest advantages of the modified Fenton's process are that it is accomplished without altering the groundwater pH and without resulting in a significant rise in the groundwater temperature (typically an

increase of no more than 2 degrees Celsius). These advantages not only extend the longevity of the oxidant, but also minimize the mobilization of metals from the aquifer matrix (Haskins, pers. com. 2006).

Pilot-scale tests using a modified Fenton's reagent were performed at three sites at Alameda Point by In-Situ Oxidative Technologies, Inc., in 2003 (Shaw 2003a). None of the sites selected for the pilot-scale tests had reported concentrations in groundwater that suggested residual DNAPL in the area of the pilot-scale test. The pilot-scale test results indicated a reduction in vinyl chloride concentration of 51 percent at one site. Reductions of 50 percent and above were reported for most of the contaminants evaluated during the pilot-scale test. IR Sites 11 and 21 experienced a reduction of all chlorinated contaminants following injection; however, the concentrations rebounded to near-baseline levels 4 weeks after injection. It is suspected that DNAPL upgradient of IR Sites 11 and 21 is the source of these contaminants. The field summary report concluded that multiple injection events would be required at the sites during full-scale application to achieve the desired results (chemical concentrations below MCLs) (Shaw 2003a). After completion of these pilot-scale tests, a proprietary modified Fenton's process was used successfully at IR Sites 9 and 16.

A recent development in ISCO technologies is another proprietary mixture utilizing peroxide called RegenOx. According to the manufacturer (Regenesis), RegenOx is an advanced ISCO technology designed to treat organic chemicals, including high concentration source areas in the saturated and vadose zones. RegenOx maximizes *in situ* performance using a solid alkaline oxidant that employs a sodium percarbonate complex containing peroxide. Once in the subsurface, the combined product produces an effective oxidation reaction comparable to that of Fenton's reagent without a violent exothermic reaction. RegenOx is reportedly effective in treating TPH, PAHs (e.g., naphthalene), and chlorinated hydrocarbons (Regenesis n.d.). RegenOx is reportedly better in source zones with contaminant concentrations above 10 ppm, which is higher than the concentrations of naphthalene (AOC 1) and vinyl chloride (AOC 23) requiring treatment at IR Site 35.

Ozone and Ozone with Hydrogen Peroxide. Ozone is one of the strongest oxidants available for ISCO. There are two distinct forms of *in situ* ozone application: vadose zone injection of ozone gas and ozone sparging below the water table. It is usually generated on-site using ozone generators. More recently, ozone has been injected in a dissolved phase as ozonated water or as an ozone/peroxide mixture, both of which are distributed in the subsurface as liquid mixtures. The liquid mixture option is similar to other ISCO oxidants. For ozone-based systems, ozonation (application of ozone alone) and peroxone (application of ozone and hydrogen peroxide) are most often considered.

Radical scavengers common within soil matrices can consume ozone, thus increasing the ozone demand and adversely affecting remediation by increasing both cost and time requirements. For ozone-based ISCO processes, the key aquifer soil considerations of concern are high levels of bacteria biomass, total organic carbon, iron, manganese, hydrogen sulfide, and carbonates.

Compared to other oxidants, the use of ozone does not appreciatively change the pH. The half-life of ozone in the presence of water is typically 30 minutes. Since the mass transfer of ozone to groundwater is limited, ozone injection is typically sustained over a longer period of time (months to years) than with other oxidants. To maximize mass transfer to groundwater, ozone is commonly delivered via sparge screens with very small orifices such that fine bubbles form. The contaminants are treated *in situ* and converted to innocuous and/or naturally occurring compounds (e.g., water, carbon dioxide, and halide ions).

Effectiveness. Effectiveness of various ISCO options will differ by contaminant, soil type, and aquifer heterogeneity because the injected reagents tend to follow preferential pathways. ISCO has been implemented successfully at several Alameda Point sites impacted with VOCs. ISCO could result in increases of dissolved iron and manganese.

Implementability. The buffering capacity of the aquifer (substrate and groundwater) is a concern for the use of the Fenton's reagent technology because of vigorous reactions that could occur between the carbonate and acid species. Other ISCO options are expected to have less vigorous reactions and are thus more implementable. The impact of the process on the subsurface formation would have to be evaluated during pilot-scale testing since ISCO can result in reductions in the hydraulic conductivity of the aquifer substrate, thereby potentially limiting the ability to take future actions. Handling of reagents requires engineering controls such as a health and safety plan and personal protective equipment.

ISCO would be implementable at IR Site 35. Some amount of physical displacement and migration of contaminants is likely during ISCO reagent injection. The need for hydraulic controls would be evaluated during remedial design. Wells would need to be installed to extract groundwater if hydraulic controls are needed.

Cost. ISCO would be moderate to high in capital costs depending on the treatment area. ISCO would be effective in reducing VOC concentrations in source areas and could significantly reduce the duration of O&M over the life of the project.

Conclusion. ISCO is retained for further evaluation at IR Site 35.

9.3.3.9 DISPOSAL

As discussed above, containment, groundwater extraction, and *ex situ* treatment were eliminated from further consideration at IR Site 35. The following sections present options for off-site disposal of untreated groundwater and on-site discharge/reinjection of treated groundwater.

Off-Site Disposal of Extracted Groundwater

Off-site disposal of groundwater would be related to groundwater sampling and waste associated with remedial activities. Under this process option, untreated groundwater would be placed in temporary storage facilities (e.g., 55-gallon drums or ASTs) and transported to an off-site treatment and disposal facility.

Effectiveness. The effectiveness of this option is considered medium since there may be future liability for disposal of untreated waste. This process option is considered effective only for small quantities and short durations of groundwater extraction.

Implementability. This option is easily implemented for small quantities of extracted groundwater. For larger quantities, implementability is moderate to low. The groundwater must be profiled and disposed of according to treatment and disposal facility requirements. Several treatment and disposal facilities in the state of California are potentially capable of accepting extracted groundwater from IR Site 35.

Cost. Temporary storage facilities may be necessary during extraction activities to store collected groundwater. Costs for off-site disposal could range from low to very high, depending upon the duration of the process, the volume of extracted groundwater for disposal, and the chemical characteristics of the groundwater. For smaller volumes, disposal tends to be a relatively cost-effective option. However, for larger volumes, off-site disposal can be among the most expensive options.

Conclusion. This process option is retained for further evaluation at IR Site 35.

Discharge to Surface Water

Sewer or surface water discharge would be associated with dewatering or other groundwater extraction associated with remedial activities. For this process option, on-site treatment of extracted groundwater would be performed to meet surface water discharge requirements. Treated groundwater would be discharged into the storm drain system, which eventually drains into San Francisco Bay. Conveyance structures (either underground or aboveground) would be constructed from the point of treatment to the storm drain system.

Effectiveness. Discharge to the storm drain system is an effective means of disposing of treated groundwater. Water would need to be treated to meet the substantive provisions of National Pollutant Discharge Elimination System permit requirements.

Implementability. Discharge to the storm drain system is implementable. Numerous sites in the San Francisco Bay Area successfully treat and discharge extracted groundwater into storm drain systems.

Cost. Temporary storage facilities may be necessary during groundwater extraction and treatment to store collected water in order to regulate discharge into the storm drain system. Temporary conveyance structures (e.g., piping) would need to be constructed. It is expected that discharge to the storm drain system would have moderate capital and O&M costs, depending on volume and duration.

Conclusion. This process option is retained for further evaluation at IR Site 35.

Publicly Owned Treatment Works

For this option, on-site treatment of extracted groundwater would be performed as required to meet the substantive requirements of an industrial wastewater discharge permit. Treated groundwater would be conveyed and discharged to a POTW facility.

Conveyance structures, such as a discharge pipe, would be constructed from the point of treatment to the City of Alameda's sanitary sewer system.

Effectiveness. Discharge to a POTW facility is an effective means of disposing of treated groundwater.

Implementability. Discharge to a POTW facility could be feasible if concentrations in the treated groundwater comply with industrial discharge permit limits established by the local POTW.

Cost. Temporary storage facilities may be necessary during groundwater extraction and treatment to store collected water to regulate discharge to a POTW. Conveyance structures (e.g., piping) would need to be constructed. Fees typically are based on the volume of water discharged. It is expected that discharge to a POTW facility would have moderate capital and O&M costs, depending on volume.

Conclusion. This process option is retained for further evaluation at IR Site 35.

Reinjection

For this option, on-site treatment of extracted groundwater would be performed. Disposal of treated groundwater would be accomplished by reinjection of the water into the aquifer from which it was extracted.

Effectiveness. Reinjection is an effective means of disposing of treated groundwater.

Implementability. Reinjection could be feasible if concentrations in the treated groundwater are below RCRA criteria and RGs. It is anticipated that reinjection would be more difficult to implement than other groundwater management options. Obtaining the required permits to reinject treated water to the subsurface may pose administrative challenges. Depending on location, reinjection could also have an adverse impact on other groundwater plumes in the area.

Cost. Temporary storage facilities may be necessary during groundwater extraction and treatment to store collected water to regulate reinjection into the subsurface. Because there are no groundwater monitoring wells or injection wells at AOCs 1 and 23, wells would need to be installed to reinject treated water to the subsurface. Reinjection is expected to be more costly than other groundwater disposal options.

Conclusion. This process option was eliminated from further evaluation based on low implementability.

9.4 SUMMARY AND CONCLUSIONS

Tables 9-3 and 9-4 summarize the results of the screening process for general soil and groundwater technologies, respectively. Several innovative technologies were included in the evaluation. Following the general screening process, retained technologies were carried forward to the development and screening of remedial alternatives in Section 10.

9.4.1 Conclusions for Soil Study Areas

Chemicals in three soil study areas were carried forward to the FS portion of this RI/FS Report: heptachlor in soil at AOC 3, lead in soil at AOCs 10 and 12 (treated together and referred to hereinafter as AOC 10/12), and PAHs in areas across Transfer Parcel EDC-5.

Remedial process options for soil that were retained in the technology screening process are the following:

- no action (as required by CERCLA)
- ICs
- containment (with an asphalt cover or soil cover)
- excavation and removal
- off-site disposal of excavated soil

9.4.2 Conclusions for Groundwater Study Areas

Chemicals in two groundwater study areas were carried forward to the FS portion of this RI/FS Report: naphthalene in groundwater at AOC 1 and vinyl chloride in groundwater at AOC 23.

Remedial process options for groundwater that were retained in the technology screening process are the following:

- no action (as required by CERCLA)
- ICs
- groundwater monitoring
- MNA
- groundwater extraction and *ex situ* treatment (for short-term duration, e.g., management of groundwater during dewatering processes)
- source removal and disposal (for AOC 1)
- enhanced ISB
- ISCO
- disposal of untreated water to an off-site treatment and disposal facility
- disposal of treated water to a storm drain system or POTW facility

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Section 10

DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES

The technologies and associated process options retained after the screening evaluation in Section 9 were assembled into remedial alternatives to address the identified contaminants in soil and groundwater at IR Site 35. Many of the remedial alternatives for soil and groundwater involve a combination of the general response actions screened in Section 9. The alternatives represent a range of technically feasible remedial responses to address the soil and groundwater contaminants.

10.1 DEVELOPMENT OF REMEDIAL ALTERNATIVES

The remedial alternatives for soil and groundwater at IR Site 35 were developed on the basis of the preliminary RGs presented in Section 8, requirements of CERCLA and the NCP, and, to the extent practicable, applicable U.S. EPA technical guidance (U.S. EPA 1988). CERCLA Section 121(b) identifies the following statutory preferences for remedial actions.

- Preferred remedial actions are those involving treatment that permanently and significantly reduce the volume, toxicity, or mobility of site-related contaminants.
- The least favored remedial action is off-site transport and disposal without treatment of hazardous substances or contaminated materials when practical treatment technologies are available.
- Remedial actions using permanent solutions, alternative treatment technologies, or resource recovery technologies should be assessed where appropriate.

The NCP states that a range of remedial alternatives should be developed in the FS process (40 C.F.R. § 300.430[e]). Alternatives may vary in the degree of treatment employed (i.e., in the quantity of material treated or the percent reduction of contaminant concentrations) as well as in the types and quantities of residuals and untreated material remaining on-site requiring long-term management. For groundwater response actions, alternatives that attain RGs in varying lengths of time using one or more different technologies may also be considered.

The criteria regarding eventual selection of a preferred remedial action were also considered (U.S. EPA 1988). The preferred remedial action(s) will be presented in the proposed plan. According to U.S. EPA technical guidance, the preferred remedial action should:

- protect human health and the environment,
- meet contaminant-specific ARARs and be consistent with location- and action-specific ARARs,
- be cost-effective,

- use permanent solutions and alternative treatment technologies to the maximum extent practicable, and
- satisfy the preference for treatment as a principal element of the remedial action to reduce the toxicity, mobility, or volume of contaminants.

The FS may also include alternatives that do not involve treatment. In these cases, human health and the environment would be protected by using engineering controls to prevent or control exposure to site contaminants. As necessary, ICs would be included as part of a comprehensive remedial alternative to ensure the continued protectiveness of the response action.

Typically, under U.S. EPA guidance for the conduct of an RI/FS (U.S. EPA 1988) at a site with interacting media (e.g., soil being a primary source of groundwater contamination), media-specific remedial alternatives are combined into sitewide alternatives, resulting in considerably more potential remedial alternatives to be evaluated. In the case of IR Site 35, interactions between soil and groundwater in relation to the current nature and extent of contamination appear to be limited; therefore, soil and groundwater remedial alternatives will be presented and evaluated separately in this RI/FS Report.

10.2 SOIL REMEDIAL ALTERNATIVES

This section presents soil remedial alternatives for three areas grouped by contaminant type:

- heptachlor in shallow soil at AOC 3
- lead in shallow soil at AOCs 10 and 12, and in one storm drain downflow from AOC 12
- PAHs in soil in PAH Areas across Transfer Parcel EDC-5, including IR Site 35

Table 10-1 lists the soil alternatives identified for IR Site 35.

10.2.1 Alternatives AOC 3-1, AOC 10/12-1, and PAH-1: No Further Action

As stipulated in the NCP (40 C.F.R. § 300.430[e][6]), the no action alternative for soil is evaluated in the same manner as the other remedial alternatives considered in this RI/FS Report. The no action alternative serves as the baseline against which the remaining soil alternatives can be compared. Alternatives include AOC 3-1, AOC 10/12-1, and PAH-1.

10.2.2 Alternatives AOC 3-2, AOC 10/12-2, and PAH-2: Cover and/or ICs

The cover and/or ICs alternatives involve installation of a cover to act as a barrier and provide separation between the underlying impacted soil and potential receptors, and/or the use of ICs to restrict removal of existing pavements, hardscape, or buildings over contaminated soil. ICs would prohibit actions that could damage or reduce the

effectiveness of the cover. Cover and/or IC alternatives include AOC 3-2, AOC 10/12-2, and PAH-2.

For Alternative AOC 3-2, a soil cover would be placed over the impacted soil and graded to prevent ponding and direct surface water drainage off-site. The source material for the soil cover is assumed to be clean, imported soil from an off-site area. ICs would be put in place prohibiting actions that could damage the cover or reduce its effectiveness.

For Alternative AOC 10/12-2, limited excavation and off-site disposal of lead-impacted soil exceeding the preliminary RG in unpaved areas would be performed. The storm drain with sediment containing lead at concentrations above the preliminary RG would also be cleaned out and disposed off-site as part of this alternative. Existing hardscape and pavements over lead-impacted soil would remain in place, and ICs prohibiting removal of the hardscape and pavements would be put in place.

For Alternative PAH-2, ICs would be put in place that would require a soil sampling plan to be implemented when existing buildings and/or hardscape are removed in the IC area. Once human-health risk is demonstrated to be similar to or less than the risk for soil in unpaved areas, the ICs would no longer be required. (The previous TCRA for PAHs removed shallow soil with B[a]P equivalent concentrations above the preliminary RG in unpaved areas, so a soil cover was not considered necessary for Alternative PAH-2.) The area of ICs would include the northeastern portion of Transfer Parcel EDC-5, where the majority of higher PAH concentrations in soil remain.

In the event of future site work that could damage soil covers, pavement, or buildings subject to ICs, prior approval would be required from regulatory agencies and the Navy. ICs would be put in place for each covered area to prohibit actions that could result in unacceptable exposure to underlying impacted soil or otherwise reduce the effectiveness of the cover. In the event of future site work in the vicinity of impacted soil addressed by the cover/ICs alternatives, prior approval from regulatory agencies and the Navy would be required. The site work would also be subject to a soil management plan. The soil management plan would consider possible subsurface hazards (such as exposure to impacted soil) that may be encountered during future excavation, and soil management requirements for stockpiles, characterization, and proper disposal. No fencing or signage would be included in any of the cover/ICs alternatives.

10.2.3 Alternatives AOC 3-3, AOC 10/12-3, PAH-3a, PAH-3b, PAH-4a, and PAH-4b: Excavation and Off-Site Disposal

Excavation and off-site disposal is the removal alternative for study areas with impacted soil. Complete removal alternatives for soil are AOC 3-3, AOC 10/12-3, and PAH-4b. Other soil alternatives that have an excavation and off-site disposal component are PAH-3a, PAH-3b, and PAH-4a.

Before excavation, additional soil samples would be collected and analyzed as needed to identify the spatial limits of the impacted soil for removal in the study areas (e.g., the western boundary of heptachlor in AOC 3 soil). To facilitate excavation, existing paved

surfaces within the planned excavation areas would be demolished and removed to allow for removal of underlying soil. Following demolition and removal of paved surfaces, the underlying soil would be excavated, stockpiled, and characterized before off-site disposal. Soil would be disposed of based on characterization results. Soil with leachable metals (or other RCRA characteristic constituents) present in concentrations exceeding the toxicity characteristic leaching procedure (TCLP) would be managed as RCRA-hazardous waste and treated as required to meet federal LDRs. Soil with total metals (or other California-regulated constituents) present at concentrations exceeding the total threshold limit concentration (TTLC), or soluble California-regulated constituents present at concentrations exceeding the soluble threshold limit concentration (STLC), would be disposed as California-hazardous waste. Soil with total and soluble metals (or other regulated chemicals) present at concentrations below the TCLP, TTLC, and STLC limits would be disposed as Class II nonhazardous soil.

For PAH Areas, excavation alternatives are intended to accomplish additional mass removal for PAHs beyond what was accomplished previously with TCRAs. Alternatives PAH-3a and PAH-3b involve excavation to remove soil with B(a)P equivalent concentrations above preliminary RGs to a depth of 2 feet bgs. Alternatives PAH-4a and PAH-4b involve excavation to remove soil with B(a)P equivalent concentrations to a depth of 4 feet bgs. Under Alternatives PAH-3a and PAH-4a, paved areas would not be excavated. Under Alternatives PAH-3b and PAH-4b, both paved and unpaved areas would be excavated. The same ICs described for Alternative PAH-2 would apply to Alternatives PAH-3a, PAH-3b, and PAH-4a. Alternative PAH-4b would not include ICs.

Any large debris items (e.g., timber, asphalt, concrete, or scrap metal) found during excavation activities would be segregated and recycled or disposed of separately. After the excavation, confirmation sampling would be performed for Alternatives AOC 3-3 and AOC 10/12-3. No confirmation sampling would be performed for Alternative PAH-4b because PAH-impacted soil is not classified as hazardous waste; therefore, confirmation sampling is not necessary. The excavated areas would be backfilled with clean imported fill soil and graded.

10.3 GROUNDWATER REMEDIAL ALTERNATIVES

This section presents the initial identification of groundwater remedial alternatives for IR Site 35, indicated by the study area followed by the alternative number (e.g., AOC 1-1).

Two groundwater areas were carried forward from the RI process into the FS. Naphthalene and vinyl chloride were reported at concentrations above the preliminary RGs at AOCs 1 and 23, respectively.

For the purposes of this evaluation, naphthalene contamination in the FWBZ groundwater at AOC 1 is assumed to be present within the depth interval of 5 to 14 feet bgs, based on the interpretation of the RI results. The naphthalene-impacted area is assumed for FS purposes to be approximately 150 feet by 50 feet in size, based on available information. Before implementing any active groundwater alternative at AOC 1, a groundwater investigation would be implemented to further refine the boundaries of naphthalene

present in groundwater at concentrations above the preliminary RG and thickness of the FWBZ. In addition, an estimated three monitoring wells would be installed as part of an active remedy at AOC 1 to verify naphthalene concentrations in monitoring well samples and track the progress of remedial measures.

The top and bottom depths of the FWBZ at AOC 23 were estimated to be 4 and 12 feet bgs, respectively, based on the interpretation of the RI results. The extent of vinyl chloride in groundwater at concentrations above the RG was assumed to be limited to two locations, approximately 75,000 square feet on EBS Parcel 124, and 5,000 square feet on EBS Parcel 125. Before implementing any active groundwater alternative at AOC 23, a limited groundwater investigation would be implemented to further refine the boundaries of vinyl chloride present in groundwater at concentrations above the RG and thickness of the FWBZ. In addition, an estimated five monitoring wells would be installed as part of an active remedy at AOC 23 to verify vinyl chloride concentrations in monitoring well samples and track the progress of remedial measures.

Table 10-2 lists the alternatives identified to address impacted groundwater at AOCs 1 and 23.

10.3.1 Alternatives AOC 1-1 and AOC 23-1: No Action

For the no action groundwater remedial alternative, no further action of any type would be conducted on the impacted groundwater areas at AOCs 1 and 23. The no action alternative assumes that the AOC will remain in its current state. This alternative is included to serve as a basis against which other groundwater remedial alternatives may be compared. The two no action alternatives are AOC 1-1 and AOC 23-1.

10.3.2 Alternatives AOC 1-2 and AOC 23-2: MNA and ICs

MNA and ICs would be utilized to address the impacted groundwater areas at AOCs 1 and 23. No enhancements to the MNA process would be included, and no source removal or soil removal actions would be performed. As part of an MNA and ICs alternative, a groundwater investigation would be performed to verify the contaminant concentrations in groundwater and the extent of groundwater with contaminant concentrations above preliminary RGs.

An MNA program would be developed and implemented to confirm the permanent reduction of contaminant concentrations. Since there are no groundwater monitoring wells in the impacted groundwater areas, monitoring wells would be installed to collect samples. For cost estimating purposes for the FS, the MNA program was assumed to occur for a project life of 10 years; however, the duration of MNA may be longer or shorter.

ICs would be put in place at AOC 23 (where MCLs are identified as ARARs) to prohibit the extraction of groundwater for domestic purposes. ICs for AOC 1 would include mitigation of potential vapor intrusion risk if additional groundwater sampling results indicate unacceptable risk; if additional groundwater sampling results do not indicate unacceptable risk, then ICs would not be needed. ICs for these areas would also specify

the protection of the groundwater monitoring wells. The two alternatives for MNA and ICs are AOC 1-2 and AOC 23-2.

10.3.3 Alternative AOC 1-3: Source Removal, Enhanced Aerobic ISB, and ICs

Alternative AOC 1-3 combines removal of the suspected source area (OWS 063A at AOC 1) and adjacent impacted soil, enhanced aerobic ISB, and ICs to address the impacted groundwater area at AOC 1. Under Alternative AOC 1-3, an additional groundwater investigation would be performed to refine the extent of naphthalene-impacted groundwater at concentrations above the preliminary RG. The initial investigation would include collection of soil samples from the capillary fringe to further delineate the suspected source area and impacted soil for remedial design purposes. In addition, three monitoring wells are assumed to be installed to verify naphthalene concentrations previously reported during the RI and to track the progress of aerobic ISB.

Under this alternative, limited excavation and off-site disposal of naphthalene-impacted soil around OWS 063A would be conducted. Dewatering activities would be performed during source removal because the excavation is expected to extend below the water table. Extracted groundwater would be treated with activated carbon to remove dissolved naphthalene and either discharged via the storm drain system to San Francisco Bay or discharged to a POTW. As part of the backfilling process, it has been assumed for FS purposes that an oxygen-releasing ISB enhancement product such as the proprietary Oxygen Release Compound (ORC) would be mixed into the clean backfill soil in the saturated and capillary fringe zone in order to accelerate the rate of aerobic biodegradation of naphthalene in groundwater and remaining saturated soil. It is expected that enhanced aerobic ISB would result in a rapid reduction of contaminant mass in remaining soil.

Following backfilling activities, ICs would be put in place, if needed, to mitigate vapor intrusion risks at AOC 1 until risks are no longer unacceptable. For FS cost estimating purposes, the assumed duration of ICs for Alternative AOC 1-3 is 10 years.

10.3.4 Alternatives AOC 1-4 and AOC 23-3: Enhanced ISB and ICs

Enhanced ISB and ICs are considered to address the impacted groundwater areas at AOCs 1 and 23. Two alternatives are considered: Alternatives AOC 1-4 and AOC 23-3.

A groundwater investigation would be performed to verify the extent of contaminant concentrations in groundwater at concentrations above RGs and assess the current configuration of the impacted areas. For FS purposes, the aerobic ISB process is assumed to utilize an oxygen-releasing ISB enhancement product such as the proprietary ORC technology to release oxygen and accelerate the biodegradation of naphthalene at AOC 1. Similarly, for FS purposes, the anaerobic ISB process is assumed to utilize an ISB enhancement product such as the proprietary Hydrogen Release Compound (HRC) technology to provide a carbon source to accelerate the biodegradation of vinyl chloride

by reductive dechlorination at AOC 23. ORC and HRC (or similar) would be injected by direct-push methods into the aquifer zones of the source areas to accelerate the reduction of naphthalene and vinyl chloride, respectively. Approximately 75 injection points would be utilized for Alternative AOC 1-4, and approximately 190 injection points would be utilized for Alternative AOC 23-3. For FS cost estimating purposes, 3 to 4 years of ISB is assumed.

Following amendment injection, groundwater sampling would be performed to document the reduction in contaminant concentrations after ISB implementation.

ICs would be put in place at AOC 23 to prohibit the extraction of groundwater for domestic purposes. ICs for AOC 1 would include mitigation of potential vapor intrusion risk if additional groundwater sampling results indicate unacceptable risk. For FS cost estimating purposes, the assumed duration of groundwater monitoring and ICs for Alternatives AOC 1-4 and AOC 23-3 is 10 years.

10.3.5 Alternatives AOC 1-5 and AOC 23-4: ISCO

Alternative AOC 1-5 and Alternative AOC 23-4 would utilize ISCO to address the impacted groundwater areas at AOCs 1 and 23.

The same groundwater investigations described in Section 10.3.4 would be performed for the ISCO alternative. For FS purposes, the ISCO process is assumed to utilize the modified Fenton's process described in Section 9 to chemically destroy dissolved-phase naphthalene and vinyl chloride in groundwater at AOCs 1 and 23. Chemical reagents (a proprietary nanoiron solution and dilute hydrogen peroxide) would be injected into groundwater using a grid system in which naphthalene and vinyl chloride concentrations above the preliminary RGs are identified; these reagents produce oxidizing agents that degrade organic chemicals to water and carbon dioxide. It is expected that ISCO operations would result in a rapid reduction in contaminant mass. For FS cost estimating purposes, a 2-year duration is assumed, including up to 6 months of ISCO followed by groundwater confirmation sampling. Groundwater confirmation sampling would be performed during and after each ISCO treatment to document the reduction in contaminant concentrations.

Long-term ICs are assumed not to be required for this alternative. One year of quarterly groundwater sampling events and one annual event are included following ISCO treatment to document posttreatment naphthalene and vinyl chloride concentrations at AOCs 1 and 23, respectively.

10.4 SCREENING OF REMEDIAL ALTERNATIVES

When multiple viable remedial alternatives exist, they may be refined and screened to reduce the number of alternatives to be analyzed in detail (U.S. EPA 1988). This screening step aids in streamlining the FS process while assuring that the most promising alternatives are being considered.

In accordance with U.S. EPA criteria, information available at the time of screening will be used primarily to identify and distinguish differences among the various alternatives and to evaluate each alternative's effectiveness, implementability, and cost. Only the alternatives judged to be the best or most promising on the basis of these evaluation factors will be retained for further consideration unless additional information becomes available that indicates further evaluation is warranted (U.S. EPA 1988).

Interactions between soil and groundwater alternatives are not thought to be an important consideration for IR Site 35. The screening of alternatives is described below.

10.4.1 Soil

For this RI/FS Report, all of the soil alternatives described in Section 10.2 are carried forward to the detailed analysis of alternatives in Section 11. The screening results for soil alternatives are presented in Table 10-3.

10.4.2 Groundwater

For this RI/FS Report, Alternatives AOC 1-4 and AOC 23-3 (enhanced ISB and ICs) are eliminated. These alternatives have a longer duration and higher anticipated costs than Alternatives AOC 1-5 and AOC 23-4. The screening results for groundwater alternatives are presented in Table 10-4.

Section 11
DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

This section details remedial alternatives for IR Site 35 and evaluates their performance against NCP criteria. Based on technology screening results (Section 9), alternatives have been developed (Section 10). The remedial alternatives evaluated in this section are intended to give decision makers a range of alternatives to address the impacted soil and groundwater at IR Site 35.

The following remedial alternatives are evaluated for soil at AOCs 3, 10, and 12, and the PAH Areas:

- AOC 3 – heptachlor in soil
  - Alternative AOC 3-1 – no action
  - Alternative AOC 3-2 – soil cover and ICs
  - Alternative AOC 3-3 – excavation and off-site disposal
- AOCs 10 and 12 – lead (LBP) in soil
  - Alternative AOC 10/12-1 – no further action
  - Alternative AOC 10/12-2 – limited excavation, cover, and ICs
  - Alternative AOC 10/12-3 – excavation and off-site disposal
- PAHs within Transfer Parcel EDC-5
  - Alternative PAH-1 – no further action
  - Alternative PAH-2 – ICs
  - Alternative PAH-3a – excavation in unpaved areas to 2 feet bgs and ICs
  - Alternative PAH-3b – excavation to 2 feet bgs and ICs
  - Alternative PAH-4a – excavation in unpaved areas to 4 feet bgs and ICs
  - Alternative PAH-4b – excavation to 4 feet bgs

The following remedial alternatives are evaluated for groundwater at AOCs 1 and 23:

- AOC 1 – naphthalene in groundwater
  - Alternative AOC 1-1 – no action
  - Alternative AOC 1-2 – MNA and ICs
  - Alternative AOC 1-3 – source removal, enhanced aerobic ISB, and ICs
  - Alternative AOC 1-5 – ISCO
- AOC 23 – vinyl chloride in groundwater
  - Alternative AOC 23-1 – no action
  - Alternative AOC 23-2 – MNA and ICs
  - Alternative AOC 23-4 – ISCO

Each active groundwater alternative includes groundwater monitoring.

11.1 REVIEW OF CRITERIA

The following nine criteria are stipulated in the NCP at 40 C.F.R. § 300.430(e)(9)(iii) for the evaluation of remedial alternatives under CERCLA:

1. overall protection of human health and the environment
2. compliance with ARARs
3. long-term effectiveness and permanence
4. reduction of toxicity, mobility, or volume through treatment
5. short-term effectiveness
6. implementability
7. cost
8. state acceptance
9. community acceptance

The NCP divides these criteria into three categories: threshold, balancing, and modifying criteria. Criteria 1 and 2 are considered threshold criteria. CERCLA Section 121(d) and the NCP at 40 C.F.R. § 300.430(f)(1)(ii) require that a cleanup remedy must protect human health and the environment and comply with ARARs unless justification to waive a specific ARAR is provided in the ROD. In other words, both threshold criteria must be satisfied for a remedial alternative to be eligible for selection unless an ARARs waiver applies. Criteria 3 through 7 from the list above are considered balancing criteria. The remedial alternatives do not have to meet all five balancing criteria, although it is preferred. The last two criteria from the list above are considered modifying criteria. Evaluation against modifying criteria is the final test in determining whether the state and the community find the alternative acceptable.

The nine NCP criteria are further defined by subcriteria and other factors (U.S. EPA 1988). The following sections explain the nine NCP criteria and summarize relevant subcriteria and other factors.

11.1.1 Overall Protection of Human Health and the Environment

This criterion assesses the extent to which an alternative protects human health and the environment, considering site characteristics and expected risk reduction. Evaluation of the overall protection of human health and the environment afforded by each alternative draws on assessments made under several other NCP criteria, especially short-term effectiveness, long-term effectiveness and permanence, and compliance with ARARs.

The following issues are addressed for each alternative under this criterion:

- reduction in risk to human health and the environment
- ability to achieve general response objectives or cleanup goals for IR Site 35 soil and groundwater

11.1.2 Compliance With Applicable or Relevant and Appropriate Requirements

This criterion examines whether an alternative would comply with all federal and state ARARs, as defined by CERCLA Section 121 and identified for IR Site 35 in Appendix K. When an ARAR is not met, the basis for justifying one of the six waivers allowed under CERCLA should be discussed.

11.1.3 Long-Term Effectiveness and Permanence

This criterion examines the impact of a remedial alternative in the long term, defined in U.S. EPA guidance as the time after RGs are met (U.S. EPA 1988). A remedial alternative is evaluated relative to its long-term effectiveness and permanence by considering the following four factors:

- magnitude of the residual risk to human and environmental receptors from remaining affected soil and groundwater at the completion of remedial activities
- type, degree, and adequacy of long-term management (including ICs, monitoring, and O&M) required for affected soil and groundwater remaining at the site
- long-term reliability of ICs to provide continued protection to human and environmental receptors from affected soil and groundwater
- the potential need to replace components of the remedy and the continuing need for repairs or maintenance

11.1.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

According to CERCLA, preferred cleanup alternatives use treatment technologies that permanently and significantly reduce the toxicity, mobility, or volume of hazardous substances (compared to baseline levels [i.e., the no action alternative]). For IR Site 35, this would mean using technologies that accomplish one or more of the following:

- reduce the exposure to impacted soil
- reduce the mobility of soil contaminants
- immobilize or remove contaminants in the subsurface
- reduce the total mass of contaminants in the subsurface
- reduce the volume of impacted groundwater
- irreversibly reduce contaminant mobility

Alternatives that do not use treatment technologies to achieve these goals, such as excavation and off-site landfill disposal of impacted soil without treatment, do not significantly reduce the toxicity, mobility, or volume of contaminants. When RCRA-hazardous soil is transported off-site, it must be treated before disposal to meet LDRs; this treatment does reduce the toxicity and mobility of the contaminants.

Evaluation of alternatives for reduction of toxicity, mobility, or volume includes the following considerations:

- treatment processes used
- amount of hazardous materials to be treated and how the principal threats at the site would be addressed
- degree of expected reduction in toxicity, mobility, or volume measured as a percentage of baseline levels
- degree to which the treatment is irreversible
- type and quantity of treatment residuals

11.1.5 Short-Term Effectiveness

This criterion considers how an alternative affects human health and the environment during cleanup (i.e., the short term). "Short term" is defined as the time required to plan, design, construct, and operate a system of cleanup until RGs are achieved (U.S. EPA 1988). The following factors are considered:

- short-term risks that might be imposed on the community (e.g., dust from excavation of impacted soil)
- potential impacts on workers during construction and O&M as well as the effectiveness and reliability of the protective measures that would be taken
- potential environmental impacts of the remedial action and the effectiveness and reliability of mitigation measures that would be taken during implementation
- amount of time required before protection is achieved (i.e., the duration of the short term)

11.1.6 Implementability

This criterion evaluates the technical and administrative feasibility of an alternative. The availability of required equipment, materials, and services is also considered. When assessing implementability, the following factors are considered:

- technical feasibility, which refers to the relative ease of implementing or completing an action based on site-specific constraints, including the use of established technologies. The following issues are considered:
  - constructability of components necessary for the alternative
  - operational reliability, or the likelihood that a technology would meet specified efficiency levels or performance goals
  - ability of the owner to undertake future remedial actions that may be required and difficulty of implementing such actions
  - ability of the owner to monitor the effectiveness of the remedy

- administrative feasibility, which includes the ability (as well as the time) to obtain approvals from governmental bodies
- availability of services and materials required to implement the alternative, including the following:
  - capacity and location of off-site treatment, storage, and disposal services
  - equipment (such as heavy construction equipment) and specialists needed
  - time needed to develop new or innovative technologies under consideration, including the time required for bench-scale and pilot-scale tests
  - potential for obtaining competitive construction bids, a factor that may be particularly important for innovative technologies

11.1.7 Cost

Procedures outlined in U.S. EPA guidance (U.S. EPA 1987, 1988, 2000b) have been followed in developing cost estimates for each remedial alternative. These cost estimates are based on the conceptual engineering designs. All estimates include capital costs and O&M costs and are expressed as present value in terms of January 2006 dollars (Appendix L). The details of the alternatives (e.g., number of new monitoring wells, frequency of groundwater sampling, analysis parameters, and amendment type and volume) would be determined in the remedial design phase. The assumptions used in estimating costs in this RI/FS Report are described in Appendix L. The estimated costs are solely for the purpose of comparing alternatives in this report and should not be used for budgetary or planning purposes.

11.1.8 State Acceptance

This criterion evaluates the remedial alternatives with respect to the concerns of state regulatory agencies. The state of California reviewed and commented on the draft RI/FS Report; responses to the state's comments are included in Appendix M. State comments will also be considered in finalizing the proposed plan and ROD.

11.1.9 Community Acceptance

This criterion assesses issues of concern to the community for each remedial alternative. The draft RI/FS Report was presented at the BRAC Cleanup Team meeting on June 20, 2006. The draft report was also presented to the Restoration Advisory Board (RAB) on July 6, 2006 and was distributed to RAB members on July 20, 2006. Any comments received from the RAB on this draft final RI/FS Report will be addressed in the final RI/FS Report. A summary of public comments and responses will be included in the ROD. Although community acceptance will be evaluated after the public comment period for the proposed plan, this criterion is described in Section 11.7 for each retained alternative.

11.2 REMEDIAL ALTERNATIVES FOR HEPTACHLOR IN SOIL AT AOC 3

This subsection provides a description and detailed analysis of the following retained remedial alternatives for heptachlor-impacted soil at AOC 3:

- Alternative AOC 3-1 – no action
- Alternative AOC 3-2 – soil cover and ICs
- Alternative AOC 3-3 – excavation and off-site disposal

11.2.1 Alternative AOC 3-1: No Action

In accordance with the NCP (40 C.F.R. § 300.430[e][6]), Alternative AOC 3-1 was evaluated in the same manner as the other soil remedial alternatives considered for AOC 3. The no action alternative serves as the baseline against which all of the remaining soil remedial alternatives can be compared.

Alternative AOC 3-1 would involve no engineered remediation measures, administrative controls, or monitoring of impacted soil at AOC 3. This alternative would not include any activities to monitor natural attenuation processes or to prevent contact with, ingestion of, or inhalation of soil with heptachlor concentrations above the preliminary RG. Potential results of selecting this alternative would include the continued potential for exposure to soil containing heptachlor and associated impacts on human receptors. If implemented, the no action alternative would be considered a final remedy for the impacted soil and would not include periodic reviews to verify its protectiveness.

11.2.1.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternative AOC 3-1 would not offer remedial measures or protection of the environment to alleviate risks associated with heptachlor in soil. This alternative would leave impacted soil on-site and provide no measures to limit human exposure. Future development of the property would not be restricted under this alternative, so future exposure routes could develop without land-use restrictions. Human-health risks would remain above the risk management range. For these reasons, this alternative is not considered protective of human health and the environment.

Alternative AOC 3-1 does not meet the threshold criterion of overall protection of human health and the environment. Therefore, an evaluation against the balancing criteria is not necessary and was not performed.

11.2.1.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

According to the NCP, the no action alternative must be evaluated in the same manner as other proposed remedial action alternatives. There are no ARARs that would apply under the no action alternative; according to CERCLA Section 121, the requirement to meet ARARs applies only when a response action is taken. This alternative does not involve any steps to prevent access to, reduce, remove, or treat the impacted soil. This alternative

would provide no additional protection to human health or the environment if exposure routes should develop.

11.2.2 Alternative AOC 3-2: Soil Cover and ICs

Alternative AOC 3-2 involves the installation of a soil cover to act as a surface barrier between the impacted soil and human receptors. ICs are included to maintain the protectiveness of the soil cover.

11.2.2.1 REFINEMENT OF EXTENT OF HEPTACHLOR IN SOIL

Before installation of the soil cover, a predesign sampling program would be implemented based on the RI soil sampling results to refine the extent of heptachlor in soil at concentrations above the preliminary RG from this area (i.e., the western boundary). It is assumed that up to 10 soil borings would be manually advanced to collect soil samples at depth intervals of 0 to 1 and 1 to 2 feet bgs for pesticide analysis using U.S. EPA Method 8081A. Based on the analytical results of these soil samples, the assumed dimensions of the soil cover area may be refined.

11.2.2.2 SOIL COVER

Based on the RI soil sampling results, the area of heptachlor in soil at concentrations above the preliminary RG is assumed for RI/FS purposes to be 3,500 square feet with a depth of 2 feet bgs (Figure 11-1). Heptachlor generally has a low mobility and is considered to have low potential to impact groundwater. The objective of the soil cover would be to provide a physical separation from underlying impacted soil rather than to provide a low-permeability cap to protect groundwater. The soil cover is assumed to be constructed of clean, imported soil from a local source.

Prior to installation of the soil cover, the existing grass sod on top of the proposed soil cover area would be removed and disposed of off-site. A topographic survey of the existing soil surface would then be performed. A 2-foot-thick soil cover would be constructed over the existing soil and compacted to at least 90 percent. After completing the cover, a topographic survey of the final grade would be performed to verify that the minimum cover thickness is in place. The covered area would then be revegetated with grass sod to prevent erosion of the protective soil layer.

11.2.2.3 INSTITUTIONAL CONTROLS

ICs would be implemented as part of this alternative to prohibit actions that might damage or otherwise reduce the effectiveness of the soil cover. Penetration of the soil cover would not be allowed without concurrence from the regulatory agencies and the Navy. In instances where excavation near the soil cover is necessary, the ICs would require development and implementation of guidelines to ensure that the exposed impacted soil is managed appropriately, protective measures to prevent exposure to workers and the public are taken, and the soil cover is restored.

The Navy would employ a dual approach to include land-use restrictions in both Navy deeds of conveyance and in the Covenant to Restrict Use of Property agreements with DTSC, entered into pursuant to the March 2000 Navy/DTSC MOA (Appendix N). More specifically, land-use restrictions would be incorporated into and implemented through the following two separate legal instruments, as provided in the Navy/DTSC MOA:

- restrictive covenants included in one or more quitclaim deeds from the Navy to the property recipient
- restrictive covenants included in one or more Covenant to Restrict Use of Property agreements entered into by the Navy and DTSC as provided in the Navy/DTSC MOA

A Covenant to Restrict Use of Property would incorporate the land-use restrictions into environmental restrictive covenants that run with the land and that are enforceable by DTSC against future transferees. The quitclaim deed(s) would include identical land-use restrictions in environmental restrictive covenants that run with the land and that would be enforceable by the Navy against future transferees.

The Navy also addresses IC implementation and maintenance actions, including periodic inspections, in the preliminary and final remedial design reports developed and submitted to the FFA signatories for review pursuant to the FFA. These actions are described in Navy Principles and Procedures for Specifying, Monitoring and Enforcement of Land Use Controls and Other Post-ROD Actions (Appendix O) attached to a January 16, 2004, DoD Memorandum entitled CERCLA Record of Decision (ROD) and Post-ROD Policy. The preliminary and final remedial design reports are primary documents as provided in Section 7.3 of the FFA.

The Navy would use its policy entitled Principles and Procedures for Specifying, Monitoring and Enforcement of Land Use Controls and Other Post-ROD Actions (Appendix O) for specifying, implementing, and monitoring ICs for this alternative.

11.2.2.4 REVIEWS AND REPORTING

An annual maintenance program would be established in the remedial design phase to assess the condition of the cover and any need for repairs due to erosion or other forces. Annual maintenance reports documenting the results of the postconstruction inspection program and any follow-on maintenance activities would be prepared over the project life. For the purposes of this RI/FS Report, a 30-year duration has been assumed for costing purposes. Comprehensive reviews of the selected remedy would be performed every 5 years under CERCLA.

11.2.2.5 EVALUATION BY CRITERIA

This subsection provides a discussion of Alternative AOC 3-2 relative to the NCP threshold criteria. Evaluation of this alternative relative to the balancing criteria is presented in Table 11-1. A cost estimate summary is presented in Table 11-2. Cost estimate details and assumptions are presented in Appendix L.

Overall Protection of Human Health and the Environment

Alternative AOC 3-2 would cover impacted soil to prevent exposure to human receptors. In addition, ICs would be implemented to maintain the cover and require health and safety precautions for any future excavations. This alternative is considered to be protective of human health and the environment.

Compliance With Applicable or Relevant and Appropriate Requirements

Alternative AOC 3-2 would comply with ARARs. Substantive postclosure requirements, including maintenance of the integrity of the soil cover (*California Code of Regulations* [Cal. Code Regs.] Title [tit.] 22, § 66264.310[b][1]), are potentially relevant and appropriate.

Potential landfill-capping ARARs have been evaluated and identified in Appendix K. Low-permeability barrier layer, drainage layer, filter layer, and permeability testing provisions of Cal. Code Regs. tits. 22 and 27 were not identified as potential ARARs because they are not applicable or relevant and appropriate. Prevention of downward entry of water is not necessary to protect public health for this alternative because heptachlor is relatively immobile in soil and the vertical extent of heptachlor is limited. Several potential ARARs, including a low-permeability barrier layer, drainage layer, and filter layer, and requirements for determination of permeability or hydraulic conductivity, are not relevant and appropriate because they are not consistent with the intent of the CERCLA remedial action. Section K4.6 in Appendix K provides more information about soil cover ARARs.

Remedial design documents would describe the measures to be implemented to comply with substantive requirements for closure and postclosure care of the soil cover in Cal. Code Regs. tit. 22.

Dust may be generated during site preparation, grading, and soil cover installation activities. The pertinent substantive provisions of BAAQMD Regulation 6, Sections 6-301, 6-302, and 6-305, are considered potentially applicable for these activities.

There are no federal ARARs for ICs. The IC mechanisms would comply with Requirements for Land-Use Covenants at Cal. Code Regs. tit. 22, § 67391.1.

11.2.3 Alternative AOC 3-3: Excavation and Off-Site Disposal

Alternative AOC 3-3 involves the excavation and off-site disposal of soil with heptachlor concentrations above the preliminary RG at AOC 3.

11.2.3.1 REFINEMENT OF EXTENT OF HEPTACHLOR IN SOIL

The extent of heptachlor in soil would be assessed as part of this alternative. The predesign investigation for Alternative AOC 3-3 would be identical to the investigation described for Alternative AOC 3-2 (Section 11.2.2.1).

11.2.3.2 EXCAVATION AND OFF-SITE DISPOSAL

For RI/FS purposes, the excavation area is assumed to be 3,500 square feet with a depth of 2 feet bgs (Figure 11-1). The total volume of excavated soil is estimated to be 260 bank cubic yards (bcy). The dimensions, depth, and volume of the proposed excavation area may be revised based on the analytical results reported for the soil samples collected during the predesign investigation.

Prior to excavation activities, the existing grass sod on top of the proposed excavation area would be removed and disposed of off-site. Excavated soil would be segregated, stockpiled into 13 approximately 20-cubic-yard batches, and characterized before off-site disposal. There is a potential for a portion of the excavated soil to be classified as RCRA hazardous waste. Furthermore, RCRA LDRs would need to be met prior to land disposal of the soil. Any hazardous waste would be appropriately manifested, transported, and disposed by licensed and permitted transporters and disposal facilities.

For RI/FS purposes, seven stockpiles (140 bcy of excavated soil) are assumed to require management as Class II nonhazardous waste. It is assumed that six stockpiles (120 bcy) would be classified as RCRA hazardous waste, half of which (three stockpiles) would require incineration to meet RCRA LDRs.

After excavation is complete, confirmation samples would be collected as described below. Following completion of confirmation sampling, the excavation would be backfilled with clean, imported soil and compacted to at least 90 percent. The backfilled area would then be revegetated with grass sod.

11.2.3.3 CONFIRMATION SAMPLING

After excavation is complete, approximately ten confirmation samples would be collected from the excavation and analyzed to confirm that the preliminary RG for heptachlor has been met. It is assumed for RI/FS purposes that one confirmation sample per approximately 450 to 500 square feet and an additional 20 percent quality assurance samples (total of approximately 10 samples) would be collected. The final confirmation sampling program would be developed during the remedial design.

11.2.3.4 CLOSEOUT REPORT

Following completion of excavation, confirmation sampling, and backfilling activities, the remedial action would be completed and no further sampling, ICs, or other actions would be performed. A remedial action closeout report would be prepared upon the completion of remedial activities.

11.2.3.5 EVALUATION BY CRITERIA

This subsection provides a discussion of Alternative AOC 3-3 relative to the NCP threshold criteria. Evaluation of this alternative relative to the balancing criteria is presented in Table 11-1. A cost estimate summary is presented in Table 11-3. Cost estimate details and assumptions are presented in Appendix L.

Overall Protection of Human Health and the Environment

Under Alternative AOC 3-3, soil with heptachlor concentrations above the preliminary RG would be excavated and disposed of off-site. The excavation would be backfilled with clean, imported soil. This alternative is assumed to result in unrestricted site use for soil. It is considered protective of human health and the environment.

Compliance With Applicable or Relevant and Appropriate Requirements

Alternative AOC 3-3 should comply with ARARs. Potential ARARs associated with this alternative have been evaluated and identified in Appendix K. RCRA requirements for identification and management of solid and hazardous wastes are potential federal action-specific ARARs identified for Alternative AOC 3-3. Excavated soil and water generated under Alternative AOC 3-3 would be subject to RCRA requirements at Cal. Code Regs. tit. 22, § 66262.10(a) and 66262.11 to determine whether such wastes should be classified as RCRA hazardous or California hazardous waste. The applicable requirements for testing, storing, handling, and off-site disposal would be followed. The appropriate management requirements of Cal. Code Regs. tit. 22, § 66264 would be evaluated as potential ARARs, should testing classify these materials as non-RCRA hazardous waste.

Dust may be generated during site preparation, excavation, and backfilling. The pertinent substantive provisions of BAAQMD Regulation 6, Sections 6-301, 6-302, and 6-305, are considered potentially applicable for these activities.

11.3 REMEDIAL ALTERNATIVES FOR LEAD IN SOIL AT AOCs 10 AND 12

This subsection provides a description and detailed analysis of retained remedial alternatives for soil with lead concentrations above the preliminary RG at AOCs 10 and 12. Active alternatives for AOCs 10 and 12 also include removal of storm-drain sediments impacted with lead identified in the RI. In AOC 12, samples from three borings collected during previous investigations had reported arsenic at concentrations above the background concentration. The samples were identified as Parcel 106 Grid 31 (20 mg/kg arsenic), Parcel 106 Grid 30 (35 mg/kg arsenic), and Parcel 106 Grid 28 (38 mg/kg arsenic). Soil with arsenic concentrations above the background concentration (9.14 mg/kg) in this portion of AOC 12 is assumed for RI/FS Report purposes to be addressed in the same manner as soil with lead concentrations above the preliminary RG for AOC 12 alternatives.

11.3.1 Alternative AOC 10/12-1: No Further Action

In accordance with the NCP (40 C.F.R. § 300.430[e][6]), Alternative AOC 10/12-1 was evaluated in the same manner as the other soil remedial alternatives considered for AOCs 10 and 12. The no further action alternative serves as the baseline against which all of the remaining soil remedial alternatives can be compared.

Alternative AOC 10/12-1 would involve no engineered remediation measures, administrative controls, or monitoring of impacted soil at AOCs 10 and 12. This alternative would not include any activities to prevent contact with, ingestion of, or inhalation of soil with lead concentrations above the preliminary RG. Although the sitewide EPC for lead is below the proposed preliminary RG, several areas would contain lead at concentrations above the preliminary RG.

Potential impacts of this alternative would include the continued potential for exposure to affected soils and associated impacts on human receptors. If implemented, the no further action alternative would be considered a final remedy for AOCs 10 and 12, and would not include periodic reviews to verify its protectiveness.

11.3.1.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Significant removal actions have already been completed at AOCs 10 and 12 as part of NTCRAs to remove lead-contaminated soil from unpaved areas, as described in Section 8.1.2.2. The areas where soil removal actions occurred in AOCs 10 and 12 are shown on Figures 11-2 and 11-3, respectively. As a result of the NTCRA, the average lead concentration and EPC at each of these AOCs is below the preliminary RG of 184 mg/kg. Eight of 107 samples in AOC 10, and 12 of 184 samples in AOC 12 exceeded the preliminary RG for lead of 184 mg/kg. The average lead concentration in soil at AOC 10 is 67 mg/kg with an EPC of 105 mg/kg. The average lead concentration in soil at AOC 12 is 52 mg/kg with an EPC of 77.5 mg/kg. Because the EPCs for lead in soil at AOCs 10 and 12 are significantly below the preliminary RG of 184 mg/kg, the no further action alternative is considered protective of human health and the environment.

11.3.1.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Identification of ARARs for Alternative AOC 10/12-1 is not needed for the reasons presented in Section 11.2.1.2.

11.3.1.3 EVALUATION BY CRITERIA

Evaluation of this alternative relative to the balancing criteria is presented in Table 11-4. There are no costs associated with this alternative.

11.3.2 Alternative AOC 10/12-2: Limited Excavation, Cover, and ICs

This subsection provides a description and detailed analysis of remedial Alternative AOC 10/12-2 for soil with lead concentrations above the preliminary RG at AOCs 10 and 12. This alternative involves the limited excavation of impacted soil beneath areas that are currently unpaved and ICs to prohibit removal of existing pavement over soil with lead at concentrations above the preliminary RG. The impacted soil beneath paved areas at AOCs 10 and 12 would not be excavated because the existing asphalt and concrete pavement act as a barrier to the underlying soil. ICs are included to maintain the protectiveness of the existing asphalt or concrete pavement.

11.3.2.1 REFINEMENT OF EXTENT OF LEAD IN SOIL

Before excavation activities, a predesign sampling program would be implemented based on the RI soil sampling results to further delineate the extent of soil with lead concentrations above the preliminary RG in the unpaved areas of AOC 10. It is assumed that up to 20 soil borings would be manually advanced to collect soil samples at depth intervals of 0 to 1 foot bgs. Soil samples would be analyzed for lead using a field portable X-ray fluorescence (XRF) instrument. In addition, 20 percent of the total number of samples would be submitted to an off-site analytical laboratory for confirmation lead analysis using U.S. EPA Method 6010B. Based on the results of these soil analyses, the assumed dimensions and depths of the impacted areas would be refined.

Based on the results of the RI, all remaining soil in AOC 12 with lead concentrations above the preliminary RG are located beneath paved surfaces. Therefore, no soil excavations would be performed in AOC 12 for this alternative (excavation would occur only in AOC 10).

11.3.2.2 LIMITED EXCAVATION IN UNPAVED AREAS

Based on the RI soil sampling results, there are two areas in AOC 10 with lead in soil at concentrations above the preliminary RG (Figure 11-2). For RI/FS Report purposes, one area is assumed to occupy 325 square feet and be covered with grass. The second area is assumed to occupy 1,900 square feet, with 40 percent (760 square feet) covered with grass and 60 percent (1,140 square feet) located beneath an asphalt road and concrete sidewalk. The total size of the unpaved areas in AOC 10 is estimated to be 1,085 square feet. The depth of excavation is assumed to be 1 foot bgs. The total volume of excavated soil for this alternative is estimated to be 40 bcy. The dimensions, depths, and volumes of the proposed excavation areas may be revised based on the analytical results reported for the soil samples collected during the predesign investigation.

Prior to excavation activities, the existing grass sod on top of the proposed excavation areas would be removed and disposed of off-site. Excavated soil would be segregated, stockpiled into five approximately 8-cubic-yard batches, and characterized before off-site disposal. There is a potential for a portion of the excavated soil to be classified as RCRA or California hazardous waste. Furthermore, RCRA LDRs would need to be met prior to land disposal of the hazardous waste. Any hazardous waste would be appropriately manifested, transported, and disposed by licensed and permitted transporters and disposal facilities.

For RI/FS purposes, three stockpiles (24 bcy of excavated soil) are assumed to be managed as Class II nonhazardous waste. It is assumed that a stockpile (8 bcy) would be classified as RCRA hazardous waste and would require stabilization to meet RCRA LDRs. Another stockpile is assumed to be classified as California hazardous waste.

After excavation is complete, confirmation samples would be collected (see Section 11.3.2.3). Following completion of confirmation sampling, the excavation areas

would be backfilled with clean, imported soil, and compacted to at least 90 percent. The backfilled area would then be revegetated with grass sod.

11.3.2.3 CONFIRMATION SAMPLING

After excavation is complete, approximately three confirmation samples would be collected from the excavation areas at AOC 10 and analyzed using a portable XRF instrument to confirm that the RG for lead has been met. It is assumed that one confirmation sample per approximately 500 square feet and an additional 20 percent quality assurance samples (total of approximately three samples) would be collected. In addition, 20 percent of the total number of XRF samples (one sample) would be submitted to an off-site analytical laboratory for confirmation lead analysis using U.S. EPA Method 6010B. The final confirmation sampling program would be developed during the remedial design.

11.3.2.4 INSPECTIONS

An annual inspection program would be established to assess the condition of the existing asphalt or concrete pavement and the need for repairs due to erosion or other forces. For cost estimating purposes, the assumed duration of this alternative is 30 years. The inspection program would be continued over the entire project life.

11.3.2.5 STORM DRAIN SEDIMENT REMOVAL

Alternative AOC 10/12-2 would also include the removal and off-site disposal of lead-impacted sediment reported during the RI in one storm drain with concentrations above the preliminary RG. The total volume of sediment is estimated to be no more than 10 bcy. Impacted sediment can be removed from the storm drains using hand tools, a vactor truck, or similar equipment. No repairs or upgrades to the storm drain are included.

For RI/FS purposes, 50 percent (5 bcy) of the sediment volume is assumed to be managed as Class II nonhazardous waste. It is assumed that 20 percent of the sediment volume (2 bcy) would be classified as RCRA hazardous waste and would require stabilization to meet RCRA LDRs. The remaining 30 percent (3 bcy) would be classified as California hazardous waste.

11.3.2.6 INSTITUTIONAL CONTROLS

ICs would be implemented as part of this alternative to prohibit actions that might damage or otherwise reduce the effectiveness of the existing asphalt or concrete pavement. Penetration of the covers or pavement would not be allowed without concurrence from the regulatory agencies and the Navy. In instances where excavation near the covers or pavement is necessary, the ICs would require development and implementation of guidelines to assure that any exposed impacted soil is managed appropriately, protective measures to prevent public exposure are taken, and the covers and pavement are restored. The mechanisms for IC implementation would be similar to those described for Alternative AOC 3-2 in Section 11.2.2.3.

11.3.2.7 REVIEWS AND REPORTING

An annual inspection program would be established in the remedial design phase to assess the condition of the asphalt and concrete pavements over soil with lead concentrations above the RG and the need for repairs due to erosion or other forces. Annual inspection reports documenting the results of the postconstruction inspection program and any follow-on maintenance activities would be prepared over the project life. For the purposes of this RI/FS Report, a 30-year duration has been assumed for costing purposes. Comprehensive reviews of the selected remedy would be performed every 5 years under CERCLA.

11.3.2.8 EVALUATION BY CRITERIA

This subsection provides a discussion of Alternative AOC 10/12-2 relative to the threshold criteria. Evaluation of this alternative relative to the balancing criteria is presented in Table 11-4. A cost estimate summary with separate costs for AOCs 10 and 12 is presented in Table 11-5. Cost estimate details and assumptions are presented in Appendix L.

Overall Protection of Human Health and the Environment

Alternative AOC 10/12-2 would remove impacted sediment and soil in unpaved areas and maintain the existing pavement over the remaining soil with lead concentrations above the RG to prevent exposure for human receptors. In addition, ICs would be implemented to maintain the existing pavement and require health and safety precautions for any future excavations. This alternative is considered to be protective of human health and the environment.

Compliance With Applicable or Relevant and Appropriate Requirements

Alternative AOC 10/12-2 would comply with ARARs. Potential ARARs associated with this alternative have been evaluated and identified in Appendix K. The same action-specific ARARs for dust and identification and management of solid and hazardous wastes identified for Alternative AOC 3-3 (Section 11.2.3.5) would apply to this alternative. The same action-specific ARARs for a soil cover and ICs identified for Alternative AOC 3-2 (Section 11.2.2.5) would apply to this alternative.

11.3.3 Alternative AOC 10/12-3: Excavation and Off-Site Disposal

This subsection provides a description and detailed analysis of remedial Alternative AOC 10/12-3. This alternative involves the excavation and off-site disposal of all soil with lead concentrations above the preliminary RG at AOCs 10 and 12.

11.3.3.1 REFINEMENT OF EXTENT OF LEAD IN SOIL

Before excavation activities, a predesign sampling program would be implemented based on the RI soil sampling results to further delineate the extent of excavation needed to remove all soil with lead concentrations above the preliminary RG at AOCs 10 and 12.

For AOC 10, it is assumed that up to 20 soil borings would be manually advanced to collect soil samples at depth intervals of 0 to 1 foot bgs for the unpaved areas or within 1 foot below the pavement's subbase layer for the paved areas. For AOC 12, it is assumed that up to 40 soil borings would be manually advanced to collect soil samples at depths from 0.5 to 2 feet below the pavement's subbase layer.

Soil samples would be analyzed for lead using a field portable XRF instrument. In addition, 20 percent of the total number of samples from each AOC would be submitted to an off-site analytical laboratory for confirmation lead analysis using U.S. EPA Method 6010B. Based on the results of these soil analyses, the assumed dimensions and depths of the excavation areas would be refined.

11.3.3.2 EXCAVATION AND OFF-SITE DISPOSAL

As described in Section 11.3.2.2, there are two areas with lead in soil at concentrations above the preliminary RG at AOC 10 (Figure 11-2). One area is assumed to occupy 325 square feet and be covered with grass. The second area is assumed to occupy 1,900 square feet, with 40 percent covered with grass and 60 percent located beneath an asphalt road and a concrete sidewalk. The depth of excavation for the areas is assumed for RI/FS purposes to be 1 foot bgs for the unpaved areas and 1 foot below the pavement's subbase layer for the paved areas. The total volume of excavated soil is estimated to be 2,225 cubic feet, or approximately 85 bcy.

Based on the RI soil sampling results, there are six areas with lead in soil at concentrations above the preliminary RG at AOC 12 (Figure 11-3). These areas range in size from approximately 405 to 1,700 square feet, with a total combined area of 5,525 square feet. All of the areas are covered with asphalt or concrete pavement. The depth of excavation for the areas would vary from 0.5 to 2 feet below the pavement's subbase layer. The total volume of excavated soil is estimated to be 252 bcy.

Prior to excavation activities, the existing grass sod on top of the unpaved areas would be removed and disposed of off-site. Paved surfaces would be demolished and removed for off-site disposal to allow for excavation of underlying soil. For RI/FS purposes, it is assumed that the property developer, not the Navy, would pay the costs of removing and disposing of any existing paved surfaces. For each AOC, excavated soil would be segregated, stockpiled, and characterized before off-site disposal. There is a potential for a portion of the excavated soil and sediment to be classified as RCRA or California hazardous waste. Furthermore, RCRA LDRs would need to be met prior to land disposal of the hazardous waste. Any hazardous waste would be appropriately manifested, transported, and disposed by licensed and permitted transporters and disposal facilities.

For RI/FS purposes, the 85 bcy of excavated soil at AOC 10 would be stockpiled into ten approximately 8.5-cubic-yard batches. Five stockpiles (42.5 bcy) are assumed to be managed as Class II nonhazardous waste. It is assumed that two stockpiles (17 bcy) would be classified as RCRA hazardous waste and would require stabilization to meet RCRA LDRs. Three stockpiles (25.5 bcy) are assumed to be classified as California hazardous waste.

The 252 bcy of excavated soil at AOC 12 would be stockpiled into an estimated ten approximately 25-cubic-yard batches. For cost estimating purposes, five stockpiles (127 bcy) are assumed to be managed as Class II nonhazardous waste. It is assumed that two stockpiles (50 bcy) would be classified as RCRA hazardous waste and would require stabilization to meet RCRA LDRs. Three stockpiles (75 bcy) are assumed to be classified as California hazardous waste.

After excavation is complete, confirmation samples would be collected as described in Section 11.3.3.3. Following completion of confirmation sampling, the excavation would be backfilled with clean, imported soil and compacted to at least 90 percent. The backfilled areas would then be revegetated with grass sod or paved with asphalt or concrete (approximately 3 inches in thickness on top of a 9-inch-thick subbase layer) to restore the previous surface cover, and sloped to promote drainage.

11.3.3.3 CONFIRMATION SAMPLING

After excavation is complete, approximately 6 confirmation samples would be collected from excavation areas at AOC 10, and 14 confirmation samples would be collected from AOC 12. Confirmation samples would be analyzed using a portable XRF instrument to confirm that the RG for lead has been met. It is assumed that one confirmation sample would be collected per approximately 500 square feet of excavation area and an additional 20 percent quality assurance samples would be collected. In addition, 20 percent of the total number of samples from each AOC would be submitted to an off-site analytical laboratory for confirmation lead analysis using U.S. EPA Method 6010B. The final confirmation sampling program would be developed during the remedial design.

11.3.3.4 STORM-DRAIN SEDIMENT REMOVAL

Removal of impacted storm-drain sediment for Alternative AOC 10/12-3 would be conducted in the same manner as was described for Alternative AOC 10/12-2 (Section 11.3.2.5).

11.3.3.5 CLOSEOUT REPORT

Because this alternative would achieve RGs upon completion of excavation activities, no 5-year reports would be included. A remedial action closeout report would be prepared upon the completion of remedial activities.

11.3.3.6 EVALUATION BY CRITERIA

This subsection provides a discussion of Alternative AOC 10/12-3 relative to the threshold criteria. Evaluation of this alternative relative to the balancing criteria is presented in Table 11-4. A cost estimate summary with separate costs for AOCs 10 and 12 is presented in Table 11-6. Cost estimate details and assumptions are presented in Appendix L.

Overall Protection of Human Health and the Environment

Under Alternative AOC 10/12-3, impacted soil and sediment would be removed and disposed of off-site. The excavation areas would be backfilled with clean, imported soil, and covered with grass sod, asphalt pavement, or concrete pavement. This alternative would result in unrestricted site use for soil. It is considered protective of human health and the environment.

Compliance With Applicable or Relevant and Appropriate Requirements

Alternative AOC 10/12-3 would comply with ARARs. Potential ARARs associated with this alternative have been evaluated and identified in Appendix K. The same action-specific ARARs for dust and identification and management of solid and hazardous wastes identified for Alternative AOC 3-3 (Section 11.2.3.5) would apply to this alternative.

11.4 REMEDIAL ALTERNATIVES FOR PAHs IN SOIL AT IR SITE 35

This subsection provides a description and detailed analysis of remedial alternatives for PAHs in soil at IR Site 35. A previous TCRA by the Navy removed soil from 0 to 2 feet bgs in unpaved areas with B(a)P equivalent concentrations exceeding 1,000 µg/kg, the preliminary RG at IR Site 35. Six locations that were not excavated during the previous TCRA were identified in a nonresidential area or under asphalt pavement at the site.

11.4.1 Alternative PAH-1: No Further Action

As stipulated in the NCP (40 C.F.R. § 300.430[e][6]), Alternative PAH-1 will be evaluated in the same manner as the other soil remedial alternatives considered in this RI/FS Report. The no further action alternative serves as the baseline against which all of the remaining soil remedial alternatives can be compared.

Alternative PAH-1 would involve no engineered remediation measures, administrative controls, or monitoring of soil with B(a)P equivalent concentrations above the preliminary RG at IR Site 35 in addition to the PAH TCRA previously completed. If implemented, the no further action alternative would be considered a final remedy for soil with B(a)P equivalent concentrations above the preliminary RG and would not include periodic reviews to verify its protectiveness.

Extensive soil excavation was conducted across IR Site 35 as part of the TCRA to remove PAH-impacted soil with concentrations above 1,000 µg/kg to approximately 2 feet bgs. TCRA excavation areas are shown on Figure 11-4. The TCRA successfully removed PAH mass and resulted in some cancer risk reduction, as shown in Tables 6-1 (pre-TCRA risk results) and 6-2 (post-TCRA risk results). Cancer risk for each DA and for each depth interval (0 to 2, 0 to 4, 0 to 8 feet) is within the risk management range, and noncancer HIs are all below 1 (for both pre- and post-TCRA risk values). Average B(a)P equivalent concentrations are also below 620 µg/kg for each DA and for each depth interval (Table 4-5).

While the no further action alternative does not include implementing active remediation or ICs, restrictions on excavation at IR Site 35 are already in place as part of the Marsh Crust Ordinance (City of Alameda Marsh Crust Excavation Ordinance Number 2824, February 2000), instituted as the final remedy for the Navy's Marsh Crust ROD. This existing IC is intended to reduce public exposure to PAH-impacted soil where present at the base of the artificial fill. The ordinance restricts excavation beyond specified depths varying from 5 to 10 feet bgs across the PAH Areas at IR Site 35, as shown on Figure 2-1.

11.4.1.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternative PAH-1 is considered protective of human health and the environment. PAH-related risk for soil across IR Site 35 at all depth intervals and in all DAs is within the NCP risk management range. Future development of the area would not need to be restricted under this alternative.

The previous TCRA has effectively removed shallow soil with B(a)P equivalent concentrations above the preliminary RG from unpaved and residential areas at IR Site 35. Data from the RI portion of this report show that soil from 0 to 4 feet bgs at IR Site 35 is generally at or below the preliminary RG (1,000 µg/kg) for PAHs. B(a)P equivalent concentrations in 6 of 2,184 soil samples collected from the upper 2 feet bgs were above the preliminary RG for PAHs at IR Site 35. These six sampling locations were in either a nonresidential area or an area currently paved with asphalt.

In the 2- to 4-foot-bgs depth interval, 44 of 708 samples had B(a)P equivalent concentrations above the preliminary RG. Because most of the exceedances are from samples collected below 2 feet bgs, most of the soil with B(a)P equivalent concentrations above the preliminary RG is already covered with over 2 feet of clean fill soil. Before the TCRA, risks associated with PAHs were within the NCP risk management range for all depth intervals (Table 6-1). Soil underlying buildings and hardscape at IR Site 35 is expected to have PAH concentrations consistent with pre-TCRA conditions and associated PAH-related risk within the NCP risk management range. Following the TCRA, calculated PAH-related risks in these excavated areas were reduced slightly (Table 6-2) and average B(a)P equivalent concentrations are less than 620 µg/kg in all DAs.

11.4.1.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Identification of ARARs for Alternative PAH-1 is not needed, for the reasons presented in Section 11.2.1.2.

11.4.1.3 EVALUATION BY CRITERIA

Evaluation of this alternative relative to the balancing criteria is presented in Table 11-7. There are no costs associated with this alternative.

11.4.2 Alternative PAH-2: ICs

This section provides a description and detailed analysis of Alternative PAH-2 for soil with B(a)P equivalent concentrations above the preliminary RG at IR Site 35. This alternative involves ICs in the area shown as crosshatched on Figure 11-4. Although cancer risk for each DA and for each depth interval (0 to 2, 0 to 4, 0 to 8 feet) is within the risk management range, and noncancer HIs are all below 1 (for both pre- and post-TCRA risk values), ICs are presented as an additional alternative for risk management decisions. For this alternative the ICs would require implementation of a sampling plan for soil beneath buildings and hardscape in the event that buildings and/or hardscape is removed during redevelopment.

11.4.2.1 INSTITUTIONAL CONTROLS

IC implementation mechanisms for this alternative would be the same as those described for Alternative AOC 3-2 in Section 11.2.2.3. Documents describing these IC mechanisms are included in Appendices N and O.

Existing ICs were established across Alameda Point as part of the City of Alameda's Marsh Crust Ordinance and currently restrict excavations beyond specified depths. This alternative does not impact these existing ICs, which would remain in place. For FS purposes, additional ICs would be implemented for this alternative. The ICs would include the following elements: 1) require the future landowner to gain written approval from the regulatory agencies and the Navy and comply with a soil management plan before the demolition or removal of hardscape, buildings, and structures (e.g., concrete roadways, parking lots, foundations, sidewalks) existing at the time of the ROD issuance; and 2) require access provisions to ensure that Navy and regulatory agencies have access to the site for the purpose of implementing the remedy, and conducting inspections.

Previous PAH-related removal actions at IR Site 35 have focused on soil in unpaved areas. For FS purposes, ICs for this alternative are assumed to apply to the identified area until results of future soil sampling under existing buildings and hardscape indicate that PAH-related health risks are similar to or less than those associated with soil in unpaved areas.

11.4.2.2 REVIEWS AND REPORTING

Comprehensive reviews of the selected remedy would be performed every 5 years under CERCLA. A 30-year duration has been assumed for costing purposes.

11.4.2.3 EVALUATION BY CRITERIA

This section provides a discussion of Alternative PAH-2 relative to the threshold criteria. Evaluation of this alternative relative to the balancing criteria is presented in Table 11-7. A cost estimate summary is presented in Table 11-8. Cost estimate details and assumptions are presented in Appendix L.

Overall Protection of Human Health and the Environment

For Alternative PAH-2, ICs would be implemented in the area shown on Figure 11-4 to confirm that PAH-related health risks are similar to or less than the risks associated with

soil in unpaved areas. This would be achieved by collecting and analyzing soil samples from beneath buildings and hardscape that would be removed in the future. Human-health risks associated with PAHs are currently within the risk management range. This alternative is considered to be protective of human health and the environment.

Compliance With Applicable or Relevant and Appropriate Requirements

Alternative PAH-2 would comply with ARARs. Potential ARARs associated with this alternative have been evaluated and identified in Appendix K. There are no federal ARARs for ICs. The IC mechanisms would comply with Requirements for Land-Use Covenants at Cal. Code Regs. tit. 22, § 67391.1.

11.4.3 Alternative PAH-3a: Excavation in Unpaved Areas to 2 Feet bgs and ICs

This alternative addresses soil with B(a)P equivalent concentrations above the preliminary RG in unpaved areas. Under this alternative, soil in unpaved areas with B(a)P equivalent concentrations above the preliminary RG would be excavated to 2 feet bgs and disposed of off-site. ICs would be designed and implemented in the area shown on Figure 11-4. The ICs would require implementation of a sampling plan for soil beneath buildings and hardscape in the event that redevelopment involves removal of buildings and/or hardscape.

11.4.3.1 EXCAVATION AND OFF-SITE DISPOSAL

Based on the RI soil sampling results, B(a)P equivalent concentrations above the preliminary RG in the 0- to 2-foot-bgs depth interval exist at six locations (two in unpaved areas and four in paved areas) (Figure 11-4). For Alternative PAH-3a, soil in the two unpaved locations would be excavated and backfilled with clean, imported fill material from a local source. For FS purposes, each excavated area is assumed to be 50 feet by 50 feet in area, centered on each RI sampling location. An estimated 300 bcy of soil would be excavated under this alternative. Since cancer risk associated with PAHs is within the risk management range and noncancer HIs are below 1, the objective of excavation would be to remove additional mass of PAH-impacted soil.

Prior to excavation activities, the existing grass sod over the areas to be excavated would be removed and disposed of off-site. Excavated soil would be stockpiled and characterized before off-site disposal. For FS purposes, it is assumed that the excavated soil with B(a)P equivalent concentrations above the preliminary RG would be classified as Class II nonhazardous waste and transported for disposal to a corresponding landfill (e.g., Altamont, Livermore). Approximately two samples would be collected from the excavated soil to determine the waste profile and the management classification. It is also assumed that one waste-profiling sample per 500 bcy plus one quality assurance sample would be collected. The collected samples would be submitted to an off-site analytical laboratory for analysis of PAHs using U.S. EPA Method 8270C SIM; gasoline-, diesel-, and motor oil–range TPH using U.S. EPA Method 8015 (modified); VOCs using

U.S. EPA Method 8260; and California Administrative Manual (CAM) 17 metals using U.S. EPA Method 200.7. For cost estimating purposes, it is assumed that one stockpile sample would be analyzed for up to four STLC metals (arsenic, lead, cadmium, and chromium).

After excavation is completed, the excavated areas would be backfilled with clean, imported soil from a local source. The backfilled areas would then be revegetated with grass sod and sloped to promote drainage.

11.4.3.2 INSTITUTIONAL CONTROLS

ICs for this alternative would be the same as those described for Alternative PAH-2 (Section 11.4.2.1).

11.4.3.3 REVIEWS AND REPORTING

Reviews and reporting activities for this alternative would be the same as those described for Alternative PAH-2 in Section 11.4.2.2.

11.4.3.4 EVALUATION BY CRITERIA

This subsection provides a discussion of Alternative PAH-3a relative to the threshold criteria. Evaluation of this alternative relative to the balancing criteria is presented in Table 11-7. A cost estimate summary is presented in Table 11-9. Cost estimate details and assumptions are presented in Appendix L.

Overall Protection of Human Health and the Environment

Alternative PAH-3a would remove impacted soil from 0 to 2 feet bgs in unpaved areas to remove additional mass of PAH-impacted soil. In addition, ICs would be implemented in the area shown on Figure 11-4 to confirm that PAH-related health risks are similar to or less than the risks associated with soil in unpaved areas. This would be achieved by collecting and analyzing soil samples from beneath buildings and hardscape that would be removed in the future. Human-health risks associated with PAHs (before excavation) are currently within the risk management range. Excavation would accomplish some additional mass reduction, but is not expected to reduce PAH-related risks appreciably. This alternative is considered protective of human health and the environment.

Compliance With Applicable or Relevant and Appropriate Requirements

Alternative PAH-3a would comply with ARARs. Potential ARARs associated with this alternative have been evaluated and identified in Appendix K. ARARs associated with dust and ICs are the same as those identified for Alternative AOC 3-2 in Section 11.2.2.5. The same action-specific ARARs associated with identification and management of solid and hazardous wastes for AOC 3-3 (Section 11.2.3.5) apply to this alternative.

Alternative PAH-3a may impact buildings of potential historic significance (Figure 11-4) identified as part of the NAS Alameda Historic District. Substantive requirements of 36 C.F.R. pt. 800 are potential ARARs for this alternative.

11.4.4 Alternative PAH-3b: Excavation to 2 Feet bgs and ICs

This alternative involves the excavation and off-site disposal of all identified soil with B(a)P equivalent concentrations above the preliminary RG in the 0- to 2-foot-bgs depth interval at IR Site 35. ICs would be designed and implemented in the area shown on Figure 11-4. The ICs would require implementation of a sampling plan for soil beneath buildings and hardscape in the event that redevelopment involves removal of buildings and/or hardscape. The six areas assumed to be excavated for Alternative PAH-3b are presented on Figure 11-4.

11.4.4.1 EXCAVATION AND OFF-SITE DISPOSAL

For this alternative, all six of the identified PAH Areas with B(a)P equivalent concentrations above the preliminary RG in the upper 2 feet bgs of soil (Figure 11-4) would be excavated to 2 feet bgs and backfilled with clean, imported fill soil from a local source. The total estimated size of PAH-impacted areas (including paved and unpaved surfaces) is approximately 14,915 square feet. An estimated 1,105 bcy of soil would be excavated under this alternative. As with Alternative PAH-3a, the objective of excavation would be to remove additional mass of PAH-impacted soil.

Prior to excavation activities, paved surfaces would be demolished and removed for off-site disposal to allow for excavation of underlying soil. Excavated soil would be segregated, stockpiled into 500-cubic-yard batches, and characterized before off-site disposal. For FS purposes, it is assumed that the excavated soil with B(a)P equivalent concentrations above the preliminary RG would be classified as Class II nonhazardous waste and transported for disposal to a corresponding landfill (e.g., Altamont, Livermore). Approximately four samples would be collected from the excavated soil to determine the waste profile and the management classification. It is also assumed that one waste-profiling sample per 500 bcy (or three samples) plus one quality assurance sample would be collected. The collected samples would be submitted to an off-site analytical laboratory for analysis of PAHs using U.S. EPA Method 8270C SIM; gasoline-, diesel-, and motor oil–range TPH using U.S. EPA Method 8015 (modified); VOCs using U.S. EPA Method 8260; and CAM 17 metals using U.S. EPA Method 200.7. For cost estimating purposes, it is assumed that one of the stockpile samples would be analyzed for up to four STLC metals (arsenic, lead, cadmium, and chromium).

After excavation is completed, the excavated areas would be backfilled with clean, imported soil from a local source. The backfilled areas would then be revegetated with grass sod and sloped to promote drainage.

11.4.4.2 INSTITUTIONAL CONTROLS

ICs associated with this alternative would be the same as those described for Alternative PAH-2 (Section 11.4.2.1).

11.4.4.3 REVIEWS AND REPORTING

Reviews and reporting activities for this alternative would be the same as those described for Alternative PAH-2 in Section 11.4.2.2.

11.4.4.4 EVALUATION BY CRITERIA

This subsection provides a discussion of Alternative PAH-3b relative to the threshold criteria. Evaluation of this alternative relative to the balancing criteria is presented in Table 11-7. A cost estimate summary is presented in Table 11-10. Cost estimate details and assumptions are presented in Appendix L.

Overall Protection of Human Health and the Environment

Under Alternative PAH-3b, soil with B(a)P equivalent concentration above the preliminary RG in the upper 2 feet bgs (in paved and unpaved areas) would be removed and disposed of off-site. The excavation areas would be backfilled with clean, imported soil and covered with grass sod. In addition, ICs would be implemented in the area shown on Figure 11-4 to confirm that PAH-related health risks are similar to or less than the risks associated with soil in unpaved areas. This would be achieved by collecting and analyzing soil samples from beneath buildings and hardscape that would be removed in the future. Human-health risks associated with PAHs (before excavation) are within the risk management range. Excavation would accomplish some additional mass reduction, but is not expected to reduce PAH-related risks appreciably. This alternative is considered protective of human health and the environment.

Compliance With Applicable or Relevant and Appropriate Requirements

Alternative PAH-3b would comply with ARARs. Potential ARARs associated with this alternative have been evaluated and identified in Appendix K. ARARs associated with dust and ICs are the same as those identified for Alternative AOC 3-2 in Section 11.2.2.5. The same action-specific ARARs associated with identification and management of solid and hazardous wastes for AOC 3-3 (Section 11.2.3.5) apply to this alternative.

Alternative PAH-3b may impact buildings of potential historic significance (Figure 11-4) identified as part of the NAS Alameda Historic District. Substantive requirements of 36 C.F.R. pt. 800 are potential ARARs for this alternative.

11.4.5 Alternative PAH-4a: Excavation in Unpaved Areas to 4 Feet bgs and ICs

This alternative addresses soil with B(a)P equivalent concentrations above the preliminary RG in unpaved areas. Under this alternative, soil in unpaved areas with B(a)P equivalent concentrations above the preliminary RG would be excavated to 4 feet bgs and disposed of off-site. ICs would be designed and implemented in the area shown on Figure 11-4. The ICs would require implementation of a sampling plan for soil beneath buildings and hardscape in the event that redevelopment involves removal of buildings and/or hardscape. The assumed excavation locations are presented on Figure 11-5.

11.4.5.1 EXCAVATION AND OFF-SITE DISPOSAL

Unpaved areas identified on Figure 11-5 would be excavated to remove soil with B(a)P equivalent concentrations above the preliminary RG to a depth of approximately 4 feet bgs and backfilled with clean, imported fill soil from a local source. At locations where exceedances were only in the 0- to 2-foot-bgs depth interval, excavation of the 2- to 4-foot-bgs depth interval would not be required. For the 44 locations where soil with B(a)P equivalent concentrations above the preliminary RG was identified at 2 to 4 feet bgs, the upper 2 feet of excavated soil would be reused on-site after characterizing to confirm the soil is at or below the preliminary RG. The total excavation area is assumed to be 91,000 square feet. An estimated 13,100 bcy of soil would be excavated under this alternative. For FS purposes, of the 13,100 bcy of excavated soil, 6,700 bcy is estimated to be soil with B(a)P equivalent concentrations above the preliminary RG, and the remaining 6,400 bcy is assumed to be suitable for use as backfill (i.e., analytical results will indicate that the B(a)P equivalent concentrations are below the preliminary RG). The objective of excavation would be to remove additional mass of PAH-impacted soil.

Excavated soil would be segregated, stockpiled into 500-bcy batches, and characterized before reuse or off-site disposal. Approximately 34 samples, including 7 quality assurance samples, would be collected from stockpiles for PAH analysis by an off-site analytical laboratory. For FS purposes, the soil with B(a)P equivalent concentrations above the preliminary RG would be classified as Class II nonhazardous waste and transported to a corresponding landfill facility (e.g., Altamont, Livermore) for disposal. Excavated soil with PAH concentrations below the preliminary RG would be reused for backfilling on-site. An estimated 18 samples would be collected from the soil with B(a)P equivalent concentrations above the preliminary RG to determine the waste profile and the management classification. It is assumed that one waste-profiling sample per 500 bcy (or 14 samples) plus four quality assurance samples would be collected. The collected samples would be submitted to an off-site analytical laboratory for the same analyses specified for Alternative PAH-3a (Section 11.4.3.1). For estimating purposes, it is assumed that four of the stockpile samples would be analyzed for up to four STLC metals (arsenic, lead, cadmium, and chromium).

After excavation is completed, the excavated areas would be backfilled with clean, imported soil from a local source or with excavated soil from on-site that is at or below the preliminary RG. For RI/FS purposes, approximately 6,400 bcy of excavated on-site soil would be reused and approximately 6,700 bcy of clean, imported backfill material would be purchased. The backfilled areas would then be revegetated with grass sod and sloped to promote drainage.

11.4.5.2 INSTITUTIONAL CONTROLS

ICs associated with this alternative would be the same as those described for Alternative PAH-2 (Section 11.4.2.1).

11.4.5.3 REVIEWS AND REPORTING

Reviews and reporting activities for this alternative would be the same as those described for Alternative PAH-2 in Section 11.4.2.2.

11.4.5.4 EVALUATION BY CRITERIA

This subsection provides a discussion of Alternative PAH-4a relative to the threshold criteria. Evaluation of this alternative relative to the balancing criteria is presented in Table 11-7. A cost estimate summary is presented in Table 11-11. Cost estimate details and assumptions are presented in Appendix L.

Overall Protection of Human Health and the Environment

Alternative PAH-4a would remove impacted soil from 0 to 4 feet bgs in unpaved areas to remove additional mass of PAH-impacted soil. In addition, ICs would be implemented in the area shown on Figure 11-4 to confirm that PAH-related health risks are similar to or less than the risks associated with soil in unpaved areas. This would be achieved by collecting and analyzing soil samples from beneath buildings and hardscape that would be removed in the future. Human-health risks associated with PAHs (before excavation) are within the risk management range. Excavation would accomplish additional mass reduction, but is not expected to reduce PAH-related risks appreciably. This alternative is considered to be protective of human health and the environment.

Compliance With Applicable or Relevant and Appropriate Requirements

Alternative PAH-4a would comply with ARARs. Potential ARARs associated with this alternative have been evaluated and identified in Appendix K. ARARs associated with dust and ICs are the same as those identified for Alternative AOC 3-2 in Section 11.2.2.5. The same action-specific ARARs associated with identification and management of solid and hazardous wastes for AOC 3-3 (Section 11.2.3.5) apply to this alternative.

Alternative PAH-4a may impact buildings of potential historic significance (Figure 11-5) identified as part of the NAS Alameda Historic District. Substantive requirements of 36 C.F.R. pt. 800 are potential ARARs for this alternative.

11.4.6 Alternative PAH-4b: Excavation to 4 Feet bgs

This alternative involves the excavation and off-site disposal of all identified soil with B(a)P equivalent concentrations above the preliminary RG to a depth of 4 feet bgs at IR Site 35 (Figure 11-5). This alternative would not include ICs because cancer risk for each DA in the 0-to-8-foot depth interval is within the risk management range, and noncancer HIs are all below 1.

11.4.6.1 EXCAVATION AND OFF-SITE DISPOSAL

For this alternative, the total size of areas with B(a)P equivalent concentrations above the preliminary RG (including paved and unpaved surface) is approximately 122,000 square feet. At locations where exceedances were reported at the 0- to 2-foot-bgs depth interval, excavation of the 2- to 4-foot-bgs depth interval would not be required. For the

44 locations where soil with B(a)P equivalent concentrations above the preliminary RG was identified at 2 to 4 feet bgs, the soil would be excavated to 4 feet bgs. The upper 2 feet of excavated soil would be reused on-site after characterization to confirm that B(a)P equivalent concentrations in shallow soil are at or below the preliminary RG. An estimated 17,000 bcy of soil would be excavated under this alternative. For RI/FS purposes, 9,000 bcy is estimated to be soil with B(a)P equivalent concentrations above the preliminary RG, and the remaining 8,000 bcy is assumed to be soil with B(a)P equivalent concentrations below the preliminary RG, and therefore suitable for use as backfill. The objective of excavation would be to remove additional mass of PAH-impacted soil.

Prior to excavation activities, paved surfaces would be demolished and removed for off-site disposal to allow for excavation of underlying soil. Excavated soil would be segregated, stockpiled into 500-cubic-yard batches, and characterized before reuse or off-site disposal. Approximately 44 samples, including 9 quality assurance samples (or 20 percent), would be collected from stockpiles for PAH analysis by an off-site analytical laboratory. For FS purposes, it is assumed the excavated soil would be classified as Class II nonhazardous waste and transported for disposal to a corresponding landfill (e.g., Altamont, Livermore). Excavated soil with PAH concentrations below the preliminary RG would be reused for backfilling on-site. An estimated 24 samples would be collected from the excavated soil with B(a)P equivalent concentrations above the preliminary RG to determine the waste profile and the management classification. It is also assumed that 1 waste-profiling sample per 500 bcy (or 19 samples) plus 5 quality assurance samples would be collected. The collected samples would be submitted to an off-site analytical laboratory for the same analyses specified for Alternative PAH-3a (Section 11.4.3.1). For estimating purposes, it is assumed that five of the stockpile samples would be analyzed for up to four STLC metals (arsenic, lead, cadmium, and chromium).

After excavation is completed, the excavated areas would be backfilled with clean, imported soil from a local source or with excavated soil from on-site that is at or below the preliminary RG. For RI/FS purposes, approximately 8,000 bcy of excavated soil from on-site would be reused and approximately 9,000 bcy of clean, imported backfill material would be purchased. The backfilled areas would then be revegetated with grass sod and sloped to promote drainage.

11.4.6.2 CLOSEOUT REPORT

This alternative would be completed with no long-term maintenance upon the completion of excavation and backfilling activities. Therefore, no 5-year reviews would be included. A remedial action closeout report would be prepared upon the completion of remedial activities.

11.4.6.3 EVALUATION BY CRITERIA

This section provides a discussion of Alternative PAH-4b relative to the threshold criteria. Evaluation of this alternative relative to the balancing criteria is presented in Table 11-7. A cost estimate summary is presented in Table 11-12. Cost estimate details and assumptions are presented in Appendix L.

Overall Protection of Human Health and the Environment

Under Alternative PAH-4b, soil from 0 to 4 feet bgs with B(a)P equivalent concentrations above the preliminary RG would be excavated and disposed of off-site. The excavation would be backfilled with on-site soil with B(a)P equivalent concentrations at or below the preliminary RG or with imported backfill material. This alternative would result in unrestricted site use for soil. Human-health risks associated with PAHs (before excavation) are within the risk management range. Excavation would accomplish additional mass reduction, but is not expected to reduce PAH-related risks appreciably. This alternative is considered protective of human health and the environment.

Compliance With Applicable or Relevant and Appropriate Requirements

Alternative PAH-4b would comply with ARARs. Potential ARARs associated with this alternative have been evaluated and identified in Appendix K. ARARs associated with dust are the same as those identified for Alternative AOC 3-2 in Section 11.2.2.5. The same action-specific ARARs associated with identification and management of solid and hazardous wastes identified for AOC 3-3 (Section 11.2.3.5) apply to this alternative.

Alternative PAH-4b may impact buildings of potential historic significance (Figure 11-5) identified as part of the NAS Alameda Historic District. Substantive requirements of 36 C.F.R. pt. 800 are potential ARARs for this alternative.

11.5 REMEDIAL ALTERNATIVES FOR NAPHTHALENE IN GROUNDWATER AT AOC 1

This subsection presents a detailed analysis of groundwater alternatives at AOC 1. The following remedial alternatives will be evaluated:

- Alternative AOC 1-1 – no action
- Alternative AOC 1-2 – MNA and ICs
- Alternative AOC 1-3 – source removal, enhanced aerobic ISB, and ICs
- Alternative AOC 1-5 – ISCO

11.5.1 Alternative AOC 1-1: No Action

In accordance with the NCP (40 C.F.R. § 300.430[e][6]), Alternative AOC 1-1 will be evaluated in the same manner as the other groundwater remedial alternatives considered in this RI/FS Report. The no action remedial alternative for groundwater serves as the baseline against which all of the remaining remedial alternatives can be compared.

Alternative AOC 1-1 would involve no engineered remediation measures, administrative controls, or monitoring for naphthalene in groundwater at AOC 1.

AOC 1 is outside the area of Alameda Point designated as Class III for groundwater (i.e., west of Saratoga Street), so MCLs are not considered ARARs for AOC 1. For CERCLA decision-making purposes, pathways other than groundwater ingestion and dermal contact while showering would be considered. If these two domestic groundwater exposure pathways are not considered, then the primary pathway would be inhalation of indoor air. The Cal/EPA cancer risk associated with the indoor air pathway is 5×10^{-5} and the HI for this pathway is 2. The cancer risk associated with inhalation of indoor air is within the risk management range; the HI is slightly above 1. If no action is taken, this alternative would be considered a final remedy for AOC 1 groundwater and would not include monitoring or periodic reviews to verify its protectiveness.

11.5.1.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

This alternative would rely on natural processes to reduce naphthalene concentrations. However, there are no means to verify that natural attenuation processes are occurring and would continue to occur. Under this alternative, there would be no method of assessing long-term effectiveness and permanence. However, because cancer risk associated with naphthalene in groundwater is within the risk management range, this alternative is considered protective of human health and the environment.

11.5.1.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

According to the NCP, the no action alternative must be evaluated in the same manner as other proposed remedial action alternatives. There are no ARARs that would apply under the no action alternative; according to CERCLA Section 121, the requirement to meet ARARs applies only when a response action is taken. This alternative does not involve any steps to prevent access to, reduce, remove, or treat the groundwater.

11.5.1.3 EVALUATION BY CRITERIA

An evaluation of Alternative AOC 1-1 against the balancing criteria is presented in Table 11-13. There are no costs associated with the no action alternative.

11.5.2 Alternative AOC 1-2: MNA and ICs

This section provides a description and detailed analysis of groundwater remedial Alternative AOC 1-2 for groundwater at AOC 1.

11.5.2.1 REFINEMENT OF EXTENT OF NAPHTHALENE IN GROUNDWATER

An initial groundwater investigation would be conducted for Alternative AOC 1-2 to verify the extent of naphthalene in groundwater at concentrations above the preliminary RG. The current interpreted naphthalene extent is shown on Figure 11-6 and is based on December 2005 results from grab groundwater sampling conducted during the RI.

The initial groundwater investigation is assumed for RI/FS purposes to consist of the following components.

- Collect soil and grab groundwater samples from approximately 15 locations in the FWBZ. For RI/FS purposes, it is assumed that two soil samples and one groundwater sample per boring would be collected for VOC analysis. The goal of the grab groundwater sampling would be to confirm the current configuration of the naphthalene-affected area in the FWBZ. The data from analyses of these samples would be used to determine the final location of new groundwater monitoring wells for use in the MNA program for this AOC.
- Install, develop, sample, and survey three new monitoring wells in the FWBZ at AOC 1 in the vicinity of the RI groundwater sampling location A01SB03. These new wells would provide information about the extent of naphthalene at concentrations above the preliminary RG (100 µg/L) and could be used to monitor effectiveness of the remedial action.

The assumed locations of the 15 grab groundwater sampling locations and the 3 new monitoring wells are shown on Figure 11-6. The actual groundwater sampling locations would be determined during the remedial design stage based on a review of available information. The final locations of the new monitoring wells would be based on results of the grab groundwater sampling performed during the remedial design phase of the project.

11.5.2.2 MONITORED NATURAL ATTENUATION FOR NAPHTHALENE

For Alternative AOC 1-2, an MNA sampling program would be developed and implemented, including sampling of the three new FWBZ wells for VOCs and field parameters. Sufficient groundwater data are not available to predict the duration of the MNA program required to reduce contaminant concentrations to preliminary RGs. To assist in estimating the time of remediation, typical attenuation rates for hydrocarbon sites were reviewed (USGS 2003), and a duration of 10 years was assumed to be sufficient to reduce concentrations by one order of magnitude. For RI/FS cost estimating purposes, it is assumed that the duration of MNA is 10 years. The groundwater monitoring well sampling would occur quarterly for the first year and annually thereafter until preliminary RGs are met.

11.5.2.3 INSTITUTIONAL CONTROLS

Under Alternative AOC 1-2, ICs have been included as a component of the alternative. The actual ICs to be employed would be established in the ROD and subsequent remedial design/remedial action documentation.

ICs would be put in place at AOC 1 to mitigate vapor intrusion risk if additional groundwater sampling results indicate unacceptable risk. Alternative AOC 1-2 does not include active remediation. Natural attenuation processes would be expected to reduce contaminant concentrations at the AOC.

The effectiveness of the ICs would be reviewed periodically as part of the CERCLA 5-year review process. The assumed duration of ICs for this alternative is 10 years. The mechanisms for IC implementation would be similar to those described for Alternative AOC 3-2 in Section 11.2.2.3.

11.5.2.4 REVIEWS AND REPORTING

For Alternative AOC 1-2, it is assumed that annual groundwater monitoring reports for remedial actions would be prepared and submitted to the regulatory agencies. For the purposes of this RI/FS Report, two 5-year reviews are assumed to be performed at the end of years 5 and 10. Reviews would be documented in a summary report issued to appropriate regulatory agencies. The monitoring program would be reviewed and optimized based on monitoring results.

11.5.2.5 EVALUATION BY CRITERIA

This section provides a discussion of Alternative AOC 1-2 relative to the threshold criteria. Evaluation of this alternative relative to the balancing criteria is presented in Table 11-13. A cost estimate summary for Alternative AOC 1-2 is presented in Table 11-14. Cost estimate details and assumptions are presented in Appendix L.

Overall Protection of Human Health and the Environment

Alternative AOC 1-2 is considered protective of human health and the environment. Natural attenuation processes occurring at AOC 1 are assumed to be effective at reducing naphthalene concentrations to achieve preliminary RGs within an acceptable time frame. Groundwater monitoring conducted as part of the MNA program would track naphthalene concentrations with time. ICs would limit human exposure to naphthalene in shallow groundwater at the AOC and would be in place, if needed, to protect human health until MNA indicates that concentrations in groundwater are reduced to preliminary RGs. Groundwater monitoring and periodic reviews would provide information to support future remedial action decisions.

Compliance With Applicable or Relevant and Appropriate Requirements

Alternative AOC 1-2 is expected to meet potential chemical-, location-, and action-specific ARARs. Potential ARARs associated with this alternative have been evaluated and identified in Appendix K. Purgewater and other wastes generated during groundwater monitoring well construction and sampling for Alternative AOC 1-2 would be subject to the substantive provisions of potential RCRA ARARs to determine whether such wastes should be classified as hazardous. This determination would be made at the time the waste is generated. The substantive provisions of potential waste management ARARs for storing, labeling, manifesting, and transporting this material for final treatment or disposal would be followed if the wastes were found to be RCRA or non-RCRA hazardous waste. Potential ARARs for ICs would be the same as those identified for Alternative AOC 3-2 (Section 11.2.2.5).

11.5.3 Alternative AOC 1-3: Source Removal, Enhanced Aerobic ISB, and ICs

This subsection provides a description and detailed analysis of Alternative AOC 1-3 for groundwater at AOC 1.

11.5.3.1 REFINEMENT OF EXTENT OF NAPHTHALENE IN GROUNDWATER

An initial groundwater investigation would be conducted for Alternative AOC 1-3 in order to verify the extent of naphthalene in groundwater at concentrations above the preliminary RG. The scope of the investigation would be identical to that described for Alternative AOC 1-2 (Section 11.5.2.1).

11.5.3.2 SOURCE REMOVAL AND ENHANCED AEROBIC ISB

This alternative includes excavation, off-site disposal, and ISB treatment of residual naphthalene in groundwater. Figure 11-7 presents the assumed treatment approach for Alternative AOC 1-3. This groundwater alternative assumes that an area of approximately 40 feet by 40 feet by 14 feet thick near OWS 063A would be identified as the source of naphthalene in AOC 1 groundwater. The intent of this alternative would be to remove OWS 063A and elevated naphthalene concentrations in soil. Utilities in the excavation area would need to be disconnected or removed temporarily. It is assumed that the groundwater extracted during the dewatering process would remove most of the groundwater containing naphthalene and be treated for VOCs using activated carbon. This alternative includes two 1,000-pound activated carbon vessels in series to be mobilized to the AOC. The carbon vessels would be used to treat up to 50 gallons per minute of extracted groundwater prior to discharge via the storm drains to San Francisco Bay.

Before excavation, the extent of naphthalene in groundwater at the AOC will be determined as described above in Section 11.5.3.1. This investigation data would be used for planning purposes in the remedial design effort and for profiling and waste disposal planning purposes.

The RI/FS Report assumes that 18 confirmation samples (including 2 quality assurance/ quality control samples) would be collected from the excavation bottom and sidewalls and that the samples would be analyzed for VOCs using U.S. EPA Method 8260B. Other constituents would not be included in the analysis as the goal of the excavation is to remove the naphthalene source. The final confirmation sampling program would be developed during the remedial design phase of the project.

The excavated soil determined to be the source of naphthalene to groundwater would be stockpiled and characterized prior to off-site disposal. For the purpose of this RI/FS Report, it is assumed that approximately 830 bcy of soil would be disposed of off-site. All of this material is assumed for RI/FS purposes to be classified as Class II nonhazardous waste.

Following completion of excavation and confirmation sampling, the excavation would be backfilled with clean, imported soil and utilities would be restored. The first foot of

backfill would include aerobic ISB amendment (i.e., ORC). The ORC-soil mixture would be placed in the bottom foot of the excavation. The timed release of oxygen from the ORC-soil mixture would stimulate ISB and thereby reduce residual naphthalene concentrations in groundwater. Groundwater performance monitoring included under Alternative AOC 1-3 would provide for assessment of changes in groundwater naphthalene concentrations over time.

11.5.3.3 ISB PERFORMANCE MONITORING

This RI/FS Report assumes that residual concentrations of contaminants could remain in the naphthalene-affected area following the excavation of the source area and dewatering activities. The excavation and off-site disposal of impacted soil and its associated dewatering would remove a substantial amount of naphthalene from soil and groundwater. However, as an added precaution to address residual concentrations, the first 1 foot of backfill would be treated using ISB (i.e., ORC) as described in the previous section. Performance monitoring of the ISB treatment is included as part of this alternative to document residual concentrations and track the effectiveness of ORC in reducing concentrations above preliminary RGs, if any. The actual source removal, ISB, and monitoring program would be designed during the remedial design phase of the project. The scope of these activities may be revised as necessary once results of the initial groundwater investigation and groundwater monitoring events are available for review. For RI/FS cost estimating purposes, it is assumed that the three newly proposed monitoring wells would be used for monitoring. Figure 11-6 shows the proposed monitoring well locations.

For the naphthalene-affected area, the ISB performance monitoring program would include sampling of three new monitoring wells for VOCs and field parameters (i.e., conductivity, temperature, turbidity, pH, oxidation-reduction potential [ORP], and DO). Groundwater sampling and analysis would be performed prior to and following the ORC-soil mixing to evaluate remediation progress for a total of 1 year. For cost estimating purposes, it is assumed that the duration of ISB performance monitoring is 10 years. The sampling would occur quarterly for the first year and annually thereafter until preliminary RGs are met. It is also assumed for RI/FS purposes that contaminant concentrations would have declined to below preliminary RGs within 10 years.

11.5.3.4 INSTITUTIONAL CONTROLS

Under Alternative AOC 1-3, ICs are included as a component of the alternative. The actual ICs to be employed would be established in the ROD and subsequent remedial design/remedial action documentation. The ICs for this alternative would be identical to those described for Alternative AOC 3-2 (Section 11.2.2.3).

11.5.3.5 REVIEWS AND REPORTING

For Alternative AOC 1-3, it is assumed that annual data summary reports for the ISB performance monitoring program would be submitted to the regulatory agencies. For the

purposes of this RI/FS Report, two 5-year reviews are assumed to be performed at the end of years 5 and 10. Reviews would be documented in a summary report issued to appropriate regulatory agencies; these reviews might suggest modifications to the monitoring programs, as appropriate.

11.5.3.6 EVALUATION BY CRITERIA

This section provides a discussion of Alternative AOC 1-3 relative to the threshold criteria. Evaluation of this alternative relative to the balancing criteria is presented in Table 11-13. A cost estimate summary for Alternative AOC 1-3 is presented in Table 11-15. Cost estimate details and assumptions are presented in Appendix L.

Overall Protection of Human Health and the Environment

Alternative AOC 1-3 is considered protective of human health and the environment in the long term. Source removal should significantly reduce naphthalene concentrations in soil and groundwater, and ISB treatment would further reduce residual naphthalene concentrations in groundwater. ICs would be in place, if needed, to protect human health until ISB performance monitoring indicates that naphthalene concentrations in groundwater are reduced and the preliminary RG is achieved.

Compliance With Applicable or Relevant and Appropriate Requirements

Alternative AOC 1-3 would comply with ARARs. Potential ARARs for this alternative have been evaluated and identified in Appendix K. The same action-specific ARARs for dust and identification and management of solid and hazardous wastes that were identified for Alternative AOC 3-3 (Section 11.2.3.5) apply to this alternative.

This alternative would comply with potential groundwater monitoring ARARs, including landfill monitoring requirements identified in Cal. Code Regs. tit. 22, § 66264.310(b)(3); 40 C.F.R. pt. 258, subpart (subpt.) F, § 258.61(a)(3); Cal. Code Regs. tit. 27, § 21090(c)(3); and Cal. Code Regs. tit. 23, § 2580(a). Soil cuttings and water generated in the course of installing and developing monitoring wells would be subject to RCRA requirements at Cal. Code Regs. tit. 22, § 66262.10(a) and 66262.11 to determine whether such wastes should be classified as hazardous.

There are no federal ARARs for ICs. Potential ARARs for ICs would be the same as those identified for Alternative AOC 3-2 (Section 11.2.2.5).

11.5.4 Alternative AOC 1-5: ISCO

This subsection provides a description and detailed analysis of Alternative AOC 1-5 for groundwater at AOC 1.

11.5.4.1 REFINEMENT OF EXTENT OF NAPHTHALENE IN GROUNDWATER

An initial groundwater investigation would be conducted for Alternative AOC 1-5 in order to verify the extent of naphthalene concentrations above the preliminary RG in

groundwater. The scope of the investigation would be identical to that described for Alternative AOC 1-2 (Section 11.5.2.1).

11.5.4.2 *IN SITU* CHEMICAL OXIDATION

This alternative includes ISCO treatment of groundwater impacted with naphthalene. For RI/FS purposes, the modified Fenton's process described in Section 9 is assumed to be used for naphthalene treatment. Figure 11-8 presents the assumed treatment approach for Alternative AOC 1-5. For RI/FS cost estimating purposes, it is assumed that treatment would occur over an approximate area of 7,500 square feet (Figure 11-8). Alternative AOC 1-5 would employ an estimated 32 injection points with spacing of 20 feet on center. The assumed dose rate for ISCO is 400 gallons per injection point (Haskins, pers. com. 2006). Measures to minimize possible contaminant migration during injection would be developed in the remedial design stage. The injections would be performed using direct-push drilling technology and applied via gravity through temporary injection screens. For RI/FS cost estimating purposes, it is assumed that the injections would focus on an approximately 10-foot-thick treatment zone for ISCO. The treatment interval may be refined based on results of the initial groundwater investigation. Performance of the process would be evaluated through groundwater sampling and analysis.

Although the ISCO process should provide active treatment, no pilot-scale testing is assumed to be necessary. The modified Fenton's process was recently performed successfully at IR Site 9. Pilot-scale testing is not considered necessary at IR Site 35 because of this local experience. Under Alternative AOC 1-5, there is the potential for temporary mobilization of dissolved metals to groundwater when implementing the ISCO process. However, ISCO has already been implemented successfully at numerous Alameda Point sites.

11.5.4.3 EFFECTIVENESS SAMPLING FOR NAPHTHALENE

After ISCO treatment, it is assumed for RI/FS purposes that naphthalene concentrations would decrease rapidly to levels below the preliminary RG within 6 months. Performance monitoring of the ISCO treatment is included as a part of this alternative to verify treatment effectiveness. The actual monitoring program would be designed during the remedial design phase of the project and evaluated once results of the first few rounds of sampling (after the initial groundwater investigation and monitoring well installation) were available for review. For RI/FS cost estimating purposes, it is assumed that the three new monitoring wells would be used for monitoring. Figure 11-6 shows the proposed monitoring well locations.

For Alternative AOC 1-5, the ISCO performance monitoring program would include sampling of three new monitoring wells and analyzing the samples for VOCs, dissolved metals, and field parameters (i.e., ferrous iron, conductivity, temperature, turbidity, pH, ORP, and DO). Groundwater sampling and analysis would be performed prior to and following the ISCO reagent injection to evaluate remediation progress for a total of 6 months. For cost estimating purposes, it is assumed that the duration of ISCO

performance monitoring would be 2 years. The sampling would occur bimonthly for the first 6 months, quarterly for the remainder of the first year, and annually for the second year. It is also assumed that contaminant concentrations would have declined to below preliminary RGs at that time.

11.5.4.4 CLOSEOUT REPORT

Because ISCO treatment is assumed to reduce naphthalene concentrations to levels below preliminary RGs within 6 months, and because Alternative AOC 1-5 has a duration of only 2 years, periodic reviews would not need to be performed every 5 years. At the end of year 2, a project closeout report would be prepared.

11.5.4.5 EVALUATION BY CRITERIA

This section provides a discussion of Alternative AOC 1-5 relative to the threshold criteria. Evaluation of this alternative relative to the balancing criteria is presented in Table 11-13. A cost estimate summary is presented in Table 11-16. Cost estimate details and assumptions are presented in Appendix L.

Overall Protection of Human Health and the Environment

Alternative AOC 1-5 would be protective of human health and the environment. The ISCO process should significantly reduce naphthalene concentrations in groundwater at AOC 1. Performance monitoring would track the overall performance of the remedy. No ICs would be included for this alternative.

Compliance With Applicable or Relevant and Appropriate Requirements

Alternative AOC 1-5 is expected to meet the potential chemical-, location-, and action-specific ARARs. Potential ARARs for this alternative have been evaluated and identified in Appendix K. The time to reduce naphthalene concentrations in groundwater is expected to be shorter than for the other alternatives.

IDW generated during the installation of chemical injection points and the initial groundwater investigation would be subject to the substantive provisions of potential RCRA ARARs to determine whether such wastes should be classified as hazardous. This would be determined at the time the waste is generated. The substantive provisions of potential waste management ARARs for storing, manifesting, and transporting this material for final disposal would be followed if the wastes were found to be either RCRA or non-RCRA hazardous waste.

The Safe Drinking Water Act Underground Injection Control (UIC) Program regulations at 40 C.F.R. pt. 144 are potential federal ARARs for this alternative.

In addition, RCRA Section 3020(a), which bans hazardous waste disposal by underground injection above a formation that contains an underground source of drinking water, does not apply to this action because commercial chemicals or chemical by-products injected into groundwater for *in situ* treatment are not considered hazardous

waste (U.S. EPA 2000e). Off-gas from any venting through monitoring wells resulting from the ISCO process may need to comply with BAAQMD air emissions requirements. Monitoring of wellheads and injection points with a photoionization detector and/or flame ionization detector would be conducted to verify that vapor emissions meet the substantive provisions of potential BAAQMD ARARs.

This alternative would comply with potential groundwater monitoring ARARs, including landfill monitoring requirements identified in Cal. Code Regs. tit. 22, § 66264.310(b)(3); 40 C.F.R. pt. 258, subpt. F, § 258.61(a)(3); Cal. Code Regs. tit. 27, § 21090(c)(3); and Cal. Code Regs. tit. 23, § 2580(a). Soil cuttings and water generated in the course of installing and developing monitoring wells would be subject to RCRA requirements in Cal. Code Regs. tit. 22, § 66262.10(a) and 66262.11 to determine whether such wastes should be classified as hazardous.

Alternative AOC 1-5 may impact buildings of potential historic significance (Figure 11-8) identified as part of the NAS Alameda Historic District. Substantive requirements of 36 C.F.R. pt. 800 are potential ARARs for this alternative.

11.6 REMEDIAL ALTERNATIVES FOR VINYL CHLORIDE IN GROUNDWATER AT AOC 23

The following remedial alternatives will be evaluated for groundwater at AOC 23:

- Alternative AOC 23-1 – no action
- Alternative AOC 23-2 – MNA and ICs
- Alternative AOC 23-4 – ISCO

11.6.1 Alternative AOC 23-1: No Action

In accordance with the NCP (40 C.F.R. § 300.430[e][6]), Alternative AOC 23-1 is evaluated in the same manner as the other groundwater remedial alternatives considered in this RI/FS Report. The no action remedial alternative for groundwater serves as the baseline against which all of the remaining remedial alternatives can be compared. Alternative AOC 23-1 would involve no engineered remediation measures, ICs, or monitoring for vinyl chloride in groundwater at AOC 23.

Alternative AOC 23-1 would not include measures to prevent contact with or ingestion of site groundwater containing vinyl chloride at concentrations above the preliminary RG. If no action is taken, this alternative would be considered a final remedy for AOC 23 groundwater and would not include monitoring or periodic reviews to verify its protectiveness.

AOC 23 is east of Saratoga Street and within the area of Alameda Point where MCLs may be considered ARARs for groundwater. Vinyl chloride concentrations in grab groundwater samples at AOC 23 (2.8 µg/L maximum) were slightly above the California MCL (0.5 µg/L). Grab groundwater sampling results tend to yield higher VOC

concentrations than samples collected from groundwater monitoring wells. For example, vinyl chloride concentrations in grab groundwater samples at IR Site 27 were approximately 10 times higher than the samples from co-located shallow monitoring wells. Vinyl chloride in groundwater samples collected and analyzed from co-located monitoring wells may be below the preliminary RG of 0.5 µg/L. The Navy plans to install and sample two to three monitoring wells at AOC 23 prior to the ROD, and to use the analytical results in the remedy selection process.

Groundwater yield from several borings at AOC 23 advanced during the RI was low, suggesting that the aquifer would not support a yield sufficient to sustain a drinking water supply. Low groundwater yield is one criterion for exemption of groundwater from the MUN beneficial use designation. If groundwater in AOC 23 were exempted from the MUN designation, MCLs would no longer be ARARs, and the no action alternative would meet threshold criteria.

11.6.1.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

This alternative would not offer remedial measures to alleviate risks or prevent public exposure or environmental exposure to groundwater contamination. Alternative AOC 23-1 would not include any measures to remediate groundwater. Although human exposure to impacted groundwater is unlikely, there would be no ICs to prohibit shallow groundwater uses that might lead to such exposure. This alternative would rely on natural processes to remediate residual contamination. However, there would be no means to verify that such processes are occurring and would continue to occur. Under this alternative, there would be no method of assessing long-term effectiveness and permanence. Because cancer risk associated with vinyl chloride in groundwater at IR Site 35 is within the risk management range, this alternative may be considered protective of human health and the environment.

11.6.1.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The no action alternative was evaluated in the same manner as the other groundwater remedial alternatives. In accordance with CERCLA Section 121, the requirement to meet the applicable ARARs applies when a response action is taken. There would be no response activities under the no action alternative, so no action-specific ARARs would apply.

11.6.1.3 EVALUATION BY CRITERIA

An evaluation of Alternative AOC 23-1 against the NCP balancing criteria is presented in Table 11-17. There are no costs associated with the no action alternative.

11.6.2 Alternative AOC 23-2: MNA and ICs

This subsection provides a description and detailed analysis of Alternative AOC 23-2 for groundwater at AOC 23.

11.6.2.1 REFINEMENT OF EXTENT OF VINYL CHLORIDE IN GROUNDWATER

An initial groundwater investigation would be conducted for Alternative AOC 23-2 to verify the extent of vinyl chloride concentrations above the preliminary RG in groundwater. The current interpreted vinyl chloride extent in groundwater is shown on Figure 11-9 and is based on grab groundwater sampling results for a previous investigation in September 2001 and the RI in December 2005.

The initial groundwater investigation is assumed for RI/FS purposes to consist of the following components.

- Collect soil and grab groundwater samples from approximately 20 locations in the FWBZ. For RI/FS purposes, it is assumed that two soil samples and one groundwater sample per boring will be collected for VOC analysis. The goal of the grab groundwater sampling would be to confirm the current configuration of the impacted area in the FWBZ. The data from groundwater analysis of these samples would be used to determine the final location of new groundwater monitoring wells for use in the MNA program for this AOC.
- Install, develop, sample, and survey five new monitoring wells in the FWBZ at AOC 23. These new wells would provide information about the assumed extent of vinyl chloride at concentrations above the preliminary RG (0.5 µg/L) and could be used to monitor effectiveness of the remedial action.

The assumed locations of the 20 grab groundwater sampling locations and the five new monitoring wells are shown on Figure 11-9. The actual grab groundwater sampling locations would be determined during the remedial design stage based on a review of available information. The final locations of the new monitoring wells would be based on results of the grab groundwater sampling during the remedial design phase of the project.

11.6.2.2 MONITORED NATURAL ATTENUATION FOR VINYL CHLORIDE

For Alternative AOC 23-2, an MNA sampling program would be developed and implemented, including sampling of the five new FWBZ wells for VOCs and field parameters. Sufficient groundwater data are not available to predict the duration of the MNA program required to reduce contaminant concentrations to preliminary RGs; therefore, for RI/FS cost estimating purposes, it is assumed that the duration of MNA is 10 years. The groundwater sampling would occur quarterly for the first year and annually thereafter until preliminary RGs are met. It is also assumed that vinyl chloride concentrations would have declined below the preliminary RG within 10 years.

11.6.2.3 INSTITUTIONAL CONTROLS

Under Alternative AOC 23-2, ICs are included as a component of the alternative. The actual ICs to be employed would be established in the ROD and subsequent remedial design/remedial action documentation.

ICs would be put in place at AOC 23 to prohibit extraction of groundwater for domestic purposes. Alternative AOC 23-2 does not include active remediation. Natural attenuation processes would be expected to continue reducing contaminant concentrations at the AOC.

The Navy would employ the same dual approach described for Alternative AOC 3-2 in Section 11.2.2.3. The selected remedy would be reviewed periodically as part of the CERCLA 5-year review process. The assumed duration of ICs for this alternative is 10 years.

11.6.2.4 REVIEWS AND REPORTING

For Alternative AOC 23-2, it is assumed that annual groundwater sampling data summary reports for remedial actions would be prepared and submitted to the regulatory agencies. For RI/FS purposes, two 5-year reviews are assumed to be performed at the end of years 5 and 10. Reviews would be documented in a summary report issued to appropriate regulatory agencies. The monitoring program would be reviewed and optimized based on monitoring results.

11.6.2.5 EVALUATION BY CRITERIA

This subsection provides a discussion of Alternative AOC 23-2 relative to the NCP threshold criteria. Evaluation of this alternative relative to the balancing criteria is presented in Table 11-17. A cost estimate summary is presented in Table 11-18. Cost estimate details and assumptions are presented in Appendix L.

Overall Protection of Human Health and the Environment

Alternative AOC 23-2 is considered protective of human health and the environment. Natural attenuation processes occurring at AOC 23 are assumed to be effective at reducing vinyl chloride concentrations to achieve preliminary RGs within an acceptable time frame. Groundwater monitoring conducted as part of the MNA program would track vinyl chloride concentrations with time. ICs would limit human exposure to vinyl chloride in shallow groundwater at the AOC and would be in place to protect human health until MNA indicates that concentrations in groundwater are reduced. Groundwater monitoring and periodic reviews would provide information to support future remedial action decisions.

Compliance With Applicable or Relevant and Appropriate Requirements

Alternative AOC 23-2 is expected to meet potential chemical-, location-, and action-specific ARARs. Potential ARARs associated with this alternative have been evaluated and identified in Appendix K. ARARs for this alternative would be the same as those identified for Alternative AOC 1-2 in Section 11.5.2.5.

11.6.3 Alternative AOC 23-4: ISCO

This subsection provides a description and detailed analysis of Alternative AOC 23-4 for groundwater at AOC 23.

11.6.3.1 REFINEMENT OF EXTENT OF VINYL CHLORIDE IN GROUNDWATER

An initial groundwater investigation would be conducted for Alternative AOC 23-4 to refine the extent of vinyl chloride concentrations above the preliminary RG in groundwater. The scope of the groundwater investigation would be identical to that described for Alternative AOC 23-2 (Section 11.6.2.1).

11.6.3.2 *IN SITU* CHEMICAL OXIDATION

Alternative AOC 23-4 includes ISCO treatment of soil in the vicinity of RI boring A23SB22, where vinyl chloride was reported at a concentration of 210 µg/kg in one soil sample collected between 5 and 6 feet bgs. This alternative also includes ISCO treatment of groundwater impacted with vinyl chloride, using the modified Fenton's process described in Section 9. For RI/FS cost estimating purposes, it is assumed that treatment would occur over two areas with an approximate total area of 80,000 square feet (Figure 11-10). Alternative AOC 23-4 would employ an estimated 115 injection points with spacing of 30 feet on center (99 injection points at EBS Parcels 123 and 124, and 16 injection points south of EBS Parcel 125). The assumed dose rate for ISCO is 400 gallons per injection point (Haskins, pers. com. 2006). Measures to minimize possible contaminant migration during injection would be developed in the remedial design stage. The injections would be performed using direct-push drilling technology and applied via gravity through temporary injection screens. For RI/FS cost estimating purposes, it is assumed that the injections would focus on an approximately 10-foot-thick treatment zone for ISCO. The treatment interval may be refined based on results of the initial groundwater investigation. Performance of the process would be evaluated through groundwater sampling and analysis.

Although the ISCO process should provide active treatment, no pilot-scale testing is assumed to be necessary. The modified Fenton's process was recently performed successfully at IR Site 9. Pilot-scale testing is not considered necessary at IR Site 35 because of this local experience. Under Alternative AOC 23-4, there is the potential for mobilization of dissolved metals to groundwater when implementing the ISCO process. However, ISCO has already been implemented successfully at numerous Alameda Point sites.

11.6.3.3 EFFECTIVENESS SAMPLING FOR VINYL CHLORIDE

After ISCO treatment, it is assumed for RI/FS purposes that vinyl chloride concentrations would decrease rapidly to levels below the preliminary RG within 6 months. Performance monitoring of the ISCO treatment is included as a part of this alternative to verify the ISCO treatment effectiveness. The actual monitoring program would be

designed during the remedial design phase of the project and evaluated once results of the first few rounds of sampling (after the initial groundwater investigation and monitoring well installation) are available for review. For RI/FS cost estimating purposes, it is assumed that the five new monitoring wells would be used for monitoring. Figure 11-9 shows the proposed monitoring locations.

For Alternative AOC 23-4, the ISCO performance monitoring program would include sampling of five new monitoring wells for VOCs, dissolved metals, and field parameters (i.e., ferrous iron, conductivity, temperature, turbidity, pH, ORP, and DO). Groundwater sampling and analysis would be performed prior to and following the ISCO reagent injection to evaluate remediation progress for a total of 6 months. For cost estimating purposes, it is assumed that the duration of ISCO performance monitoring is 2 years. The sampling would occur bimonthly for the first 6 months, quarterly for the remainder of the first year, and annually for the second year. It is also assumed that contaminant concentrations would have declined to below the preliminary RG at that time.

11.6.3.4 CLOSEOUT REPORT

Because ISCO treatment is assumed to reduce vinyl chloride concentrations to levels below the preliminary RG within 6 months, and Alternative AOC 23-4 has a duration of only 2 years, periodic reviews would not need to be performed every 5 years. At the end of year 2, a project closeout report would be prepared.

11.6.3.5 EVALUATION BY CRITERIA

This subsection provides a discussion of Alternative AOC 23-4 relative to the threshold criteria. Evaluation of this alternative relative to the balancing criteria is presented in Table 11-17. A cost estimate summary is presented in Table 11-19. Cost estimate details and assumptions are presented in Appendix L.

Overall Protection of Human Health and the Environment

Alternative AOC 23-4 would be protective of human health and the environment. The ISCO process should significantly reduce vinyl chloride concentrations in groundwater at AOC 23. Performance monitoring would track the overall performance of the remedy. No ICs would be implemented for this alternative.

Compliance With Applicable or Relevant and Appropriate Requirements

Alternative AOC 23-4 is expected to meet the potential chemical-, location-, and action-specific ARARs. Potential ARARs associated with this alternative have been evaluated and identified in Appendix K. ARARs associated with this alternative are the same as those identified for Alternative AOC 1-5 (Section 11.5.4.5).

11.7 COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES

This subsection compares the relative performance of the remedial alternatives considered in this RI/FS Report against the NCP evaluation criteria described in Section 11.1. The

soil alternatives evaluated in Sections 11.2 through 11.4 and the groundwater alternatives evaluated in Sections 11.5 and 11.6 provide a wide range of options for remediation of soil and groundwater at IR Site 35. These alternatives were developed after consideration of the requirements of the NCP, U.S. EPA technical guidance (U.S. EPA 1988), the statutory preferences listed in CERCLA Section 121(b), and preliminary RGs. This comparative analysis considers the advantages and disadvantages of each alternative and identifies key trade-offs the Navy must consider when selecting a cleanup remedy.

CERCLA Section 121(d) and the NCP at 40 C.F.R. § 300.430(f)(1)(ii) require that a cleanup remedy must protect human health and the environment and comply with ARARs, unless justification to waive a specific ARAR is provided in the final RI/FS Report. Both threshold criteria must be satisfied for a remedial alternative to be eligible for selection, unless an ARAR waiver applies. Therefore, the selection of eligible remedial alternatives will generally be based on a comparison of the alternatives with respect to satisfying the five balancing criteria and the two modifying criteria. The subsections below compare the remedial alternatives with respect to meeting the NCP threshold criteria and the balancing criteria.

The two modifying criteria (state acceptance and community acceptance) are also briefly addressed in this subsection. The Navy's more extensive evaluation of the alternatives relative to the modifying criteria will be documented in the ROD after formal comments have been received on this RI/FS Report and the proposed plan, and a final remedy selection decision is being made.

As suggested by U.S. EPA (1988), under each balancing criterion, the alternative(s) that perform best under that criterion are discussed first, and the other alternatives are discussed in the relative order in which they perform. Alternatives are rated "high," "medium," or "low" based on their performance under each criterion. For example, an alternative that was substantially easier to implement than remaining alternatives would be rated "high" in implementability. Similarly, an alternative that was significantly lower in cost than remaining alternatives would be rated "high" since it performed best overall in the cost category.

11.7.1 Remedial Alternatives for Heptachlor in Soil at AOC 3

This subsection presents a comparative analysis of the soil remedial alternatives analyzed for AOC 3. A detailed analysis of the alternatives by the balancing criteria is presented in Table 11-1.

11.7.1.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternative AOC 3-1 does not meet the threshold criterion of overall protection of human health and the environment because this alternative would leave impacted soil on-site and provide no measures to limit human exposure. Human-health risks would remain from concentrations of heptachlor above the risk management range. Alternatives AOC 3-2 and AOC 3-3 meet the threshold criterion for overall protection of human health and the environment.

11.7.1.2 COMPLIANCE WITH ARARs

ARARs are not applicable to Alternative AOC 3-1. For Alternative AOC 3-2, preventing the downward entry of water (i.e., surface water infiltration) is not an objective of the alternative. The Navy would comply with substantive closure and postclosure requirements of the soil cover, including maintenance of the integrity of the cover. For Alternative AOC 3-3, the Navy would comply with the RCRA requirements for identification and management of solid and hazardous wastes. Alternatives AOC 3-2 and AOC 3-3 meet the threshold criterion of compliance with ARARs.

11.7.1.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternative AOC 3-3 was rated high in long-term effectiveness because all impacted soil would be removed. Alternative AOC 3-2 was rated medium in long-term effectiveness and permanence because this alternative requires ICs and long-term management of contaminants.

11.7.1.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

Alternative AOC 3-3 was rated medium in reduction of toxicity, mobility, or volume through treatment. Some of the excavated waste would likely be treated off-site, which would necessitate on-site staging and segregation of the wastes, and engineering controls. Prior to off-site disposal, hazardous wastes would be treated as required to meet LDRs. Nonhazardous wastes would not be treated.

Alternative AOC 3-2 was rated low in reduction of toxicity, mobility, or volume through treatment because this alternative does not involve active treatment processes that would reduce the toxicity or volume of heptachlor in impacted soil. Mobility of impacted soil would be reduced with a soil cover.

11.7.1.5 SHORT-TERM EFFECTIVENESS

Alternative AOC 3-3 was rated high in short-term effectiveness because this alternative would not take a significant amount of time to implement. Once completed, this alternative would eliminate exposure to impacted soil. No ICs or long-term management would be required.

Alternative AOC 3-2 was rated medium in short-term effectiveness because ICs would be implemented for the life of the project. Long-term cover maintenance, monitoring, and reporting would also be required.

11.7.1.6 IMPLEMENTABILITY

Alternative AOC 3-3 was rated high in implementability because this alternative has been performed in the past at Alameda Point, can be easily accomplished, and involves a limited volume of soil. Alternative AOC 3-2 was rated medium in implementability because, although the soil cover would be relatively easy to design and construct, this

alternative would include ICs that restrict excavations and other actions that could damage the cover.

11.7.1.7 COST

Both alternatives AOC 3-2 and AOC 3-3 were rated medium in the cost comparison.

11.7.1.8 STATE ACCEPTANCE

This criterion evaluates remedial alternatives with respect to the concerns of state regulatory agencies. The state of California has reviewed and commented on this RI/FS Report. Agency comments on the draft RI/FS Report have been addressed and included in this RI/FS Report (Appendix M). State responses will be considered when revising this report. State comments will also be considered in finalizing the proposed plan and ROD.

11.7.1.9 COMMUNITY ACCEPTANCE

This criterion assesses issues of concern to the community for each remedial alternative. Comments were solicited from community members during the public review period for this RI/FS Report. No comments were received from the Restoration Advisory Board on the draft RI/FS Report. Comments made during public and regulatory agency review of this document will be evaluated during the remedy selection process. As required by the NCP and U.S. EPA guidance, comments will also be addressed in the proposed plan as well as the ROD.

11.7.1.10 COMPARATIVE ANALYSIS

Alternative AOC 3-3 was rated highest overall in satisfying the balancing criteria. This alternative was judged to be the most effective in the long- and short-term, and more implementable than Alternative AOC 3-2. Both alternatives are comparable in cost.

11.7.2 Remedial Alternatives for Lead in Soil at AOCs 10 and 12

This subsection presents a comparative analysis of the soil remedial alternatives analyzed for AOCs 10 and 12. A detailed analysis of the alternatives by the balancing criteria is presented in Table 11-4.

11.7.2.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternative AOC 10/12-1 is considered protective of human health and the environment. Average lead concentrations and EPCs at each AOC are below the preliminary RG for lead. Alternatives AOC 10/12-2 and AOC 10/12-3 also meet the threshold criterion for overall protection of human health and the environment.

11.7.2.2 COMPLIANCE WITH ARARs

ARARs are not applicable to Alternative AOC 10/12-1. Alternatives AOC 10/12-2 and AOC 10/12-3 meet the threshold criterion of compliance with ARARs, as discussed for the AOC 3 alternatives (Section 11.7.1.2).

11.7.2.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternative AOC 10/12-3 was rated high in long-term effectiveness and permanence because soil with lead at a concentration above the preliminary RG would be removed. Alternative AOC 10/12-2 was rated medium in long-term effectiveness and permanence because only impacted soil in unpaved areas would be removed, and this alternative includes ICs.

Alternative AOC 10/12-1 was rated low in long-term effectiveness and permanence.

11.7.2.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

Alternatives AOC 10/12-2 and AOC 10/12-3 were rated medium in reduction of toxicity, mobility, or volume through treatment. Some of the excavated waste would likely be treated off-site. Prior to off-site disposal, hazardous wastes would be treated as required to meet LDRs. Nonhazardous wastes would not be treated.

Alternative AOC 10/12-1 was rated low in this criterion. No reduction in toxicity, mobility, or volume of impacted soil would be accomplished by the no further action alternative.

11.7.2.5 SHORT-TERM EFFECTIVENESS

Alternative AOC 10/12-3 was rated high in short-term effectiveness because this alternative would not take a significant amount of time to implement and the volume of soil involved is limited. Once completed, this alternative would eliminate exposure to impacted soil. No ICs or long-term management would be required.

Alternative AOC 10/12-2 was rated medium in short-term effectiveness because ICs would be implemented for the project life. Long-term monitoring and reporting would also be required for ICs.

Alternative AOC 10/12-1 was rated low in short-term effectiveness.

11.7.2.6 IMPLEMENTABILITY

Alternative AOC 10/12-1 was rated high in implementability because no further action would be taken. Alternative AOC 10/12-3 was also rated high in implementability because actions associated with these alternatives have been performed in the past at Alameda Point and can be easily accomplished. Alternative AOC 10/12-2 was rated medium in implementability because of the long-term ICs that would be implemented for the project life.

11.7.2.7 COST

Alternative AOC 10/12-1 was rated high in the cost criterion because no costs are incurred. Alternative AOC 10/12-3 was rated medium in the cost criterion because it would cost less than Alternative AOC 10/12-2.

11.7.2.8 STATE ACCEPTANCE

Agency comments on this RI/FS Report have been addressed as discussed in Section 11.7.1.8.

11.7.2.9 COMMUNITY ACCEPTANCE

Comments received from the community on remedial alternatives will be addressed as discussed in Section 11.7.1.9.

11.7.2.10 COMPARATIVE ANALYSIS

Alternative AOC 10/12-3 was rated highest overall in satisfying the balancing criteria. This alternative was judged to be the most effective in the long- and short-term, and less costly than the other active remedial alternative (Alternative AOC 10/12-2).

11.7.3 Remedial Alternatives for PAHs in Soil at IR Site 35

This subsection presents a comparative analysis of the soil remedial alternatives analyzed for the PAH Areas in IR Site 35. A detailed analysis of the alternatives by the balancing criteria is presented in Table 11-7.

11.7.3.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternative PAH-1 would be protective of human health and the environment based on the results of remedial investigations conducted at IR Site 35, because PAH-related human-health risks are within the risk management range. Alternatives PAH-2, PAH-3a, PAH-3b, PAH-4a, and PAH-4b also meet the threshold criterion for overall protection of human health and the environment.

11.7.3.2 COMPLIANCE WITH ARARs

ARARs are not applicable to Alternative PAH-1. Alternatives PAH-2, PAH-3a, PAH-3b, PAH-4a, and PAH-4b meet the threshold criterion of compliance with ARARs, as discussed for the AOC 3 alternatives (Section 11.7.1.2).

11.7.3.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternatives PAH-4a and PAH-4b were rated high in long-term effectiveness and permanence. Comparison of these two alternatives shows that Alternative PAH-4b would be more effective because all identified soil with B(a)P equivalent concentrations above the preliminary RG from 0 to 4 feet bgs would be removed. Alternative PAH-4a would only remove identified soil with B(a)P equivalent concentrations above the preliminary

RG at a depth of 0 to 4 feet bgs in unpaved areas. Remaining impacted soil in paved areas would not be excavated under Alternative PAH-4a, but existing hardscape and buildings in these areas would be maintained to prevent public exposure. Compared to Alternative PAH-4b, this alternative would require ICs and long-term management of remaining impacted soil.

Alternatives PAH-2, PAH-3a, and PAH-3b were rated medium in long-term effectiveness and permanence. In this group, Alternative PAH-3b would be the most effective because all identified soil with B(a)P equivalent concentrations above the preliminary RG from 0 to 2 feet bgs would be removed. Alternative PAH-3a would only remove soil with B(a)P equivalent concentrations above the preliminary RG at a depth of 0 to 2 feet bgs in unpaved areas. Under Alternative PAH-2, ICs would be put in place to manage soil under buildings and hardscapes; no excavations of impacted soil would be performed.

Alternative PAH-1 was rated low in long-term effectiveness and permanence relative to other PAH alternatives because this alternative would not provide any further measures to reduce the risk of exposure to soil with B(a)P equivalent concentrations above the preliminary RG. However, residual cancer risk is within the risk management range, and HIs are below 1.

11.7.3.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

Alternatives PAH-3a, PAH-3b, PAH-4a, and PAH-4b were rated low in reduction of toxicity, mobility, or volume through treatment. Under these alternatives, soil with B(a)P equivalent concentrations above the preliminary RG would be removed and disposed of off-site. No treatment would be performed on the excavated soil prior to disposal.

Alternatives PAH-1 and PAH-2 were also rated low in this criterion. Alternatives PAH-1 and PAH-2 would accomplish no reduction in toxicity, mobility, or volume of PAHs.

11.7.3.5 SHORT-TERM EFFECTIVENESS

Alternatives PAH-2, PAH-3a, PAH-3b, and PAH-4a were rated medium in short-term effectiveness. Compared to the other active remedial alternatives, Alternative PAH-2 would have the lowest short-term risks to workers and the community (i.e., low potential to generate dust and only approximately 20 truckloads of clean fill soil to be transported through the community). Alternatives PAH-3a, PAH-3b, and PAH-4a would result in more impacts to workers and the community. Alternative PAH-4b would result in the highest potential to generate dust and would require approximately 1,200 truckloads of excavated impacted soil and clean fill soil to be driven through the community; therefore, this alternative was rated low in this category. Under Alternatives PAH-2, PAH-3a, PAH-3b, and PAH-4a, ICs would be implemented. Long-term reporting would also be required for ICs.

Alternative PAH-1 was rated low in short-term effectiveness because some soil with concentrations above the preliminary RG would remain without restrictions to manage potential future exposure if hardscapes are removed.

11.7.3.6 IMPLEMENTABILITY

Alternative PAH-1 was rated high in implementability because no action would be taken. The remaining alternatives were rated medium in this criterion. The remedial alternatives can all be readily implemented with no significant technical difficulties. The excavation of impacted soil and installation of covers have been performed in the past at Alameda Point.

Compared to the other active remedial alternatives, Alternative PAH-2 was rated high because it would take the least amount of time to implement; no soil excavations would be performed. Alternatives PAH-3a and PAH-3b would require additional time to implement. Alternatives PAH-4a and PAH-4b would take a significant amount of time to implement because of the larger volumes of impacted soil that would be excavated and disposed of off-site. Under Alternatives PAH-2, PAH-3a, PAH-3b, and PAH-4a, ICs would be implemented for the project life. Long-term reporting would also be required for ICs. Under Alternative PAH-4b, ICs would not be implemented, but hardscapes and buildings would need to be removed to allow excavation to occur. Alternatives PAH-2, PAH-3a, PAH-3b, PAH-4a, and PAH-4b were all rated medium in implementability.

11.7.3.7 COST

Alternative PAH-1 was rated high in the cost criterion because no costs are incurred. Alternative PAH-2, PAH-3a, and PAH-3b were rated medium because these alternatives would cost less than Alternatives PAH-4a and PAH-4b. Alternatives PAH-4a and PAH-4b would incur the largest cost to complete; therefore, these alternatives were rated low in the cost criterion.

11.7.3.8 STATE ACCEPTANCE

Agency comments on this RI/FS Report have been addressed as discussed in Section 11.7.1.8.

11.7.3.9 COMMUNITY ACCEPTANCE

Comments received from the community on remedial alternatives will be addressed as discussed in Section 11.7.1.9.

11.7.3.10 COMPARATIVE ANALYSIS

Alternatives PAH-1, PAH-2, PAH-3a, PAH-3b, and PAH-4a were rated comparably in satisfying the balancing criteria. Alternative PAH-4b was rated lowest.

11.7.4 Remedial Alternatives for Naphthalene in Groundwater at AOC 1

This subsection presents a comparative analysis of the groundwater remedial alternatives for AOC 1. A detailed analysis of the alternatives by the balancing criteria is presented in Table 11-13.

11.7.4.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Because cancer risk associated with naphthalene in groundwater is within the risk management range, Alternative AOC 1-1 may be considered protective of human health and the environment. Alternatives AOC 1-2, AOC 1-3, and AOC 1-5 meet the threshold criterion for overall protection of human health and the environment.

11.7.4.2 COMPLIANCE WITH ARARs

ARARs are not applicable to Alternative AOC 1-1.

Wastes generated during the activities listed below would be subject to the substantive provisions of potential RCRA ARARs to determine whether such wastes should be classified as hazardous:

- groundwater monitoring under Alternatives AOC 1-2, AOC 1-3, and AOC 1-5
- soil excavation and dewatering under Alternative AOC 1-3
- installation of chemical injection points under Alternative AOC 1-5
- initial groundwater investigation under Alternatives AOC 1-2, AOC 1-3, and AOC 1-5

The substantive provisions of potential waste management ARARs for storing, labeling, and manifesting material for final treatment or disposal would be followed for Alternatives AOC 1-2, AOC 1-3, and AOC 1-5 if the wastes were found to be RCRA or non-RCRA hazardous waste. The substantive provisions of the UIC program are potential federal ARARs for Alternative AOC 1-5.

Alternatives AOC 1-2, AOC 1-3, and AOC 1-5 meet the threshold criterion of compliance with ARARs.

11.7.4.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternatives AOC 1-3 and AOC 1-5 were rated high in long-term effectiveness because removal of soil and groundwater in the source area and/or treatment of the source area groundwater using ISB or ISCO should be effective in reducing naphthalene concentrations in groundwater. Alternative AOC 1-2 was rated medium in long-term effectiveness and permanence because this alternative includes ICs and long-term management of contaminants. Alternative AOC 1-1 was rated low because no action would be taken.

11.7.4.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

Alternatives AOC 1-3 and AOC 1-5 were rated high in reduction of toxicity, mobility, or volume through treatment. Both alternatives involve active treatment processes that would reduce the toxicity or volume of naphthalene in impacted groundwater.

Alternative AOC 1-2 was rated medium in reduction of toxicity, mobility, or volume through treatment because this alternative does not involve active treatment processes that would reduce the toxicity or volume of naphthalene in impacted groundwater. The naphthalene concentrations would continue to decrease through natural attenuation processes, which would be verified through groundwater monitoring.

Alternative AOC 1-1 was rated low in reduction of toxicity, mobility, or volume through treatment because this alternative does not involve active treatment or monitoring to verify if contaminant concentrations are decreasing through natural attenuation processes.

11.7.4.5 SHORT-TERM EFFECTIVENESS

All alternatives (AOC 1-1, AOC 1-2, AOC 1-3, and AOC 1-5) were rated medium in short-term effectiveness. The overall time to reach preliminary RGs in the source area is expected to be longer for Alternatives AOC 1-1 and AOC 1-2 than for the other alternatives; however, there would be minimal short-term risks to the community and environment or potential impacts to workers under these alternatives. The preliminary RGs at AOC 1 are expected to be achieved more quickly for Alternatives AOC 1-3 and AOC 1-5 than for the other alternatives; however, they both pose some risk to site workers. In addition, for Alternative AOC 1-5, hazardous reagents must be transported through the community.

11.7.4.6 IMPLEMENTABILITY

Alternatives AOC 1-1 and AOC 1-2 were rated high in implementability. Under Alternative AOC 1-1, no action would be taken. Under Alternative AOC 1-2, groundwater monitoring and ICs are readily implementable.

Alternatives AOC 1-3 and AOC 1-5 were rated medium in implementability. Under Alternative AOC 1-3, the excavation of the source area would provide some challenges because the source area is expected to be located in saturated soil. In addition, dewatering and the associated treatment and discharge of water extracted during dewatering can be accomplished but may prove difficult. Under Alternative AOC 1-5, there is the potential for temporary mobilization of dissolved metals to groundwater when implementing the ISCO process. However, ISCO has already been implemented successfully at numerous Alameda Point sites.

11.7.4.7 COST

Alternative AOC 1-1 was rated high in the cost criterion (lowest cost) because there is no cost associated with this alternative. Alternatives AOC 1-2 and AOC 1-5 were rated

medium in the cost comparison because they would cost less than Alternative AOC 1-3, which was ranked low.

11.7.4.8 STATE ACCEPTANCE

Agency comments on this RI/FS Report have been addressed as discussed in Section 11.7.1.8.

11.7.4.9 COMMUNITY ACCEPTANCE

Comments received from the community on remedial alternatives will be addressed as discussed in Section 11.7.1.9.

11.7.4.10 COMPARATIVE ANALYSIS

Alternative AOC 1-5 was rated highest overall in satisfying the balancing criteria. This alternative was judged to be the most effective in the long and short term, more implementable, had a shorter duration to reach preliminary RGs, and was less costly than Alternative AOC 1-3.

11.7.5 Remedial Alternatives for Vinyl Chloride in Groundwater at AOC 23

This subsection presents a comparative analysis of the groundwater remedial alternatives analyzed for AOC 23. A detailed analysis of the alternatives by the balancing criteria is presented in Table 11-17.

11.7.5.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternative AOC 23-1 would not offer remedial measures to alleviate risks or prevent public exposure or environmental exposure to groundwater contamination. Because cancer risk associated with vinyl chloride in soil and groundwater is within the risk management range, Alternative AOC 23-1 may be considered protective of human health and the environment. Alternatives AOC 23-2 and AOC 23-4 also meet the threshold criterion for overall protection of human health and the environment. Alternative AOC 23-1 would be selected only if the results of monitoring well sampling (described in Section 11.6.1) indicate that vinyl chloride concentrations in representative groundwater samples are below MCLs.

11.7.5.2 COMPLIANCE WITH ARARs

ARARs are not applicable to Alternative AOC 23-1.

Wastes generated during the activities listed below would be subject to the substantive provisions of potential RCRA ARARs to determine whether such wastes should be classified as hazardous:

- groundwater monitoring under Alternatives AOC 23-2 and AOC 23-4
- installation of chemical injection points under Alternative AOC 23-4
- initial groundwater investigation under Alternatives AOC 23-2 and AOC 23-4

The substantive provisions of potential waste management ARARs for storing, labeling, and manifesting material for final treatment or disposal would be followed for Alternatives AOC 23-2 and AOC 23-4 if the wastes were found to be RCRA or non-RCRA hazardous waste.

The substantive provisions of the UIC program are potential federal ARARs for Alternative AOC 23-4.

Alternatives AOC 23-2 and AOC 23-4 meet the threshold criterion of compliance with ARARs.

11.7.5.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternative AOC 23-4 was rated high in long-term effectiveness because treatment of the source-area groundwater using ISCO should be effective in reducing vinyl chloride concentrations in groundwater. Alternative AOC 23-2 was rated medium in long-term effectiveness and permanence because this alternative includes ICs and long-term management of contaminants. Alternative AOC 23-1 was rated low because no action would be taken.

11.7.5.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

Alternative AOC 23-4 was rated high in reduction of toxicity, mobility, or volume through treatment because it involves an active treatment process that would reduce the toxicity and volume of vinyl chloride in impacted groundwater.

Alternative AOC 23-2 was rated medium in reduction of toxicity, mobility, or volume through treatment because this alternative does not involve active treatment processes that would reduce the toxicity or volume of vinyl chloride in impacted groundwater. The vinyl chloride concentrations would continue to decrease through natural attenuation processes, which would be verified through groundwater monitoring.

Alternative AOC 23-1 was rated low in reduction of toxicity, mobility, or volume through treatment because this alternative does not involve active treatment or monitoring to verify if contaminant concentrations are decreasing through natural attenuation processes.

11.7.5.5 SHORT-TERM EFFECTIVENESS

Alternatives AOC 23-2 and AOC 23-4 were rated medium in short-term effectiveness. The overall time to reach preliminary RGs in the source area is expected to be longer for Alternative AOC 23-2 than for Alternative AOC 23-4; however, there would be minimal short-term risks to the community and the environment or potential impacts to workers under Alternative AOC 23-2. The preliminary RGs at AOC 23 are expected to be

achieved more quickly for Alternative AOC 23-4 than for the other alternatives; however, it poses some risk to site workers. In addition for Alternative AOC 23-4, hazardous reagents must be transported through the community.

Alternative AOC 23-1 was rated low in short-term effectiveness because there are no protective measures associated with this alternative to mitigate domestic groundwater exposure.

11.7.5.6 IMPLEMENTABILITY

Alternatives AOC 23-1 and AOC 23-2 were rated high in implementability. Under Alternative AOC 23-1, no action would be taken. Under Alternative AOC 23-2, groundwater monitoring and ICs would be readily implementable.

Alternative AOC 23-4 was rated medium in implementability. Under Alternative AOC 23-4, there is the potential for temporary mobilization of dissolved metals to groundwater when implementing the ISCO process. However, ISCO has already been implemented successfully at numerous Alameda Point sites.

11.7.5.7 COST

Alternative AOC 23-1 was rated high in the cost criterion (i.e., it is low in cost) because there is no cost associated with this alternative. Alternative AOC 23-2 was rated medium in the cost comparison because it would cost less than Alternative AOC 23-4.

11.7.5.8 STATE ACCEPTANCE

Agency comments on this RI/FS Report have been addressed as discussed in Section 11.7.1.8.

11.7.5.9 COMMUNITY ACCEPTANCE

Comments received from the community on remedial alternatives will be addressed as discussed in Section 11.7.1.9.

11.7.5.10 COMPARATIVE ANALYSIS

Alternatives AOC 23-2 and AOC 23-4 are competitive in satisfying the balancing criteria; however, Alternative AOC 23-4 is preferable because the preliminary RGs at AOC 23 are expected to be achieved more quickly under Alternative AOC 23-4 than under Alternative AOC 23-2.

Section 12
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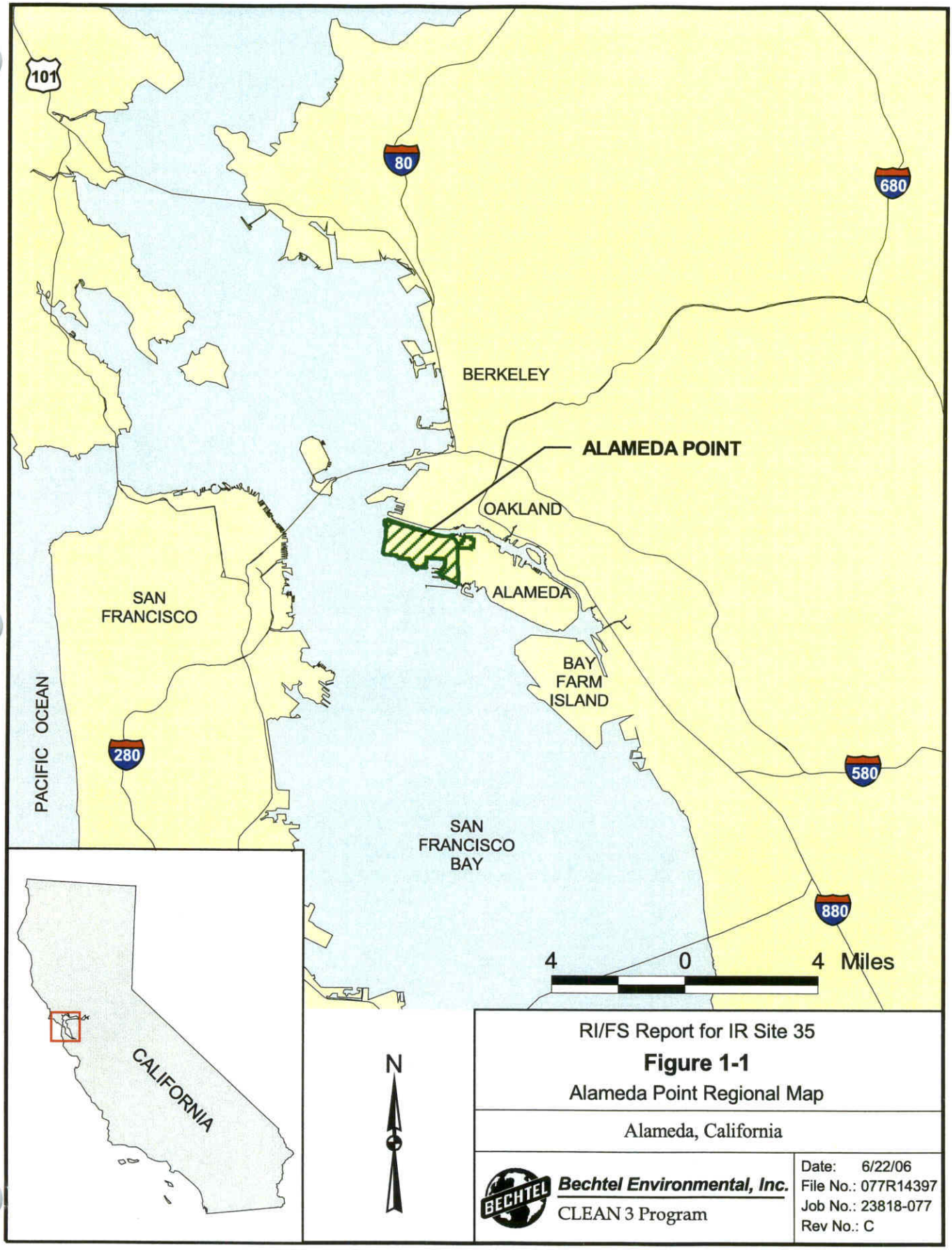
N00236.002712
ALAMEDA POINT
SSIC NO. 5090.3

FIGURES

FINAL
REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT
IR SITE 35, AREAS OF CONCERN IN TRANSFER PARCEL EDC-5

DATED 25 APRIL 2007



RI/FS Report for IR Site 35

Figure 1-1

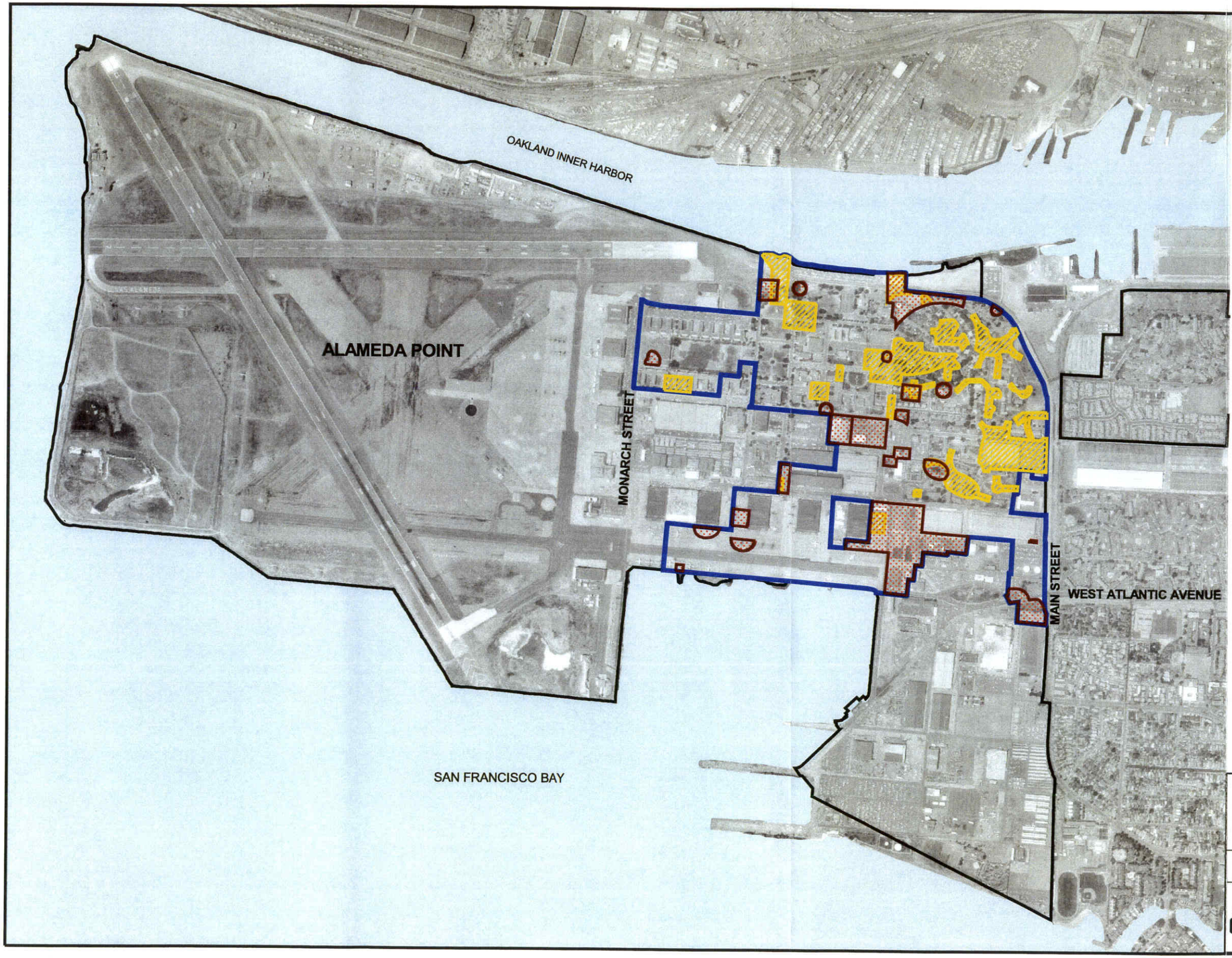
Alameda Point Regional Map

Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 6/22/06
File No.: 077R14397
Job No.: 23818-077
Rev No.: C



LEGEND

- IR SITE 35 AOCS AND DATA GAP AREAS
- IR SITE 35 PAH AREAS
- TRANSFER PARCEL EDC-5 BOUNDARY
- NAVY ONSHORE PROPERTY BOUNDARIES
- WATER

NOTES:

AOC – AREA OF CONCERN

EDC – ECONOMIC DEVELOPMENT CONVEYANCE

IR – INSTALLATION RESTORATION (PROGRAM)

PAH – POLYNUCLEAR AROMATIC HYDROCARBON

RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

N

1200 0 1200 Feet

RI/FS Report for IR Site 35

Figure 1-2

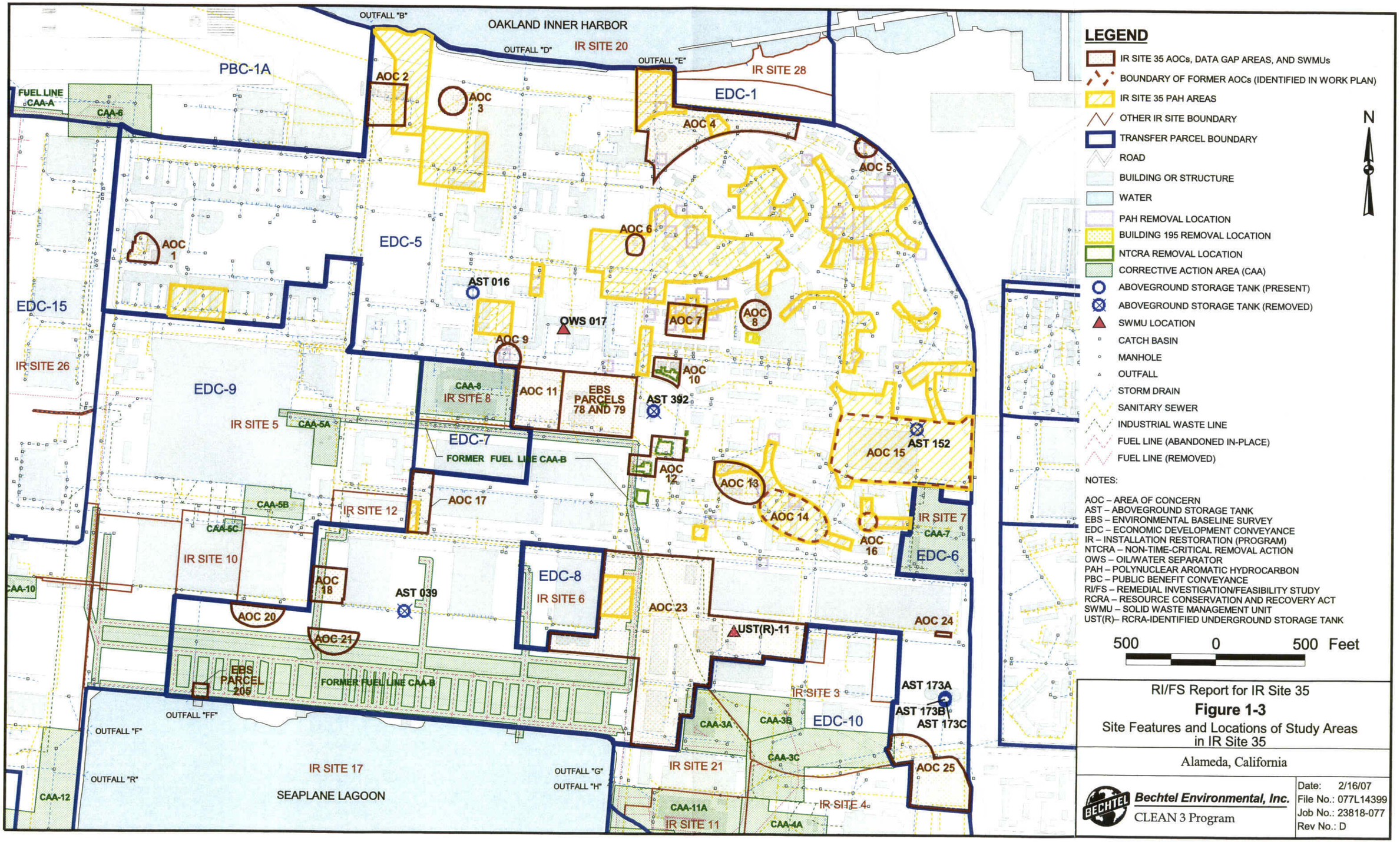
Site Location Map

Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 6/22/06
File No.: 077L14398
Job No.: 23818-077
Rev No.: C



RI/FS Report for IR Site 35

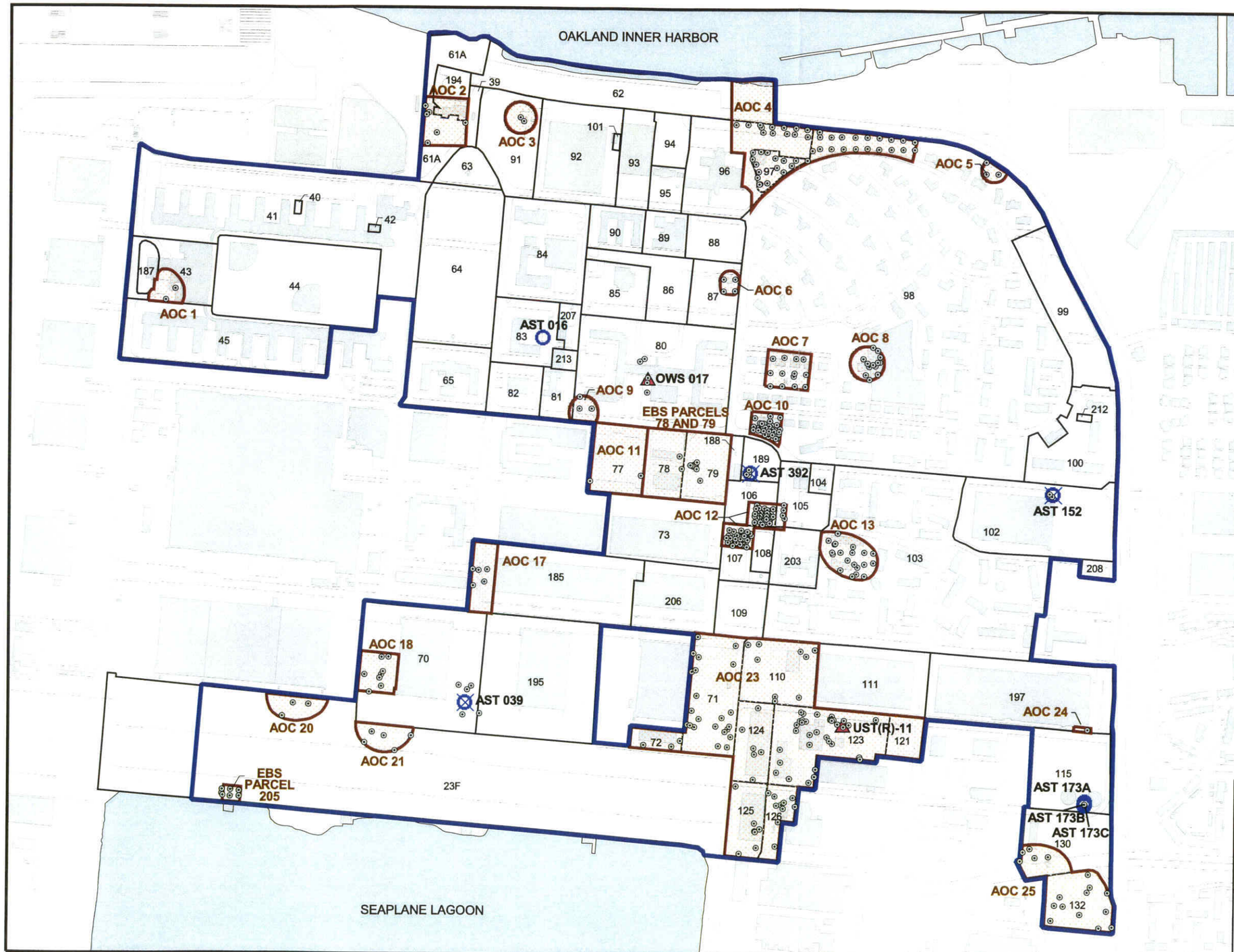
Figure 1-3

Site Features and Locations of Study Areas in IR Site 35

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 077L14399
Job No.: 23818-077
Rev No.: D



LEGEND

- IR SITE 35 AOCs, DATA GAP AREAS, AND SWMUs
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- BUILDING OR STRUCTURE
- WATER
- 98 EBS PARCEL
- ABOVEGROUND STORAGE TANK (PRESENT)
- ABOVEGROUND STORAGE TANK (REMOVED)
- SWMU LOCATION
- HISTORICAL SAMPLING LOCATION

NOTES:

AOC – AREA OF CONCERN

AST – ABOVEGROUND STORAGE TANK

EBS – ENVIRONMENTAL BASELINE SURVEY

EDC – ECONOMIC DEVELOPMENT CONVEYANCE

IR – INSTALLATION RESTORATION (PROGRAM)

OWS – OIL/WATER SEPARATOR

RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

RCRA – RESOURCE CONSERVATION AND RECOVERY ACT

SWMU – SOLID WASTE MANAGEMENT UNIT

UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK

N

500 0 500 Feet

RI/FS Report or IR Site 35

Figure 1-4

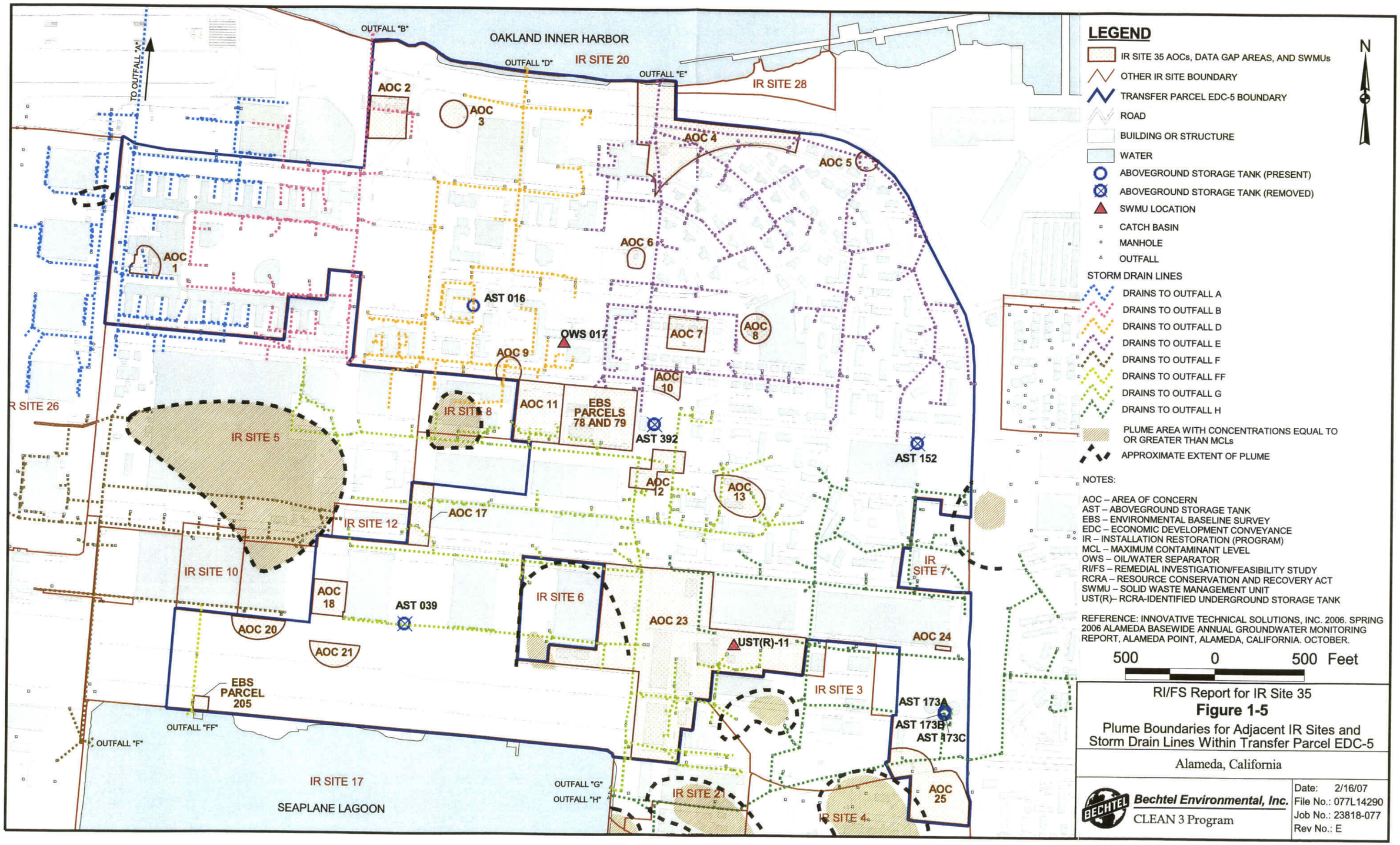
Previous Sampling Locations in IR Site 35 AOCs, Data Gap Areas, and SWMUs

Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 2/16/07
File No.: 077L14400
Job No.: 23818-077
Rev No.: D



LEGEND

- IR SITE 35 AOCs, DATA GAP AREAS, AND SWMUs
- OTHER IR SITE BOUNDARY
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- BUILDING OR STRUCTURE
- WATER
- ABOVEGROUND STORAGE TANK (PRESENT)
- ABOVEGROUND STORAGE TANK (REMOVED)
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- OUTFALL

STORM DRAIN LINES

- DRAINS TO OUTFALL A
- DRAINS TO OUTFALL B
- DRAINS TO OUTFALL D
- DRAINS TO OUTFALL E
- DRAINS TO OUTFALL F
- DRAINS TO OUTFALL FF
- DRAINS TO OUTFALL G
- DRAINS TO OUTFALL H

- PLUME AREA WITH CONCENTRATIONS EQUAL TO OR GREATER THAN MCLs
- APPROXIMATE EXTENT OF PLUME

N

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
MCL – MAXIMUM CONTAMINANT LEVEL
OWS – OIL/WATER SEPARATOR
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R)– RCRA-IDENTIFIED UNDERGROUND STORAGE TANK

REFERENCE: INNOVATIVE TECHNICAL SOLUTIONS, INC. 2006. SPRING 2006 ALAMEDA BASEWIDE ANNUAL GROUNDWATER MONITORING REPORT, ALAMEDA POINT, ALAMEDA, CALIFORNIA. OCTOBER.

500 0 500 Feet

RI/FS Report for IR Site 35

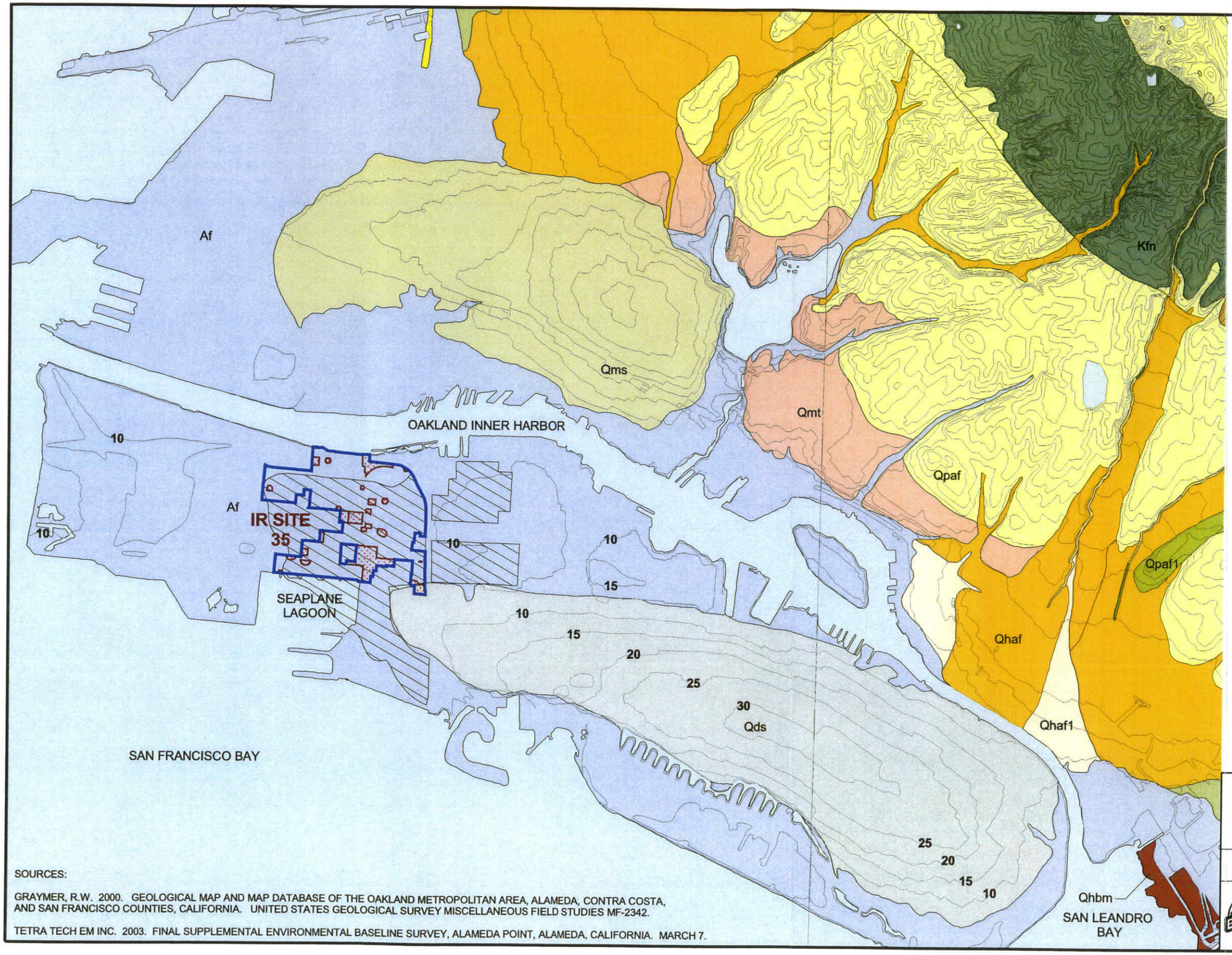
Figure 1-5

Plume Boundaries for Adjacent IR Sites and Storm Drain Lines Within Transfer Parcel EDC-5

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 077L14290
Job No.: 23818-077
Rev No.: E



LEGEND

- IR SITE 35 AOCs AND DATA GAP AREAS
- TRANSFER PARCEL EDC-5 BOUNDARY
- 10 TOPOGRAPHIC INTERVAL IN FEET ABOVE MEAN SEA LEVEL
- WATER
- Af - ARTIFICIAL FILL

QUATERNARY (Q) PERIOD:

- Qds - DUNE SAND
- Qhaf - ALLUVIAL FAN AND FLUVIAL DEPOSITS (HOLOCENE)
- Qhaf1 - YOUNGER ALLUVIAL FAN DEPOSITS (HOLOCENE)
- Qhbm - BAY MUD (HOLOCENE)
- Qms - MERRITT SAND (HOLOCENE AND PLEISTOCENE)
- Qpaf - ALLUVIAL FAN AND FLUVIAL DEPOSITS (PLEISTOCENE)
- Qpaf1 - ALLUVIAL TERRACE DEPOSITS (PLEISTOCENE)
- Qmt - MARINE TERRACE DEPOSITS (PLEISTOCENE)

CRETACEOUS (K) PERIOD:

- Kfn - SANDSTONE (LATE CRETACEOUS)
- MARSH CRUST WITHIN FORMER NAVAL AIR STATION ALAMEDA BOUNDARY

NOTES:

AOC – AREA OF CONCERN

EDC – ECONOMIC DEVELOPMENT CONVEYANCE

IR – INSTALLATION RESTORATION (PROGRAM)

RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

N

3000 0 3000 Feet

SOURCES:

GRAYMER, R.W. 2000. GEOLOGICAL MAP AND MAP DATABASE OF THE OAKLAND METROPOLITAN AREA, ALAMEDA, CONTRA COSTA, AND SAN FRANCISCO COUNTIES, CALIFORNIA. UNITED STATES GEOLOGICAL SURVEY MISCELLANEOUS FIELD STUDIES MF-2342.

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RI/FS Report for IR Site 35

Figure 2-1

Regional Topography and Geology

Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 2/16/07
File No.: 077R14403
Job No.: 23818-077
Rev No.: C

TOP OF UNIT (IN FEET BELOW GROUND SURFACE)	STRATIGRAPHIC UNITS			HYDROGEOLOGIC UNITS
0	FILL (UNDERLAIN BY MARSH CRUST AT SOME LOCATIONS)			WATER TABLE AQUIFER - NOT A PRIMARY AQUIFER (FWBZ)
5-15	BAY SEDIMENT UNIT (BSU)			AQUITARD
20-50	MERRITT SAND FORMATION			MERRITT SAND AQUIFER - A PRIMARY AQUIFER (SWBZ)
60-80	SAN ANTONIO FORMATION	UPPER UNIT	ALLUVIAL DEPOSITS	
90-120		LOWER UNIT	YERBA BUENA MUD	AQUITARD
			OTHER ESTUARINE DEPOSITS	
100-200	ALAMEDA FORMATION	UPPER CLAY-RICH PORTION		
180-220		ALLUVIAL DEPOSITS		ALAMEDA AQUIFER - PRINCIPAL REGIONAL AQUIFER
400-800	FRANCISCAN FORMATION			

NOTES:

FWBZ – FIRST WATER-BEARING ZONE
IR – INSTALLATION RESTORATION (PROGRAM)
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWBZ – SECOND WATER-BEARING ZONE

SOURCE:

TETRA TECH EM, INC. 1999. DRAFT OU-2 RI REPORT, ALAMEDA POINT, ALAMEDA, CALIFORNIA. PREPARED FOR THE UNITED STATES DEPARTMENT OF THE NAVY, ENGINEERING FIELD ACTIVITY WEST, NAVAL FACILITIES ENGINEERING COMMAND, SAN BRUNO, CALIFORNIA. JUNE 29.

RI/FS Report for IR Site 35

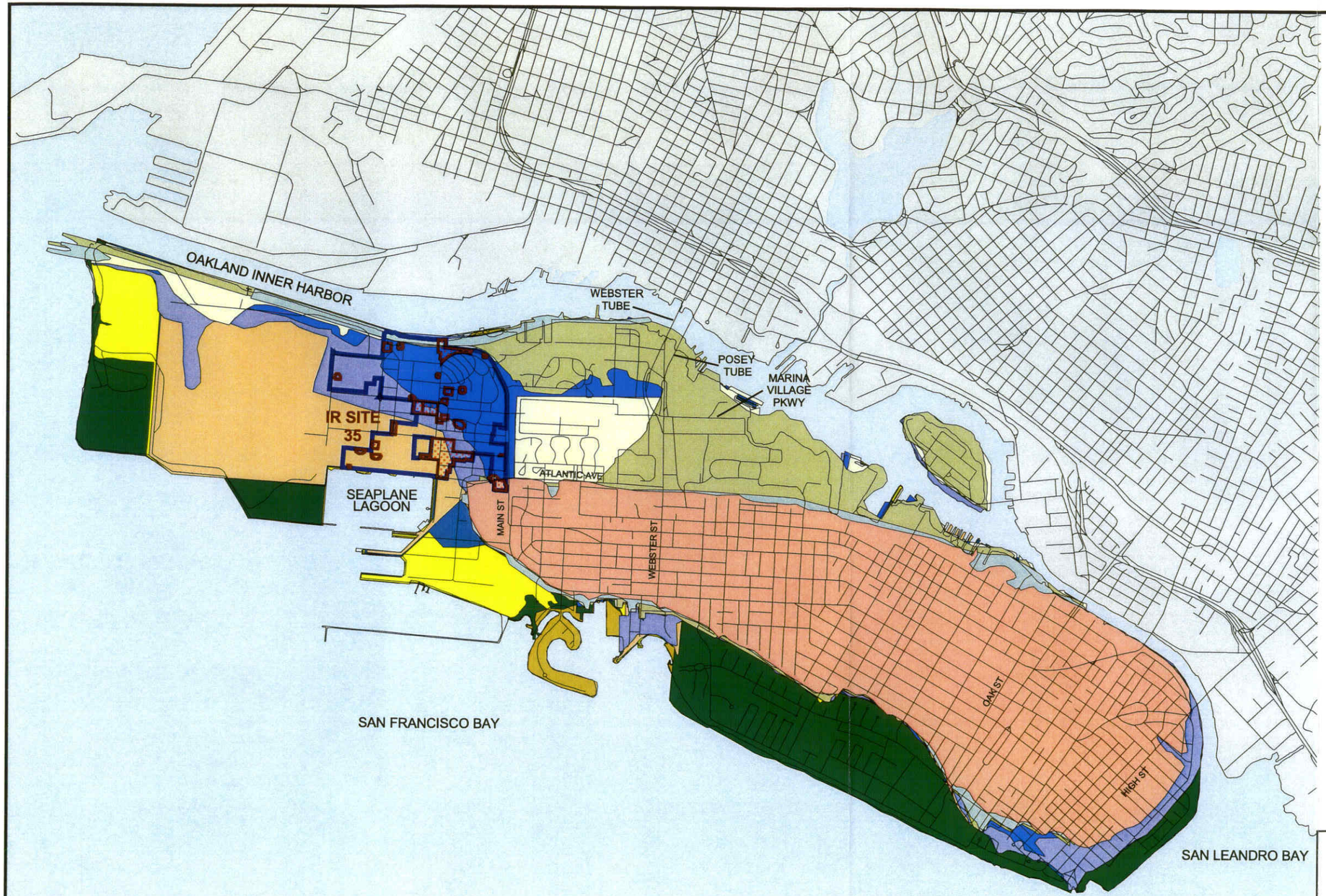
Figure 2-2

Schematic Geology and Hydrogeology of Alameda Point

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/22/06
File No: 077C14404
Job No: 23818-077
Rev No: B



LEGEND

- IR SITE 35 AOCs AND DATA GAP AREAS
- TRANSFER PARCEL EDC-5 BOUNDARY
- DRY LAND 1859
- FILL MATERIAL IN PLACE IN 1903
- FILL MATERIAL IN PLACE IN 1919
- FILL MATERIAL IN PLACE IN 1927
- FILL MATERIAL IN PLACE IN 1930
- FILL MATERIAL IN PLACE IN 1936
- FILL MATERIAL IN PLACE IN 1941
- FILL MATERIAL IN PLACE IN 1945
- FILL MATERIAL IN PLACE IN 1949
- FILL MATERIAL IN PLACE IN 1959
- FILL MATERIAL IN PLACE IN 1973
- WATER

NOTES:

AOC – AREA OF CONCERN

EDC – ECONOMIC DEVELOPMENT CONVEYANCE

IR – INSTALLATION RESTORATION (PROGRAM)

RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

N

3000 0 3000 Feet

SOURCES: UNITED STATES COAST GEODETIC SURVEY 1859, 1903, 1919, 1927, 1930, AND 1941; OAKLAND BOARD OF PORT COMMISSIONERS 1936 AND 1945; UNITED STATES GEOLOGICAL SURVEY 1949, 1959 [PHOTO REVISED 1968 AND 1973], 1980a, 1980b, 1980c, AND 1980d.

RI/FS Report for IR Site 35

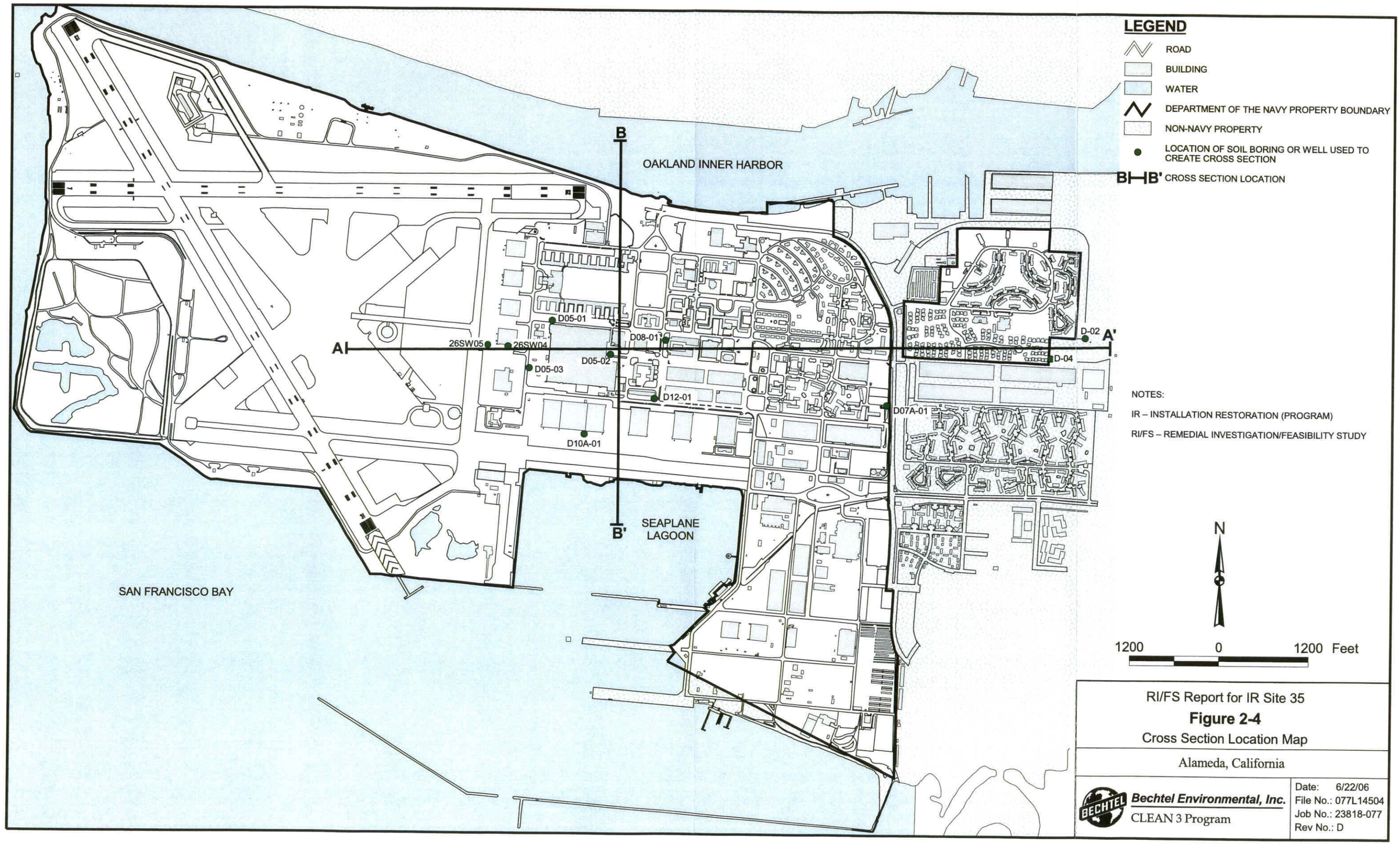
Figure 2-3

History of Artificial Fill at Alameda Island (1859-1973)

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 077L14405
Job No.: 23818-077
Rev No.: D



RI/FS Report for IR Site 35

Figure 2-4

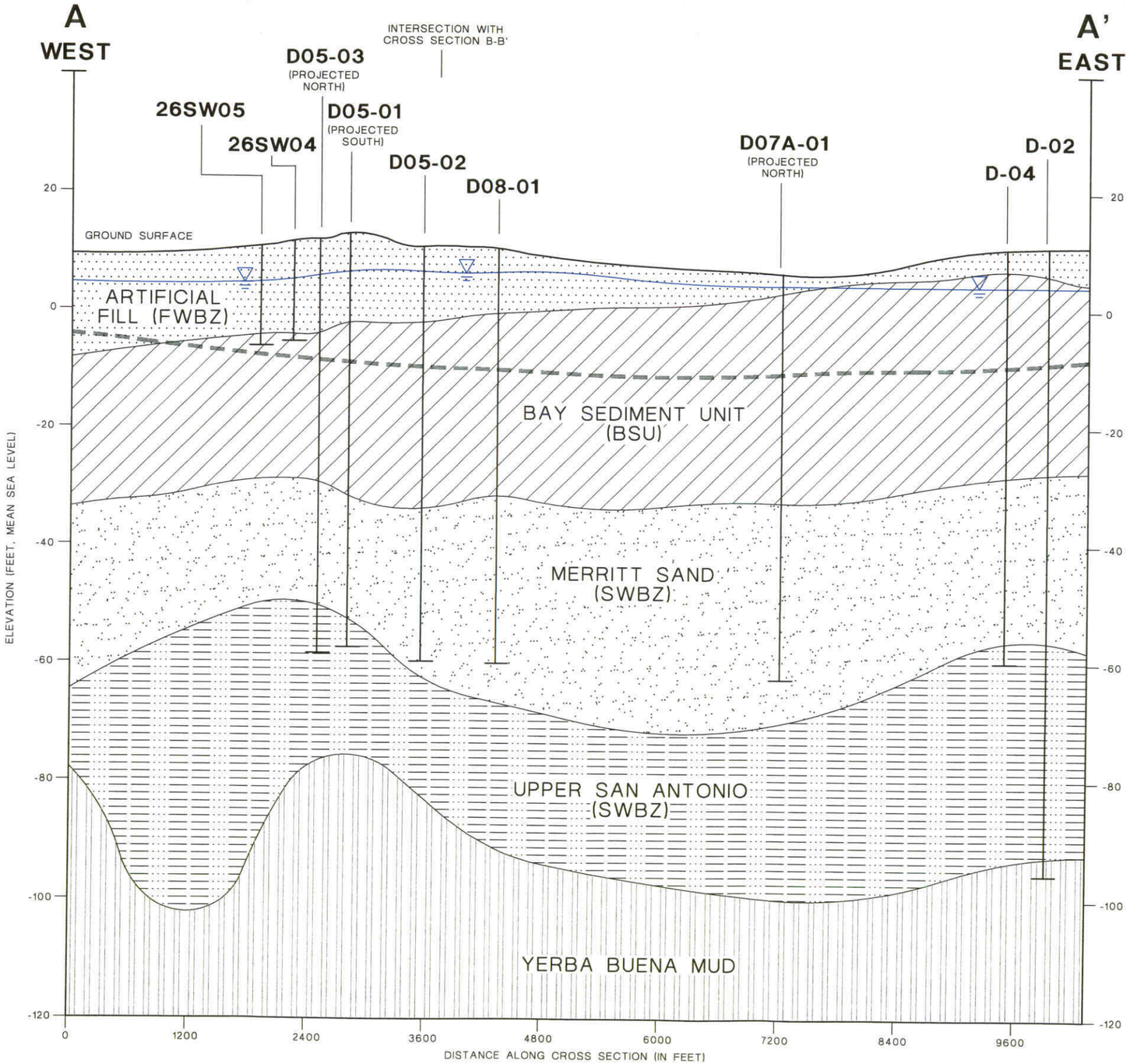
Cross Section Location Map

Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 6/22/06
File No.: 077L14504
Job No.: 23818-077
Rev No.: D



LEGEND

- FILL
- BAY SEDIMENTS
- MERRITT SAND
- UPPER SAN ANTONIO
- YERBA BUENA MUD
- WATER LEVEL
- SALINE WATER INTERFACE

NOTES:

BSU – BAY SEDIMENT UNIT
FWBZ – FIRST WATER-BEARING ZONE
IR – INSTALLATION RESTORATION (PROGRAM)
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWBZ – SECOND WATER-BEARING ZONE

SOURCES:

STRATIGRAPHIC UNIT IDENTIFICATION AND ELEVATIONS AT BOREHOLES USE THE FOLLOWING REFERENCES:

TETRA TECH EM INC. 1999. OU-2 REMEDIAL INVESTIGATION REPORT, ALAMEDA POINT, ALAMEDA, CALIFORNIA. JUNE 23.

NEPTUNE AND COMPANY, INC., INTERNATIONAL TECHNOLOGY CORPORATION, AND ENVIRON. 2002. DRAFT FINAL OU-5 REMEDIAL INVESTIGATION REPORT, ALAMEDA POINT, ALAMEDA, CALIFORNIA. JULY 12.

TOP OF YERBA BUENA MUD IS BASED ON FIGURE 2-10 FROM TETRA TECH EM INC. 1999. OU-2 REMEDIAL INVESTIGATION REPORT, ALAMEDA POINT, ALAMEDA, CALIFORNIA. JUNE 23.

BEI 2003. FINAL REMEDIAL INVESTIGATION REPORT FOR IR SITE 26, WESTERN HANGER ZONE ALAMEDA POINT, ALAMEDA, CALIFORNIA. NOVEMBER

0 20 40
VERTICAL SCALE IN FEET

0 1200 2400
HORIZONTAL SCALE IN FEET

RI/FS Report for IR Site 35

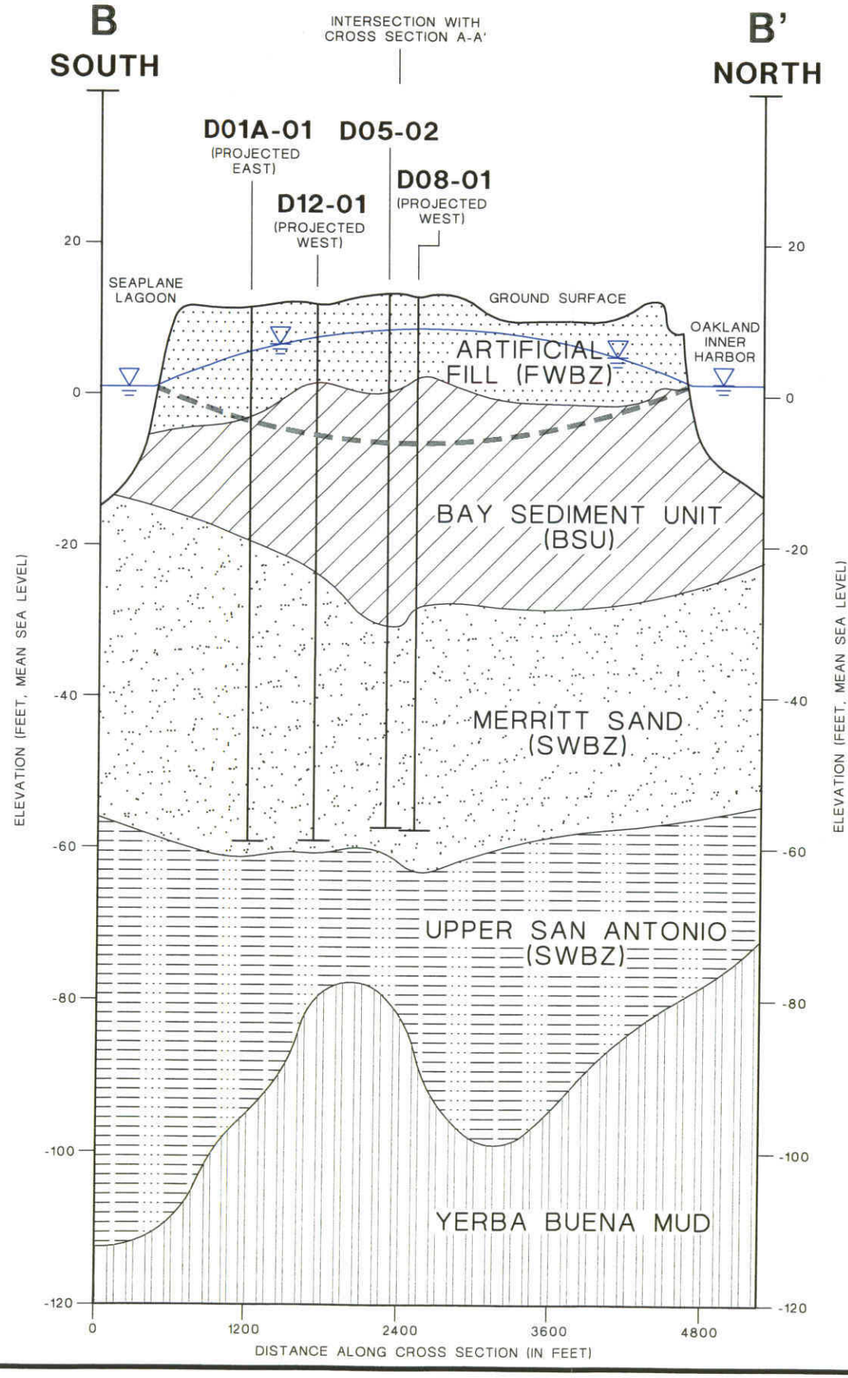
Figure 2-5

Conceptual Cross Section A-A'

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/22/06
File No: 077X14559
Job No: 23818-077
Rev No: C



LEGEND

- FILL
- BAY SEDIMENTS
- MERRITT SAND
- UPPER SAN ANTONIO
- YERBA BUENA MUD
- WATER LEVEL
- SALINE WATER INTERFACE

NOTES:

BSU – BAY SEDIMENT UNIT
FWBZ – FIRST WATER-BEARING ZONE
IR – INSTALLATION RESTORATION (PROGRAM)
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWBZ – SECOND WATER-BEARING ZONE

SOURCES:

STRATIGRAPHIC UNIT IDENTIFICATION AND ELEVATIONS AT BOREHOLES USE THE FOLLOWING REFERENCES:

TETRA TECH EM INC. 1999. OU-2 REMEDIAL INVESTIGATION REPORT, ALAMEDA POINT, ALAMEDA, CALIFORNIA. JUNE 23.

NEPTUNE AND COMPANY, INC., INTERNATIONAL TECHNOLOGY CORPORATION, AND ENVIRON. 2002. DRAFT FINAL OU-5 REMEDIAL INVESTIGATION REPORT, ALAMEDA POINT, ALAMEDA, CALIFORNIA. JULY 12.

TOP OF YERBA BUENA MUD IS BASED ON FIGURE 2-10 FROM TETRA TECH EM INC. 1999. OU-2 REMEDIAL INVESTIGATION REPORT, ALAMEDA POINT, ALAMEDA, CALIFORNIA. JUNE 23.

BEI 2003. FINAL REMEDIAL INVESTIGATION REPORT FOR IR SITE 26, WESTERN HANGER ZONE ALAMEDA POINT, ALAMEDA, CALIFORNIA. NOVEMBER

0 20 40
VERTICAL SCALE IN FEET

0 1200 2400
HORIZONTAL SCALE IN FEET

RI/FS Report for IR Site 35

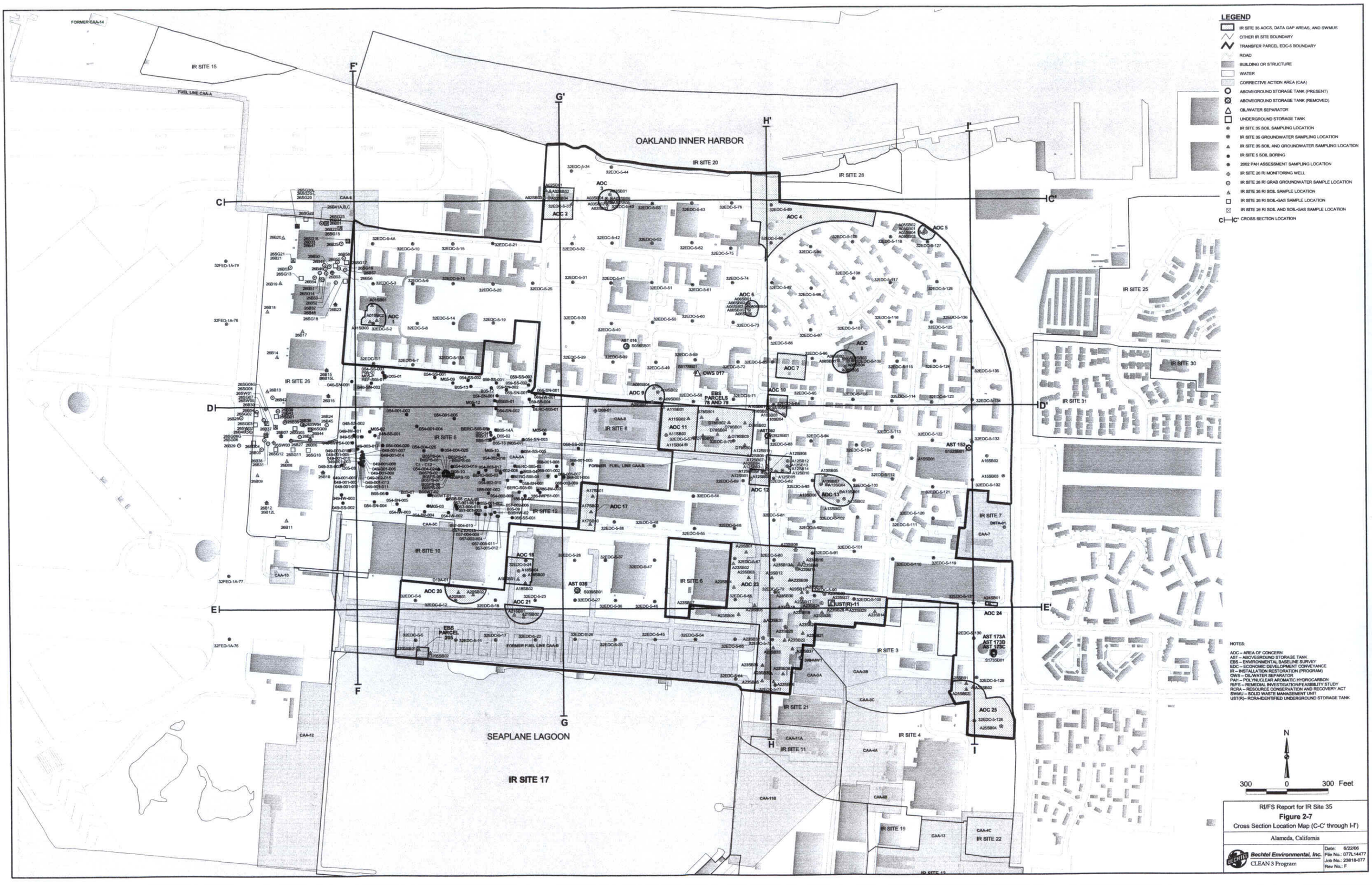
Figure 2-6

Conceptual Cross Section B-B'

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/22/06
File No: 077X14558
Job No: 23818-077
Rev No: B



LEGEND

- IR SITE 35 AOCS, DATA GAP AREAS, AND SWMUS
- OTHER IR SITE BOUNDARY
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- BUILDING OR STRUCTURE
- WATER
- CORRECTIVE ACTION AREA (CAA)
- ABOVEGROUND STORAGE TANK (PRESENT)
- ABOVEGROUND STORAGE TANK (REMOVED)
- OIL/WATER SEPARATOR
- UNDERGROUND STORAGE TANK
- IR SITE 35 SOIL SAMPLING LOCATION
- IR SITE 35 GROUNDWATER SAMPLING LOCATION
- IR SITE 35 SOIL AND GROUNDWATER SAMPLING LOCATION
- IR SITE 5 SOIL BORING
- 2002 PAH ASSESSMENT SAMPLING LOCATION
- IR SITE 26 RI MONITORING WELL
- IR SITE 26 RI GRAB GROUNDWATER SAMPLE LOCATION
- IR SITE 26 RI SOIL SAMPLE LOCATION
- IR SITE 26 RI SOIL-GAS SAMPLE LOCATION
- IR SITE 26 RI SOIL AND SOIL-GAS SAMPLE LOCATION

C—C' CROSS SECTION LOCATION

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R)– RCRA-IDENTIFIED UNDERGROUND STORAGE TANK

N

300 0 300 Feet

RI/FS Report for IR Site 35

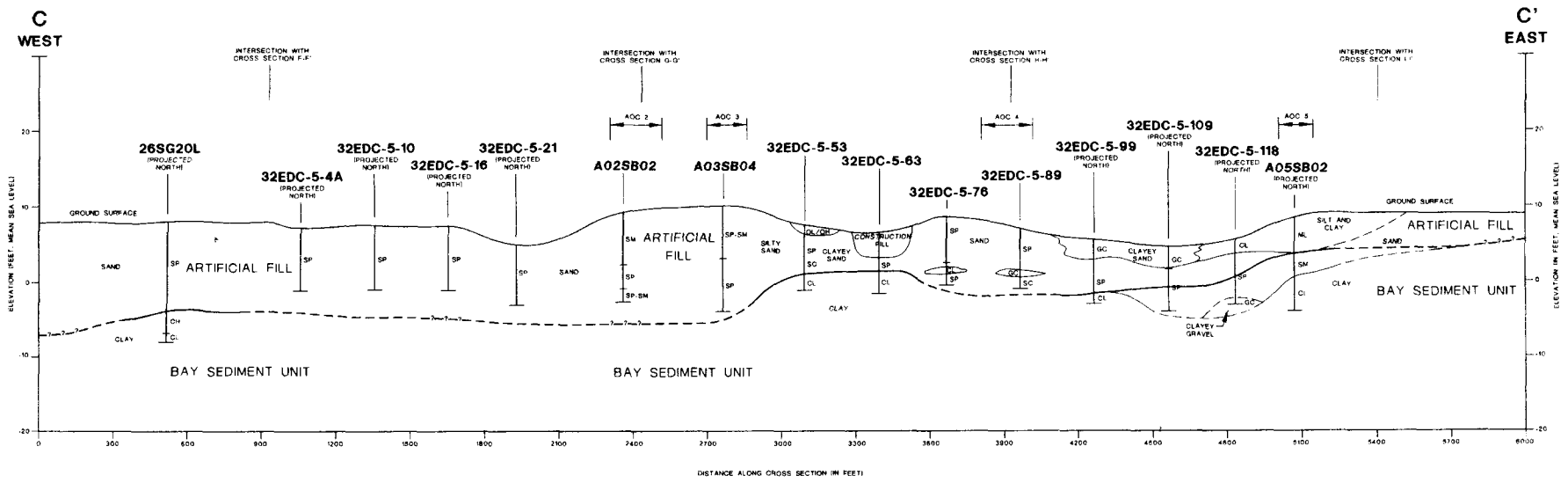
Figure 2-7

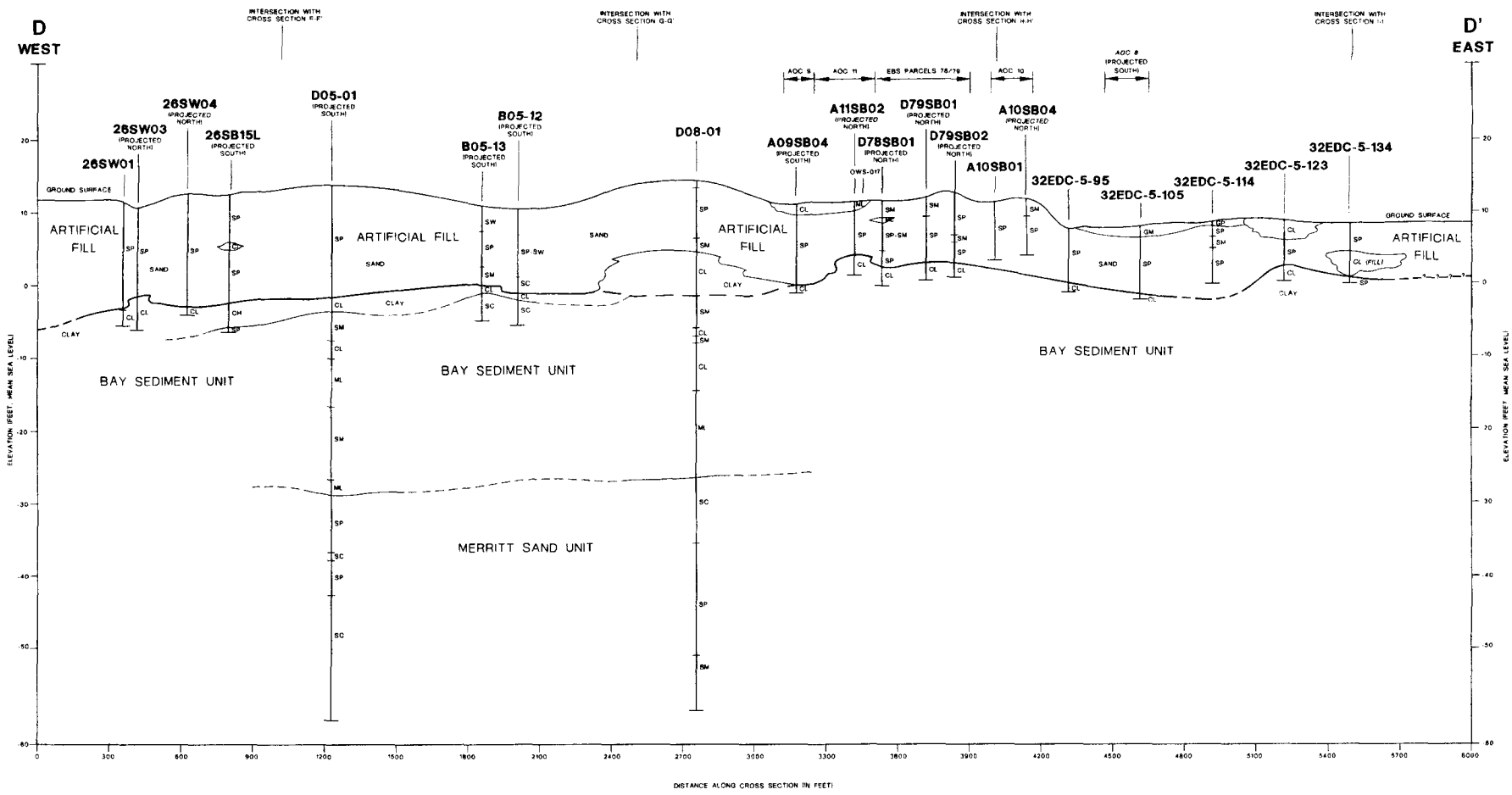
Cross Section Location Map (C-C' through I-I')

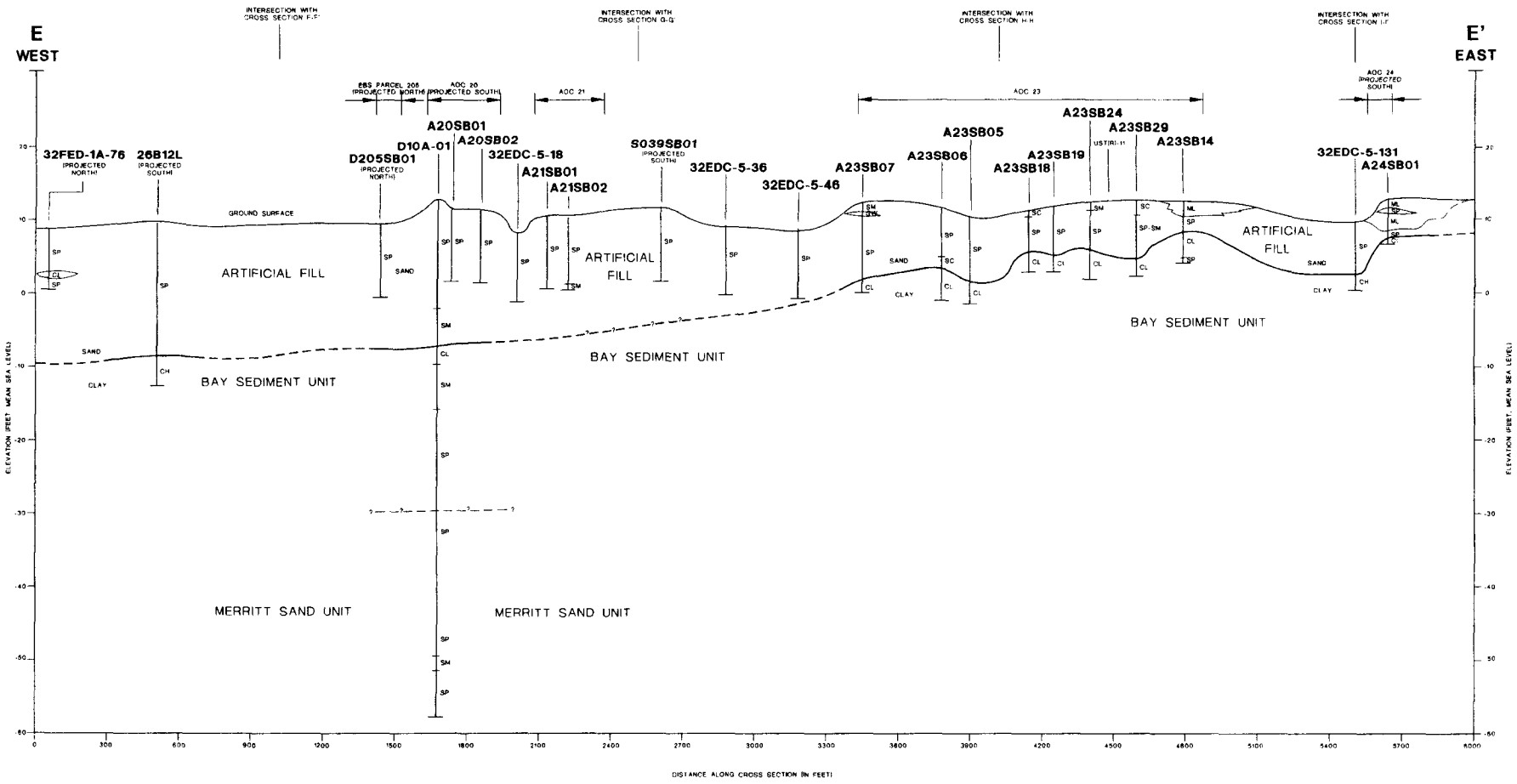
Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/22/06
File No.: 077L14477
Job No.: 23818-077
Rev No.: F







LEGEND

CONTACT BETWEEN UNITS (DASHED WHERE APPROXIMATED, QUERIED WHERE UNCERTAIN)

CONTACT BETWEEN THE ARTIFICIAL FILL AND THE BAY SEDIMENT UNIT (DASHED WHERE APPROXIMATED, QUERIED WHERE UNCERTAIN)

BORING LOCATION

GC - CLAYEY GRAVEL
CH - FAT CLAY
SP - POORLY GRADED SAND
CL - LEAN CLAY
SP-SM - POORLY GRADED SAND WITH SILT
SP-SC - POORLY GRADED SAND WITH CLAY
GP-GM - POORLY GRADED GRAVEL WITH SILT
GP - POORLY GRADED GRAVEL
SC - CLAYEY SAND
OL/OH - ORGANIC SILT AND CLAY
ML - SILT

NOTES:

IR - INSTALLATION RESTORATION (PROGRAM)

RI/FS - REMEDIAL INVESTIGATION/FEASIBILITY STUDY

SOURCES:

BEI 2005. FINAL SITE INSPECTION REPORT, TRANSFER PARCEL EDC-5, ALAMEDA POINT, ALAMEDA, CALIFORNIA, MARCH

BEI 2003. FINAL *REMEDIATION INVESTIGATION REPORT, IR SITE 26, WESTERN* HANGER ZONE, ALAMEDA POINT, ALAMEDA, CALIFORNIA, NOVEMBER

TETRA TECH EM INC. 1999. OU-2 REMEDIAL INVESTIGATION REPORT PREPARED FOR UNITED STATES DEPARTMENT OF THE NAVY, ENGINEERING FIELD ACTIVITY WEST, NAVAL FACILITIES ENGINEERING COMMAND, SAN BRUNO, CALIFORNIA. JUNE

VERTICAL SCALE IN FEET
0 10 20

HORIZONTAL SCALE IN FEET
0 300 600

RI/FS Report for IR Site 35

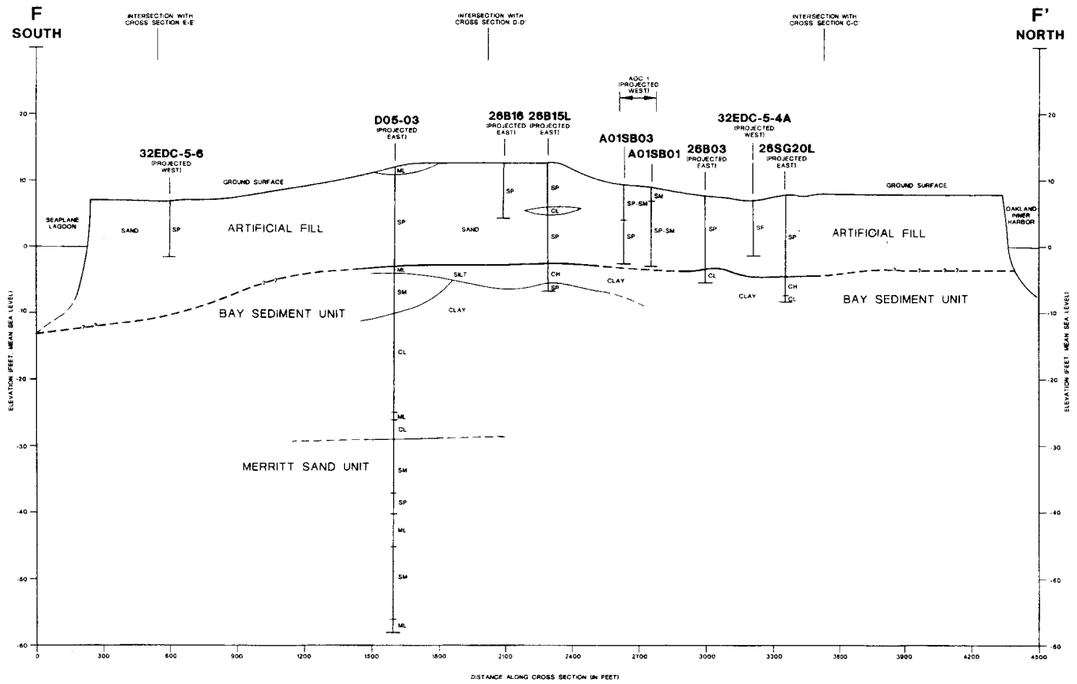
Figure 2-8

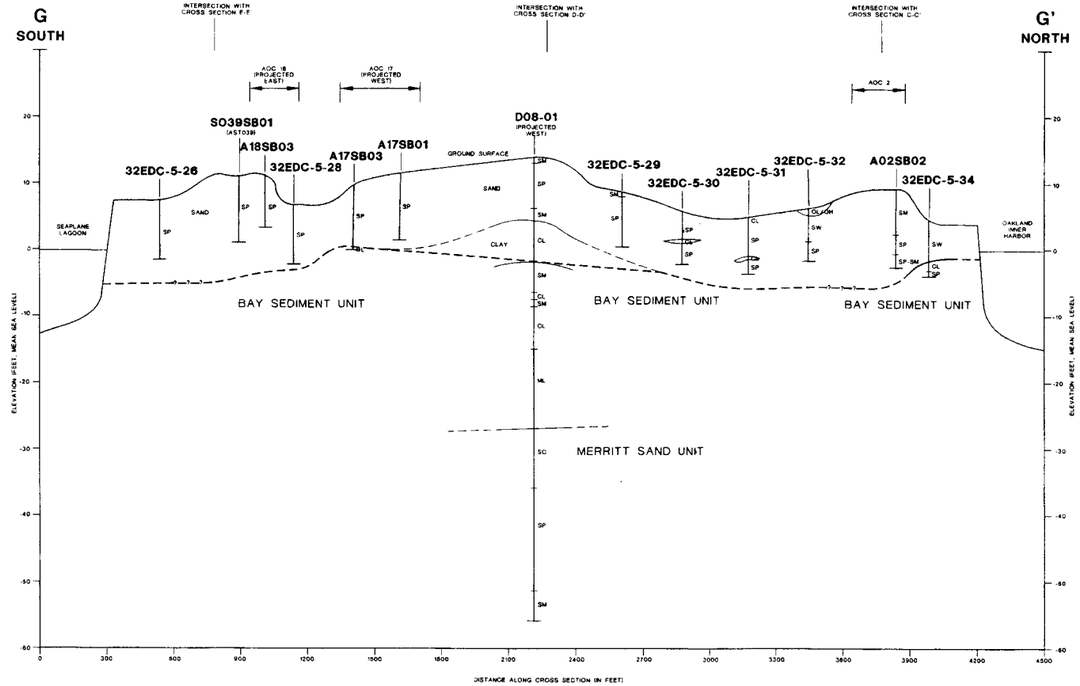
Geologic Cross Sections C-C', D-D', and E-E'

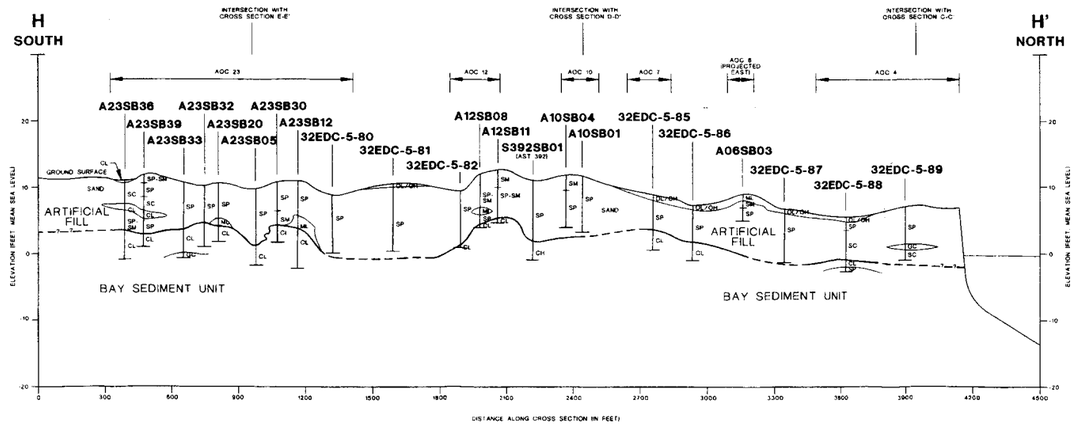
Alameda, California

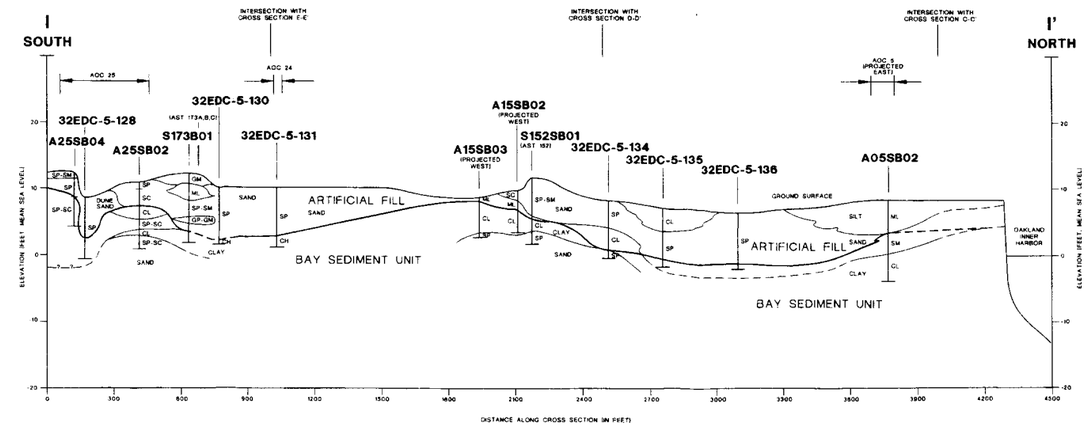
Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 1/15/07
File No: 077X14544
Job No: 23818.077
Rev No: 1









LEGEND

CONTACT BETWEEN ARTIFICIAL FILL AND BAY SEDIMENT UNITS (DASHED WHERE APPROXIMATED, QUERIED WHERE UNCERTAIN)

CONTACT BETWEEN UNITS (DASHED WHERE APPROXIMATED, QUERIED WHERE UNCERTAIN)

BORING LOCATION

GC - CLAYEY GRAVEL
CH - FAT CLAY
SP - POORLY GRADED SAND
CL - LEAN CLAY
SP-SM - POORLY GRADED SAND WITH SILT
SP-SC - POORLY GRADED SAND WITH CLAY
SP-GM - POORLY GRADED GRAVEL WITH SILT
GP - POORLY GRADED GRAVEL
SC - CLAYEY SAND
OL/OH - ORGANIC SILT AND CLAY
ML - SILT

NOTES

IR - INSTALLATION RESTORATION PROGRAM

RI/FS - REMEDIAL INVESTIGATION/FEASIBILITY STUDY

SOURCES

SEI 2005. FINAL SITE INSPECTION REPORT, TRANSFER PARCEL EDC-5, ALAMEDA POINT, ALAMEDA, CALIFORNIA. MARCH.

SEI 2003. FINAL REMEDIATION INVESTIGATION REPORT, IR SITE 26, WESTERN HANGER ZONE, ALAMEDA POINT, ALAMEDA, CALIFORNIA. NOVEMBER.

TETRA TECH EM INC. 1999. OU-2 REMEDIAL INVESTIGATION REPORT. PREPARED FOR UNITED STATES DEPARTMENT OF THE NAVY, ENGINEERING FIELD ACTIVITY WEST, NAVAL FACILITIES ENGINEERING COMMAND, SAN BRUNO, CALIFORNIA. JUNE.

VERTICAL SCALE IN FEET: 0, 10, 20

HORIZONTAL SCALE IN FEET: 0, 300, 600

RI/FS Report for IR Site 35

Figure 2-9

Geologic Cross Sections F-F', G-G', H-H', and I-I'

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/28/07
File No: 077X14545
Job No: 23818-077
Rev. No: 1

OAKLAND INNER HARBOR

(FORMER SAN ANTONIO CREEK)

EDC-5

MAIN STREET

SEAPLANE LAGOON

SAN FRANCISCO BAY

A

A'

C

C'

D

D'

E

E'

F

F'

G

G'

H

H'

I

I'

LEGEND

- IR SITE 35 AOCs
- FORMER AOCs (IDENTIFIED IN WORK PLAN)
- TRANSFER PARCEL EDC-5 BOUNDARY
- NAVY BASE BOUNDARY
- HISTORIC ESTUARY
- TIDAL ZONE
- 5 — DEPTH OF BAY IN FATHOMS (ONE FATHOM EQUALS 6 FEET)
- A — A' — CROSS SECTION LOCATION

NOTES:

AOC – AREA OF CONCERN

IR – INSTALLATION RESTORATION (PROGRAM)

RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

SOURCE:

UNITED STATES COAST GEODETIC SURVEY 1903

N

1200 0 1200 Feet

RI/FS Report for IR Site 35

Figure 2-10

1903 Bathymetry for Alameda Point

Alameda, California

Bechtel Environmental, Inc.

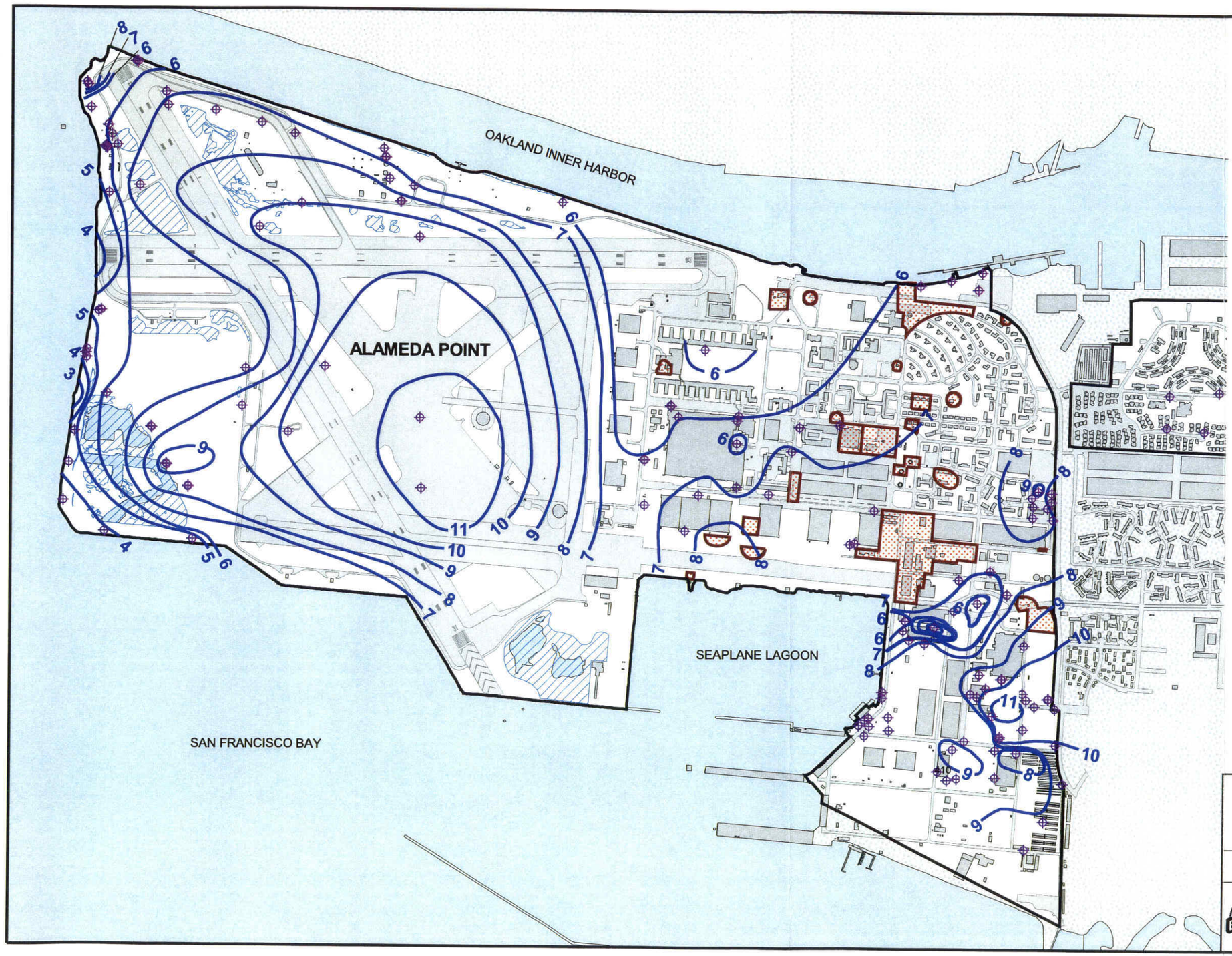
CLEAN 3 Program

Date: 2/16/07

File No.: 077L15462

Job No.: 23818-077

Rev No.: B



LEGEND

- 7 — GROUNDWATER CONTOUR IN FEET ABOVE MEAN SEA LEVEL
- MONITORING WELL LOCATION
- IR SITE 35 AOCs AND DATA GAP AREAS
- BUILDING OR STRUCTURE
- ROAD OR RUNWAY
- WATER
- WETLAND
- NAVY ONSHORE PROPERTY BOUNDARIES
- NON-NAVY PROPERTY

NOTES:

AOC – AREA OF CONCERN

IR – INSTALLATION RESTORATION (PROGRAM)

OU – OPERABLE UNIT

RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

CONTOURS ARE BASED ON APRIL 1998 GROUNDWATER DATA, WHICH HAVE BEEN CORRECTED FOR TIDAL INFLUENCES

SOURCE :
BASED ON A COMPILATION OF DATA FROM TETRA TECH EM INC. 1999. OU-2 DRAFT REMEDIAL INVESTIGATION REPORT.

N

1200 0 1200 Feet

RI/FS Report for IR Site 35

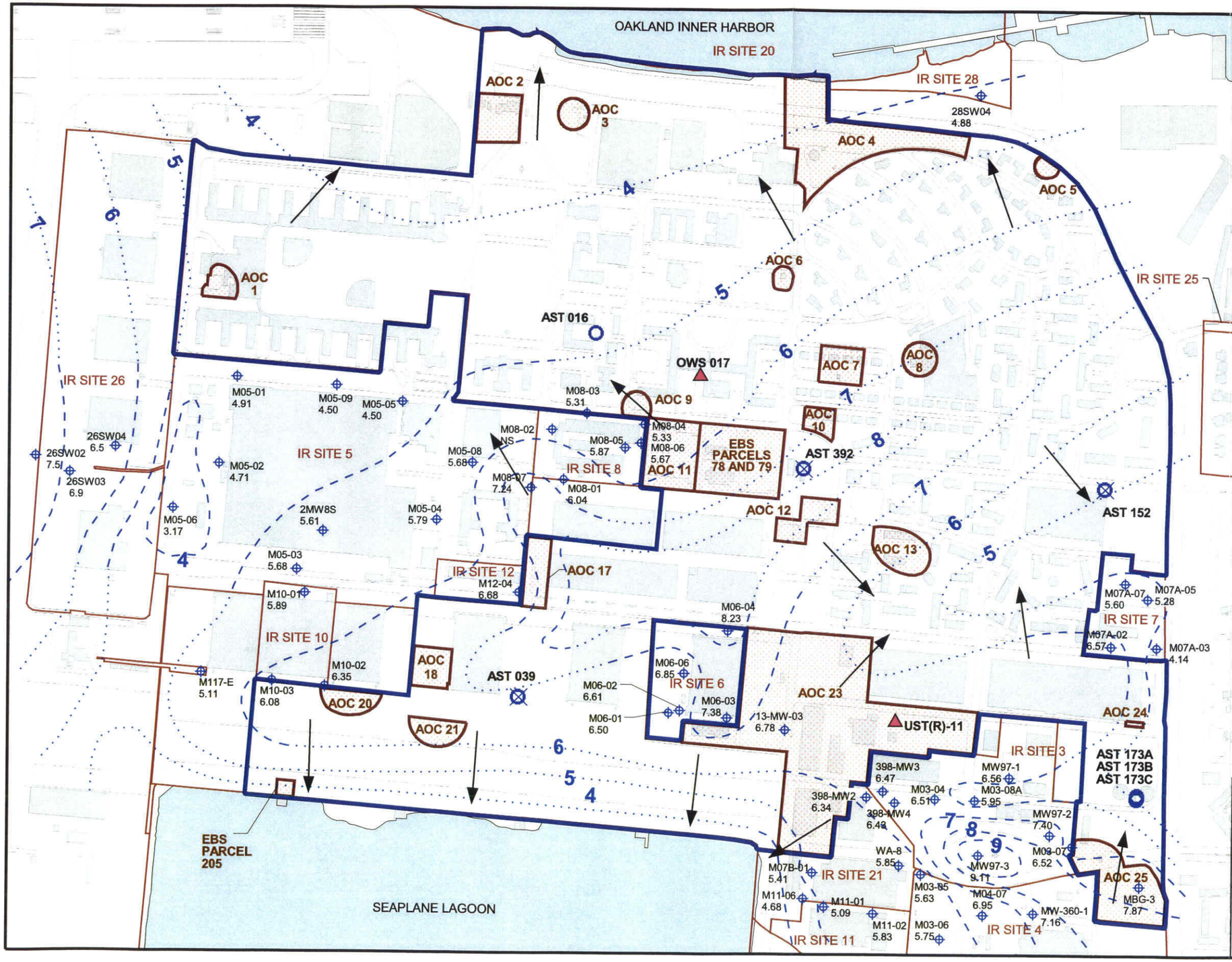
Figure 2-11

Basewide Groundwater Elevation Map
First Water-Bearing Zone

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/14/07
File No.: 077Q14406
Job No.: 23818-077
Rev No.: C



LEGEND

- IR SITE 35 AOCs AND DATA GAP AREAS
- OTHER IR SITE BOUNDARY
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- BUILDING OR STRUCTURE
- WATER
- ABOVEGROUND STORAGE TANK (PRESENT)
- ABOVEGROUND STORAGE TANK (REMOVED)
- SWMU LOCATION
- APPROXIMATE GROUNDWATER ELEVATION CONTOUR IN FEET ABOVE MSL
- INTERPOLATED GROUNDWATER ELEVATION CONTOUR IN FEET ABOVE MSL
- M08-04 7.11 — MONITORING WELL LOCATION WITH STATION IDENTIFICATION AND WATER LEVEL
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

N

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
MSL – MEAN SEA LEVEL
OWS – OIL/WATER SEPARATOR
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R)– RCRA-IDENTIFIED UNDERGROUND STORAGE TANK

SOURCES:

INNOVATIVE TECHNICAL SOLUTIONS, INC., 2006. SUMMER 2005 QUARTERLY GROUNDWATER MONITORING DATA REPORT. PLATE 2, GROUNDWATER ELEVATIONS SUMMER 2005

BECHTEL ENVIRONMENTAL, INC. 2003. FINAL REMEDIAL INVESTIGATION REPORT, IR SITE 26, WESTERN HANGAR ZONE, ALAMEDA POINT, ALAMEDA, CALIFORNIA. NOVEMBER.

500 0 500 Feet

RI/FS Report for IR Site 35

Figure 2-12

Groundwater Elevation Map
First Water-Bearing Zone, Summer 2005

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 077Q14548
Job No.: 23818-077
Rev No.: H

OAKLAND INNER HARBOR

MONARCH BUTTERFLY ROOSTING AREA

SEAPLANE LAGOON

LEGEND

- IR SITE 35 AOCs, DATA GAP AREAS, AND SWMUs
- TRANSFER PARCEL EDC-5 BOUNDARY
- URBAN HABITAT AREA
- BARREN HABITAT AREA
- 98 EBS PARCEL
- ROAD OR PAVED AREA
- BUILDING OR STRUCTURE
- UNPAVED AREA
- WATER
- ABOVEGROUND STORAGE TANK (PRESENT)
- ABOVEGROUND STORAGE TANK (REMOVED)
- SWMU LOCATION

N

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
OWS – OIL/WATER SEPARATOR
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK

SOURCE:

TETRA TECH EM INC. 2003. ALAMEDA POINT ARCVIEW ®QUERY STATION. MAY 20.

500 0 500 Feet

RI/FS Report for IR Site 35

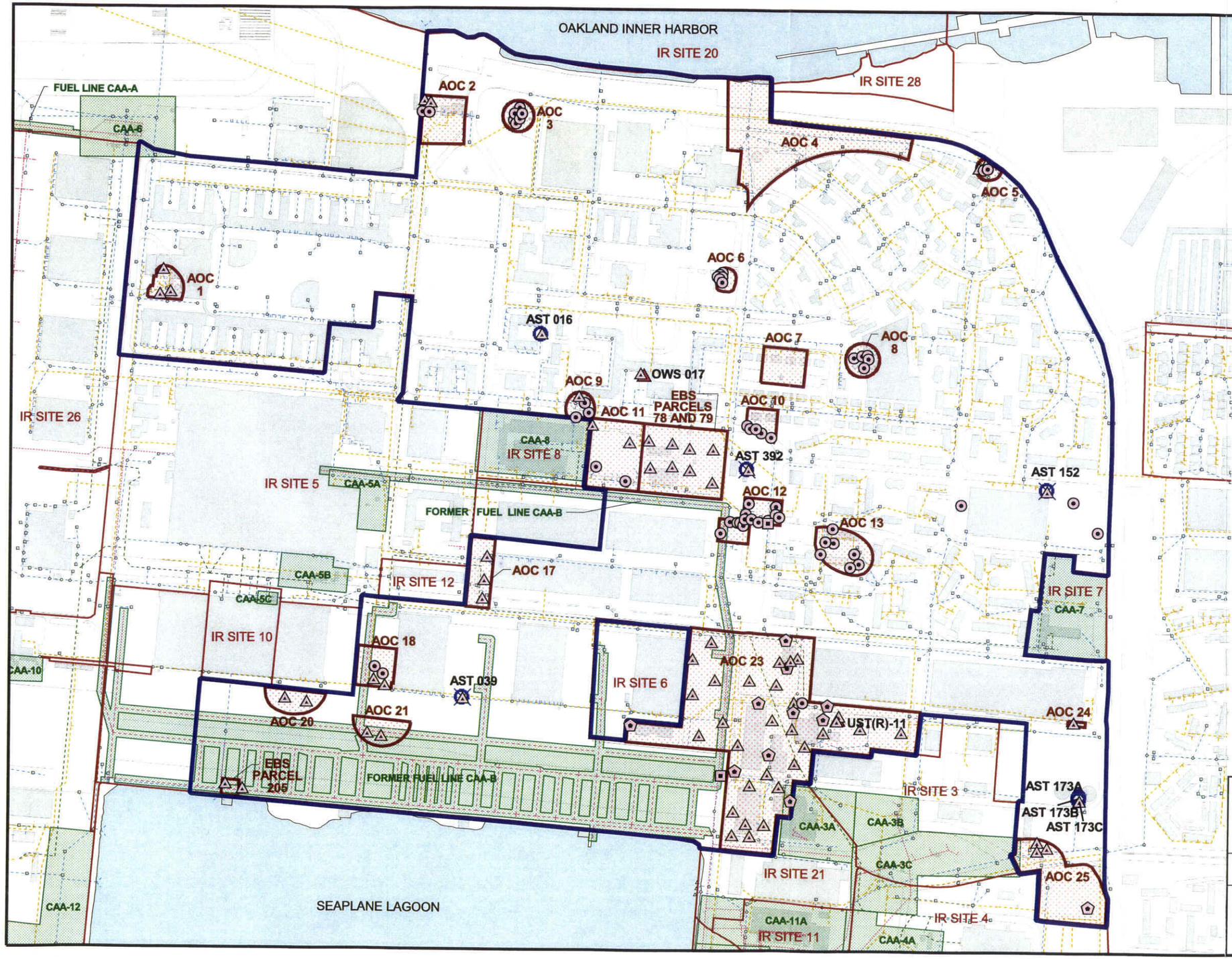
Figure 2-13

Habitat Areas

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 077L14408
Job No.: 23818-077
Rev No.: E



LEGEND

- IR SITE 35 AOCs, DATA GAP AREAS, AND SWMUs
- OTHER IR SITE BOUNDARY
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- BUILDING OR STRUCTURE
- WATER
- CORRECTIVE ACTION AREA (CAA)
- ABOVEGROUND STORAGE TANK (PRESENT)
- ABOVEGROUND STORAGE TANK (REMOVED)
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- OUTFALL
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- FUEL LINE (ABANDONED IN-PLACE)
- FUEL LINE (REMOVED)
- SOIL SAMPLING LOCATION
- GROUNDWATER SAMPLING LOCATION
- SOIL AND GROUNDWATER SAMPLING LOCATION
- STORM DRAIN MANHOLE SEDIMENT SAMPLING LOCATION

N

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
OWS – OIL/WATER SEPARATOR
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R)– RCRA-IDENTIFIED UNDERGROUND STORAGE TANK

500 0 500 Feet

RI/FS Report for IR Site 35

Figure 3-1

Locations of Samples Collected During RI Field Activities

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 077L14409
Job No.: 23818-077
Rev No.: D

OAKLAND INNER HARBOR

AOC 1
AOC 2
AOC 3
AOC 4
AOC 5
AOC 6
AOC 7
AOC 8
AOC 9
AOC 10
AOC 11
AOC 12
AOC 13
AOC 17
AOC 18
AOC 20
AOC 21
AOC 23
AOC 24
AOC 25

IR SITE 26
IR SITE 5
IR SITE 8
IR SITE 10
IR SITE 12
IR SITE 28
IR SITE 6
IR SITE 7
IR SITE 3
IR SITE 21
IR SITE 4
IR SITE 17
SEAPLANE LAGOON

EBS PARCELS 78 AND 79
EBS PARCEL 205

AST 016
AST 392
AST 152
AST 173A
AST 173B
AST 173C
AST 239
OWS-017
UST(R)-11

FUEL LINE CAA-A
FORMER FUEL LINE CAA-B
FUEL LINE CAA-4
CAA-5A
CAA-5B
CAA-5C
CAA-10
CAA-12
CAA-8
CAA-3A
CAA-3B
CAA-3C
CAA-11A
CAA-7

LEGEND

STATION ID
GROUNDWATER VOC SAMPLING LOCATION
SOIL VOC SAMPLING LOCATION
DETECTED VOC CONCENTRATION ABOVE GROUNDWATER PSC AT THIS LOCATION
DETECTED VOC CONCENTRATION ABOVE SOIL PSC AT THIS LOCATION
99 EBS PARCEL
IR SITE 35 AOCs, DATA GAP AREAS, AND SWMUs
OTHER IR SITE BOUNDARY
TRANSFER PARCEL EDC-5 BOUNDARY
ROAD
BUILDING OR STRUCTURE
WATER
CORRECTIVE ACTION AREA (CAA)
ABOVEGROUND STORAGE TANK (PRESENT)
ABOVEGROUND STORAGE TANK (REMOVED)
SWMU LOCATION
CATCH BASIN
MANHOLE
OUTFALL
STORM SEWER LINE
SANITARY SEWER LINE
INDUSTRIAL WASTE LINE
FUEL LINE (PRESENT)
FUEL LINE (REMOVED)
APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE UNIT
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
OWS – OIL/WATER SEPARATOR
PSC – PRELIMINARY SCREENING CRITERION
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SI – SITE INSPECTION
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOC – VOLATILE ORGANIC COMPOUND

EBS SAMPLING LOCATIONS ARE IDENTIFIED BY SAMPLE ID

GROUNDWATER FLOW DIRECTIONS FROM: INNOVATIVE TECHNICAL SOLUTIONS, INC., 2006, SUMMER 2005 QUARTERLY GROUNDWATER MONITORING DATA REPORT, PLATE 2, GROUNDWATER ELEVATIONS SUMMER 2005.

BECHTEL ENVIRONMENTAL, INC. 2003. FINAL REMEDIAL INVESTIGATION REPORT, IR SITE 26, WESTERN HANGAR ZONE, ALAMEDA POINT, ALAMEDA, CALIFORNIA, NOVEMBER.

N

200 0 200 Feet

RI/FS Report for IR Site 35
Figure 4-1
Sampling Locations and Volatile Organic Compounds Above PSCs
Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 0771.14423
Job No.: 23818-077
Rev No.: F

OAKLAND INNER HARBOR

LEGEND

STATION ID

- GROUNDWATER TPH SAMPLING LOCATION
- SOIL TPH SAMPLING LOCATION
- DETECTED TPH CONCENTRATION ABOVE GROUNDWATER PSC AT THIS LOCATION
- DETECTED TPH CONCENTRATION ABOVE SOIL PSC AT THIS LOCATION
- 99 EBS PARCEL
- IR SITE 35 AOCs, DATA GAP AREAS, AND SWMUs
- OTHER IR SITE BOUNDARY
- TRANSFER PARCEL EDC-6 BOUNDARY
- ROAD
- BUILDING OR STRUCTURE
- WATER
- CORRECTIVE ACTION AREA (CAA)
- ABOVEGROUND STORAGE TANK (PRESENT)
- ABOVEGROUND STORAGE TANK (REMOVED)
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- OUTFALL
- STORM SEWER LINE
- SANITARY SEWER LINE
- INDUSTRIAL WASTE LINE
- FUEL LINE (PRESENT)
- FUEL LINE (REMOVED)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

NOTES:

AOC – AREA OF CONCERN

AST – ABOVEGROUND STORAGE UNIT

EBS – ENVIRONMENTAL BASELINE SURVEY

EDC – ECONOMIC DEVELOPMENT CONVEYANCE

IR – INSTALLATION RESTORATION (PROGRAM)

OWS – OIL/WATER SEPARATOR

PSC – PRELIMINARY SCREENING CRITERION

RCRA – RESOURCE CONSERVATION AND RECOVERY ACT

RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

SI – SITE INSPECTION

SWMU – SOLID WASTE MANAGEMENT UNIT

TPH – TOTAL PETROLEUM HYDROCARBONS

UST(R)– RCRA-IDENTIFIED UNDERGROUND STORAGE TANK

EBS SAMPLING LOCATIONS ARE IDENTIFIED BY SAMPLE ID

GROUNDWATER FLOW DIRECTIONS FROM: INNOVATIVE TECHNICAL SOLUTIONS, INC., 2006, SUMMER 2006 QUARTERLY GROUNDWATER MONITORING DATA REPORT, PLATE 2, GROUNDWATER ELEVATIONS SUMMER 2006

BECHTEL ENVIRONMENTAL, INC, 2003, FINAL REMEDIAL INVESTIGATION REPORT, IR SITE 26, WESTERN HANGAR ZONE, ALAMEDA POINT, ALAMEDA, CALIFORNIA, NOVEMBER.

N

200 0 200 Feet

RI/FS Report for IR Site 35

Figure 4-2

Sampling Locations and Total Petroleum Hydrocarbons Above PSCs

Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 2/16/07
File No.: 077L14424
Job No.: 23818-077
Rev No.: F

OAKLAND INNER HARBOR

FUEL LINE CAA-A

AOC 1
AOC 2
AOC 3
AOC 4
AOC 5
AOC 6
AOC 7
AOC 8
AOC 9
AOC 10
AOC 11
AOC 12
AOC 13
AOC 14
AOC 15
AOC 16
AOC 17
AOC 18
AOC 20
AOC 21
AOC 23
AOC 24
AOC 25

IR SITE 5
IR SITE 6
IR SITE 7
IR SITE 8
IR SITE 10
IR SITE 12
IR SITE 17
SEAPLANE LAGOON
IR SITE 21
IR SITE 26
IR SITE 28
IR SITE 3
IR SITE 4

EBS PARCELS 78 AND 79
EBS PARCEL 205

AST 016
AST 039
AST 392
AST 152
AST 173A
AST 173B
AST 173C
OWS-017
UST(R)-11

FORMER FUEL LINE CAA-B

CAA-5
CAA-5A
CAA-5B
CAA-5C
CAA-6
CAA-6C
CAA-10
CAA-12
CAA-3A
CAA-3B
CAA-3C
CAA-11A

RAMP

LEGEND

STATION ID
- GROUNDWATER SVOC SAMPLING LOCATION
- SOIL SVOC SAMPLING LOCATION
- DETECTED SVOC CONCENTRATION ABOVE GROUNDWATER PSC AT THIS LOCATION
- B(a)P EQUIVALENT CONCENTRATION ABOVE 620 µg/kg AT THIS LOCATION

99 EBS PARCEL
1 DECISION AREA
IR SITE 35 AOCs, DATA GAP AREAS, AND SWMUs
BOUNDARY OF FORMER AOCs
OTHER IR SITE BOUNDARY
TRANSFER PARCEL EDC-5 BOUNDARY
ROAD
BUILDING OR STRUCTURE
WATER
CORRECTIVE ACTION AREA (CAA)
ABOVEGROUND STORAGE TANK (PRESENT)
ABOVEGROUND STORAGE TANK (REMOVED)
SWMU LOCATION
CATCH BASIN
MANHOLE
OUTFALL
STORM SEWER LINE
SANITARY SEWER LINE
INDUSTRIAL WASTE LINE
FUEL LINE (PRESENT)
FUEL LINE (REMOVED)
APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE UNIT
B(a)P – BENZO(A)PYRENE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
µg/kg – MICROGRAMS PER KILOGRAM
OWS – OIL/WATER SEPARATOR
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
SI – SITE INSPECTION
SVOC – SEMIVOLATILE ORGANIC COMPOUND
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R)– RCRA-IDENTIFIED UNDERGROUND STORAGE TANK

EBS SAMPLING LOCATIONS ARE IDENTIFIED BY SAMPLE ID

GROUNDWATER FLOW DIRECTIONS FROM: INNOVATIVE TECHNICAL SOLUTIONS, INC., 2006, SUMMER 2005 QUARTERLY GROUNDWATER MONITORING DATA REPORT, PLATE 2, GROUNDWATER ELEVATIONS SUMMER 2005.

BECHTEL ENVIRONMENTAL, INC. 2003, FINAL REMEDIAL INVESTIGATION REPORT, IR SITE 26, WESTERN HANGAR ZONE, ALAMEDA POINT, ALAMEDA, CALIFORNIA, NOVEMBER.

N

200 0 200 Feet

RI/FS Report for IR Site 35

Figure 4-3

Sampling Locations and B(a)P Equivalents and SVOCs Above PSCs

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 077L14425
Job No.: 23818-077
Rev No.: E

OAKLAND INNER HARBOR

AOC 1
AOC 2
AOC 3
AOC 4
AOC 5
AOC 6
AOC 7
AOC 8
AOC 9
AOC 10
AOC 11
AOC 12
AOC 13
AOC 17
AOC 18
AOC 20
AOC 21
AOC 23
AOC 24
AOC 25

IR SITE 5
IR SITE 6
IR SITE 7
IR SITE 8
IR SITE 10
IR SITE 12
IR SITE 17
SEAPLANE LAGOON
IR SITE 21
IR SITE 26
IR SITE 28
IR SITE 3
IR SITE 4

EBS PARCELS 78 AND 79
EBS PARCEL 205

AST 016
AST 039
AST 392
AST 152
AST 173A
AST 173B
AST 173C
UST(R)-11
OWS-017

FUEL LINE CAA-A
FORMER FUEL LINE CAA-B
FORMER FUEL LINE CAA-B
CAA-A
CAA-5A
CAA-5B
CAA-5C
CAA-10
CAA-12
CAA-3A
CAA-3B
CAA-3C
CAA-11A
CAA-4A

RAMP1
RAMP2
RAMP3
RAMP4

LEGEND

STATION ID

- GROUNDWATER PESTICIDE/PCB SAMPLING LOCATION
- SOIL PESTICIDE/PCB SAMPLING LOCATION
- DETECTED PESTICIDE/PCB CONCENTRATION ABOVE SOIL PSC AT THIS LOCATION
- 99 EBS PARCEL
- IR SITE 35 AOCs, DATA GAP AREAS, AND SWMUs
- OTHER IR SITE BOUNDARY
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- BUILDING OR STRUCTURE
- WATER
- CORRECTIVE ACTION AREA (CAA)
- ABOVEGROUND STORAGE TANK (PRESENT)
- ABOVEGROUND STORAGE TANK (REMOVED)
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- OUTFALL
- STORM SEWER LINE
- SANITARY SEWER LINE
- INDUSTRIAL WASTE LINE
- FUEL LINE (PRESENT)
- FUEL LINE (REMOVED)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

NOTES:

AOC – AREA OF CONCERN

AST – ABOVEGROUND STORAGE UNIT

EBS – ENVIRONMENTAL BASELINE SURVEY

EDC – ECONOMIC DEVELOPMENT CONVEYANCE

IR – INSTALLATION RESTORATION (PROGRAM)

OWS – OIL/WATER SEPARATOR

PCB – POLYCHLORINATED BIPHENYL

PSC – PRELIMINARY SCREENING CRITERION

RCRA – RESOURCE CONSERVATION AND RECOVERY ACT

RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

SI – SITE INSPECTION

SWMU – SOLID WASTE MANAGEMENT UNIT

UST(R)– RCRA-IDENTIFIED UNDERGROUND STORAGE TANK

EBS SAMPLING LOCATIONS ARE IDENTIFIED BY SAMPLE ID

THERE WERE NO EXCEEDANCES FOR PESTICIDES/PCB IN GROUNDWATER

GROUNDWATER FLOW DIRECTIONS FROM: INNOVATIVE TECHNICAL SOLUTIONS, INC., 2006, SUMMER 2005 QUARTERLY GROUNDWATER MONITORING DATA REPORT, PLATE 2, GROUNDWATER ELEVATIONS SUMMER 2005.

BECHTEL ENVIRONMENTAL, INC. 2003, FINAL REMEDIAL INVESTIGATION REPORT, IR SITE 26, WESTERN HANGAR ZONE, ALAMEDA POINT, ALAMEDA, CALIFORNIA, NOVEMBER.

N

200 0 200 Feet

RI/FS Report for IR Site 35

Figure 4-4

Sampling Locations and Pesticides and PCBs Above PSCs

Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 2/16/07
File No.: 0771.14426
Job No.: 23818-077
Rev No.: E

OAKLAND INNER HARBOR

INSET MAP 2

30 0 30 Feet

INSET MAP 1

60 0 60 Feet

INSET MAP 3

20 0 20 Feet

AOC 1
AOC 2
AOC 3
AOC 4
AOC 5
AOC 6
AOC 7
AOC 8
AOC 9
AOC 10
AOC 11
AOC 12
AOC 13
AOC 17
AOC 18
AOC 20
AOC 21
AOC 23
AOC 24
AOC 25

IR SITE 26
IR SITE 28
IR SITE 8
IR SITE 12
IR SITE 10
IR SITE 6
IR SITE 7
IR SITE 3
IR SITE 21
IR SITE 4
IR SITE 17
SEAPLANE LAGOON

AST 016
AST 039
AST 392
AST 152
AST 173A
AST 173B
AST 173C

UST(R)-11

OWS-017

EBS PARCELS 78 AND 79

EBS PARCEL 205

FORMER FUEL LINE CAA-B

SEE INSET MAP 1
SEE INSET MAP 2
SEE INSET MAP 3

LEGEND

STATION ID
GROUNDWATER METALS SAMPLING LOCATION
SOIL METALS SAMPLING LOCATION
DETECTED METAL CONCENTRATION ABOVE SOIL PSC
DETECTED METAL CONCENTRATION ABOVE GROUNDWATER PSC AND ABOVE BACKGROUND AT THIS LOCATION
99 EBS PARCEL
IR SITE 35 AOCs, DATA GAP AREAS, AND SWMUs
OTHER IR SITE BOUNDARY
TRANSFER PARCEL EDC-5 BOUNDARY
ROAD
BUILDING OR STRUCTURE
WATER
CORRECTIVE ACTION AREA (CAA)
ABOVEGROUND STORAGE TANK (PRESENT)
ABOVEGROUND STORAGE TANK (REMOVED)
SWMU LOCATION
CATCH BASIN
MANHOLE
OUTFALL
STORM SEWER LINE
SANITARY SEWER LINE
INDUSTRIAL WASTE LINE
FUEL LINE (PRESENT)
FUEL LINE (REMOVED)
APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

NOTES:
AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE UNIT
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
OWS – OIL/WATER SEPARATOR
PSC – PRELIMINARY SCREENING CRITERION
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SI – SITE INSPECTION
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R)- RCRA-IDENTIFIED UNDERGROUND STORAGE TANK

EBS SAMPLING LOCATIONS ARE IDENTIFIED BY SAMPLE ID

GROUNDWATER FLOW DIRECTIONS FROM: INNOVATIVE TECHNICAL SOLUTIONS, INC., 2006, SUMMER 2006 QUARTERLY GROUNDWATER MONITORING DATA REPORT, PLATE 2, GROUNDWATER ELEVATIONS SUMMER 2006

BECHTEL ENVIRONMENTAL, INC., 2003, FINAL REMEDIAL INVESTIGATION REPORT, IR SITE 26, WESTERN HANGAR ZONE, ALAMEDA POINT, ALAMEDA, CALIFORNIA, NOVEMBER.

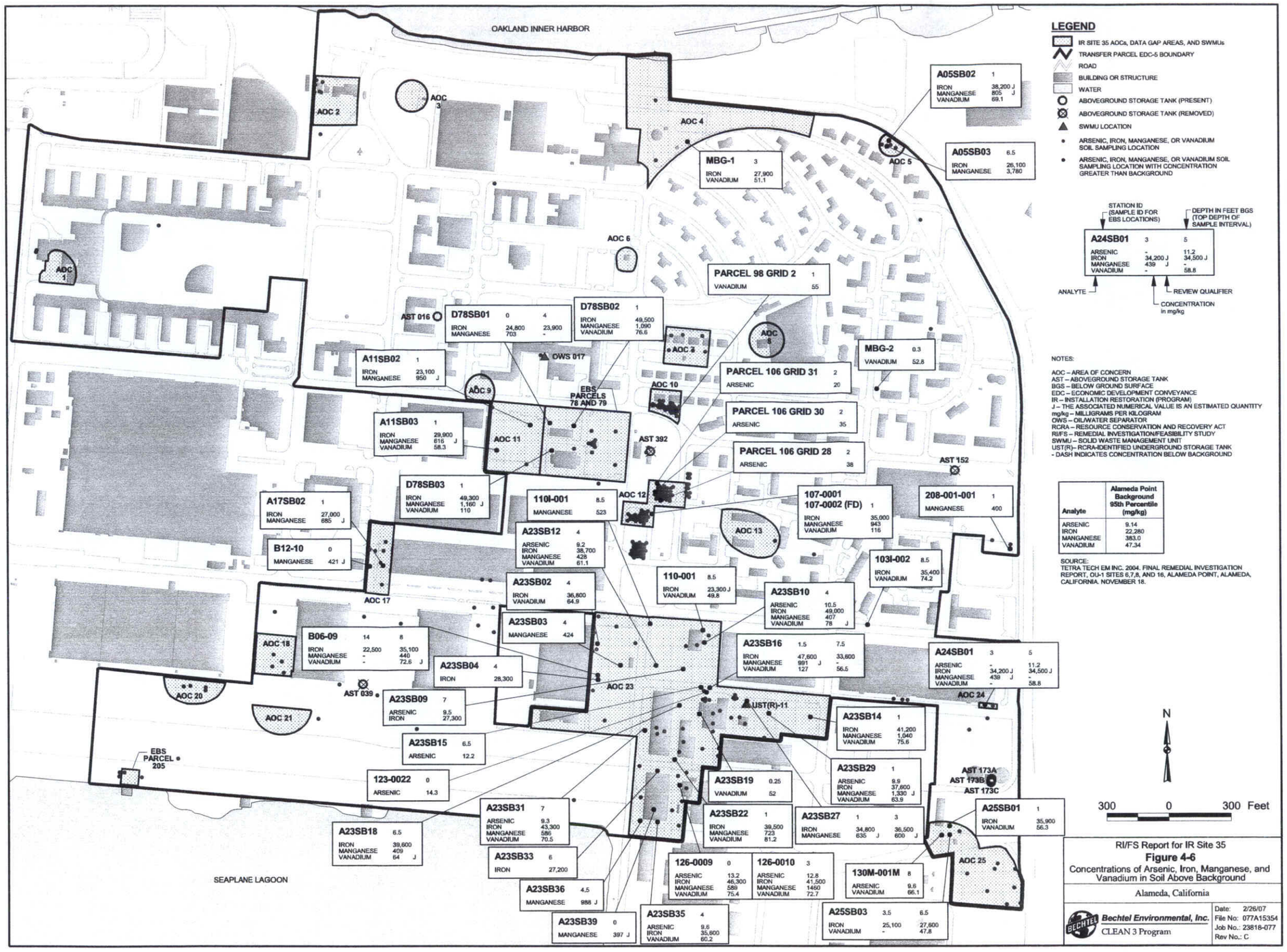
N

200 0 200 Feet

RI/FS Report for IR Site 35
Figure 4-5
Sampling Locations and Metals Above PSCs
Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 077L14427
Job No.: 23818-077
Rev No.: D



RI/FS Report for IR Site 35

Figure 4-6

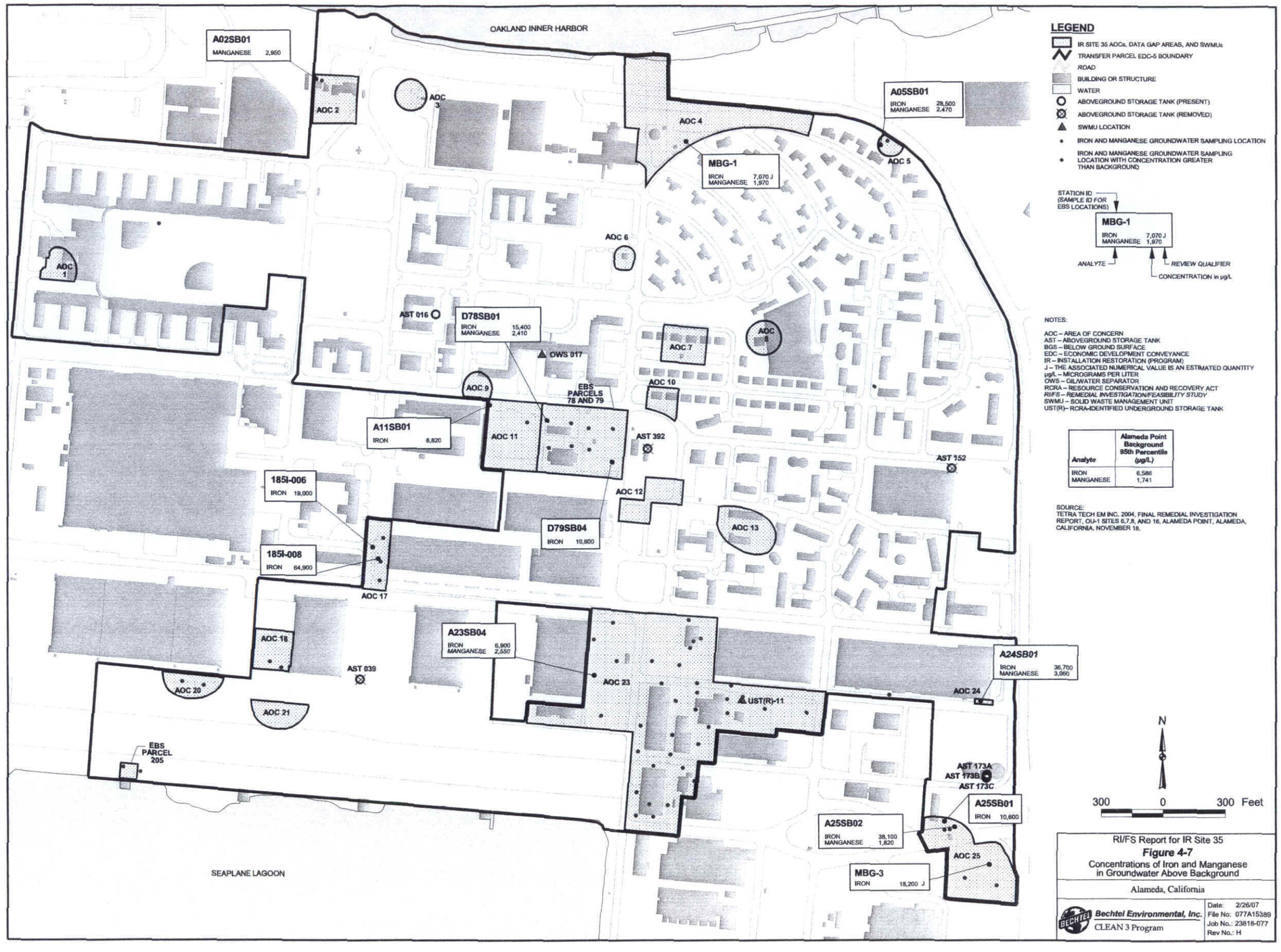
Concentrations of Arsenic, Iron, Manganese, and Vanadium in Soil Above Background

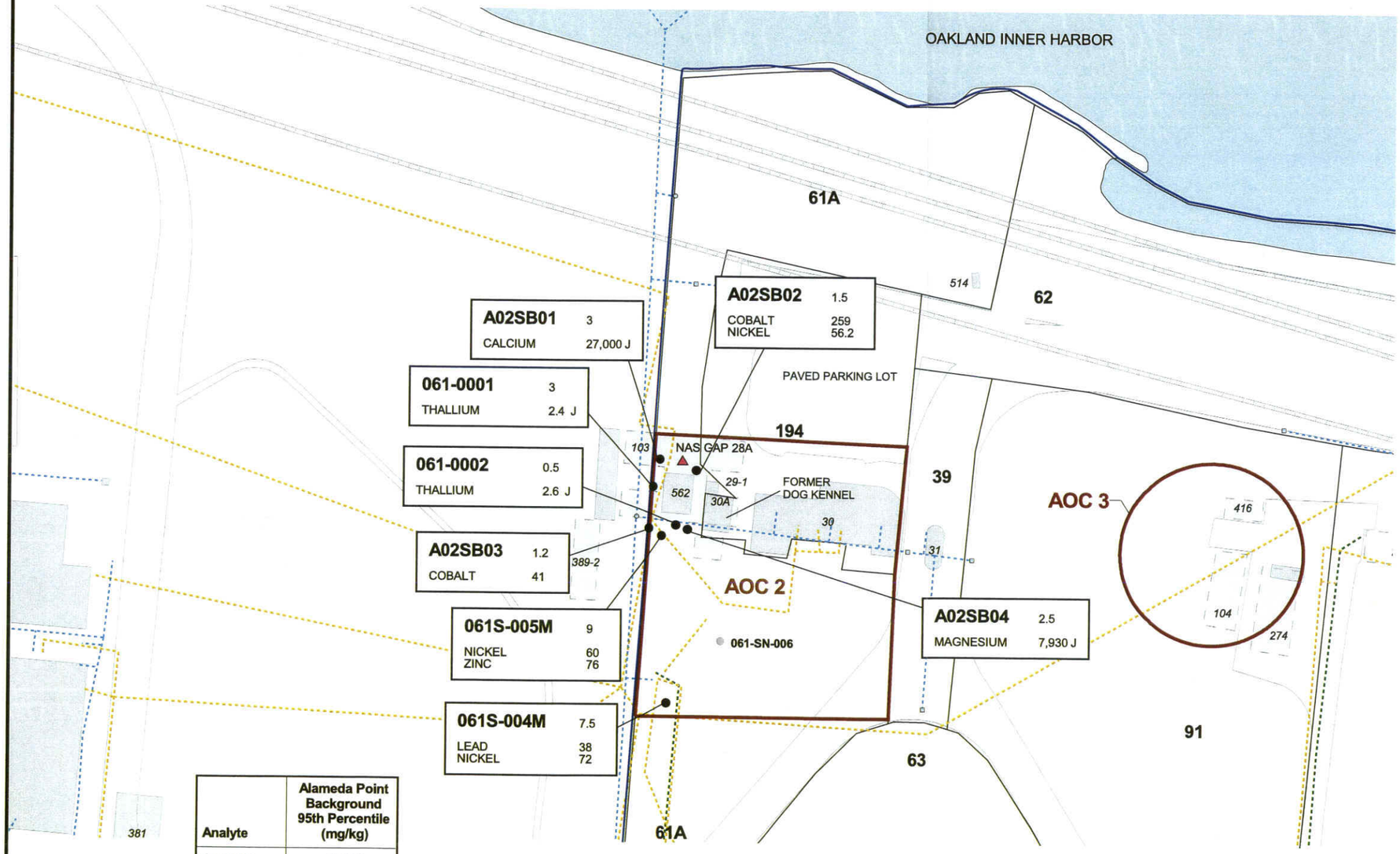
Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 2/26/07
File No: 077A15354
Job No.: 23818-077
Rev No.: C


OAKLAND INNER HARBOR
A02SB01
MANGANESE 2,950
AOC 2
AOC 3
AOC 4
A05SB01
IRON 28,500
MANGANESE 2,470
AOC 5
MBG-1
IRON 7,070 J
MANGANESE 1,970
AOC 6
AOC 1
AST 016
D78SB01
IRON 15,400
MANGANESE 2,410
OWS 017
AOC 7
AOC 8
AOC 9
AOC 10
EBS PARCELS 78 AND 79
A11SB01
IRON 8,820
AOC 11
AST 392
AST 152
185I-006
IRON 19,000
AOC 12
D79SB04
IRON 10,600
AOC 13
185I-008
IRON 64,900
AOC 17
A23SB04
IRON 6,900
MANGANESE 2,550
AOC 18
AST 039
AOC 20
AOC 21
AOC 23
A24SB01
IRON 36,700
MANGANESE 3,060
AOC 24
UST(R)-11
EBS PARCEL 205
AST 173A
AST 173B
AST 173C
A25SB01
IRON 10,600
A25SB02
IRON 38,100
MANGANESE 1,820
AOC 25
MBG-3
IRON 18,200 J
SEAPLANE LAGOON
LEGEND
IR SITE 35 AOCs, DATA GAP AREAS, AND SWMUs
TRANSFER PARCEL EDC-5 BOUNDARY
ROAD
BUILDING OR STRUCTURE
WATER
ABOVEGROUND STORAGE TANK (PRESENT)
ABOVEGROUND STORAGE TANK (REMOVED)
SWMU LOCATION
IRON AND MANGANESE GROUNDWATER SAMPLING LOCATION
IRON AND MANGANESE GROUNDWATER SAMPLING LOCATION WITH CONCENTRATION GREATER THAN BACKGROUND
STATION ID (SAMPLE ID FOR EBS LOCATIONS)
MBG-1
IRON 7,070 J
MANGANESE 1,970
ANALYTE
REVIEW QUALIFIER
CONCENTRATION in µg/L
NOTES:
AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
BGS – BELOW GROUND SURFACE
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
µg/L – MICROGRAMS PER LITER
OWS – OILWATER SEPARATOR
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R)– RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
Analyte
Alameda Point Background 95th Percentile (µg/L)
IRON 6,586
MANGANESE 1,741
SOURCE:
TETRA TECH EM INC. 2004, FINAL REMEDIAL INVESTIGATION REPORT, OU-1 SITES 6,7,8, AND 16, ALAMEDA POINT, ALAMEDA, CALIFORNIA, NOVEMBER 18.
N
300 0 300 Feet
RI/FS Report for IR Site 35
Figure 4-7
Concentrations of Iron and Manganese in Groundwater Above Background
Alameda, California
Bechtel Environmental, Inc.
CLEAN 3 Program
Date: 2/26/07
File No: 077A15389
Job No.: 23818-077
Rev No.: H



Analyte	Alameda Point Background 95th Percentile (mg/kg)
CALCIUM	16,800
COBALT	14.30
LEAD	37.66
MAGNESIUM	7,304
NICKEL	55.72
THALLIUM	0.50
ZINC	67.48

SOURCE:
TETRA TECH EM INC. 2004. FINAL REMEDIAL INVESTIGATION REPORT, OU-1 SITES 6,7,8, AND 16, ALAMEDA POINT, ALAMEDA, CALIFORNIA. NOVEMBER 18.

LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- WATER
- 71 EBS PARCEL
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- METALS SOIL SAMPLING LOCATION
- METALS SOIL SAMPLING LOCATION WITH CONCENTRATION GREATER THAN BACKGROUND

N

STATION ID (SAMPLE ID FOR EBS LOCATIONS) — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

A02SB04 2.5
MAGNESIUM 7,930 J

ANALYTE — REVIEW QUALIFIER
CONCENTRATION in mg/kg

NOTES:

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
mg/kg – MILLIGRAMS PER KILOGRAM
NAS – NAVAL AIR STATION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT

100 0 100 Feet

RI/FS Report for IR Site 35

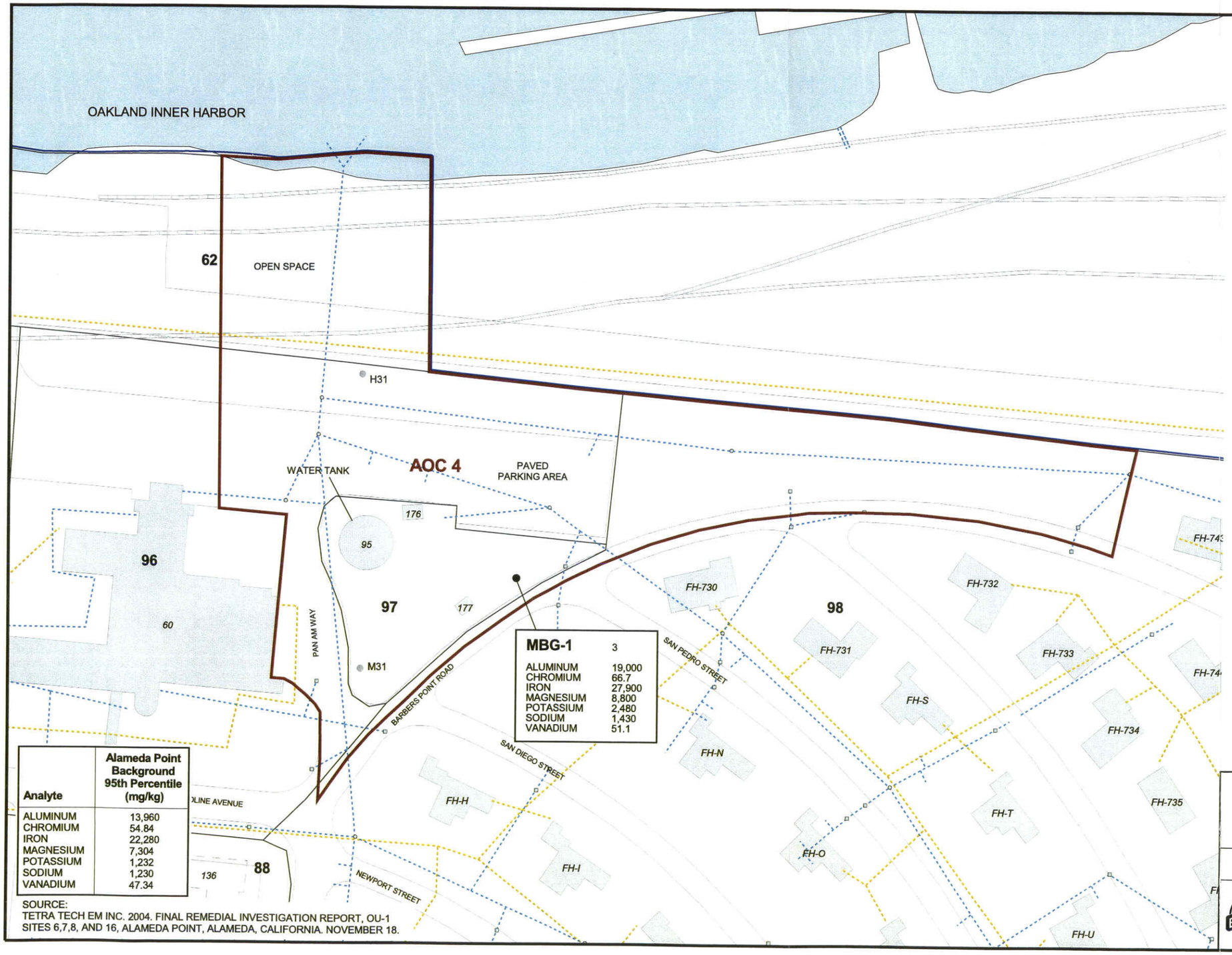
Figure 4-8

Concentrations of Metals in Soil Above Background – Area of Concern 2

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/28/07
File No.: 077A15383
Job No.: 23818-077
Rev No.: C



Analyte	Alameda Point Background 95th Percentile (mg/kg)
ALUMINUM	13,960
CHROMIUM	54.84
IRON	22,280
MAGNESIUM	7,304
POTASSIUM	1,232
SODIUM	1,230
VANADIUM	47.34

SOURCE:
TETRA TECH EM INC. 2004. FINAL REMEDIAL INVESTIGATION REPORT, OU-1 SITES 6,7,8, AND 16, ALAMEDA POINT, ALAMEDA, CALIFORNIA. NOVEMBER 18.

LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- WATER
- 71 EBS PARCEL
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- METALS SOIL SAMPLING LOCATION
- METALS SOIL SAMPLING LOCATION WITH CONCENTRATION GREATER THAN BACKGROUND

N

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

MBG-1	3
ALUMINUM	19,000
CHROMIUM	66.7
IRON	27,900
MAGNESIUM	8,800
POTASSIUM	2,480
SODIUM	1,430
VANADIUM	51.1

ANALYTE — CONCENTRATION in mg/kg

NOTES:

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
mg/kg – MILLIGRAMS PER KILOGRAM
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

100 0 100 Feet

RI/FS Report for IR Site 35

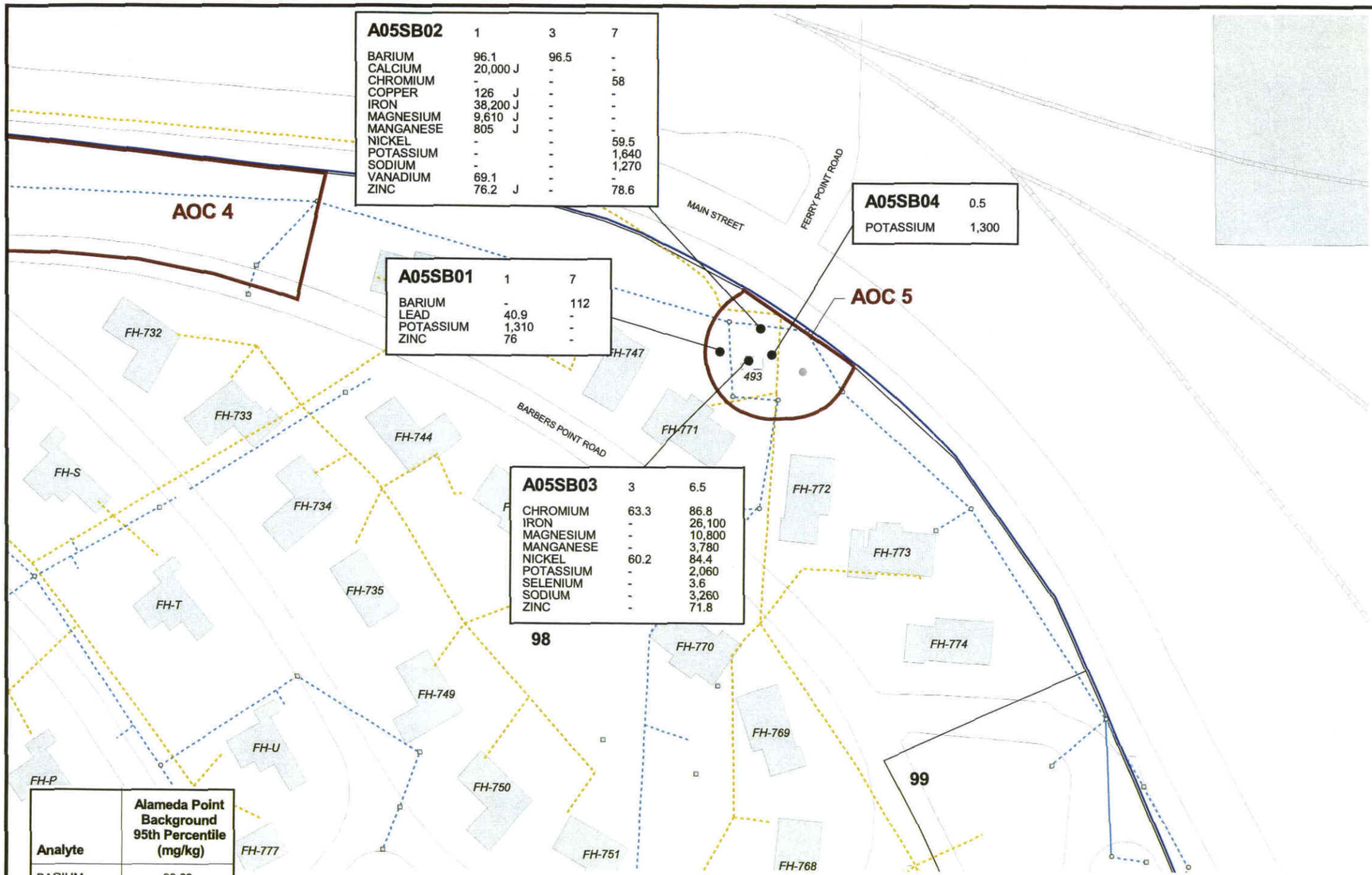
Figure 4-9

Concentrations of Metals in Soil Above Background – Area of Concern 4

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/28/07
File No.: 077A15378
Job No.: 23818-077
Rev No.: C



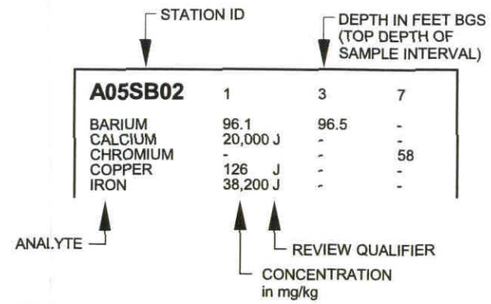
Analyte	Alameda Point Background 95th Percentile (mg/kg)
BARIUM	93.68
CALCIUM	16,800
CHROMIUM	54.84
COPPER	39.14
IRON	22,280
LEAD	37.66
MAGNESIUM	7,304
MANGANESE	383.0
NICKEL	55.72
POTASSIUM	1,232
SELENIUM	1.78
SODIUM	1,230
VANADIUM	47.34
ZINC	67.48

SOURCE:
TETRA TECH EM INC. 2004. FINAL REMEDIAL INVESTIGATION REPORT, OU-1 SITES 6,7,8, AND 16, ALAMEDA POINT, ALAMEDA, CALIFORNIA. NOVEMBER 18.

LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 493 BUILDING OR STRUCTURE (FORMER) AND ID
- WATER
- 71 EBS PARCEL
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- METALS SOIL SAMPLING LOCATION
- METALS SOIL SAMPLING LOCATION WITH CONCENTRATION GREATER THAN BACKGROUND

N



NOTES:

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
mg/kg – MILLIGRAMS PER KILOGRAM
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
- DASH INDICATES CONCENTRATION BELOW BACKGROUND

100 0 100 Feet

RI/FS Report for IR Site 35

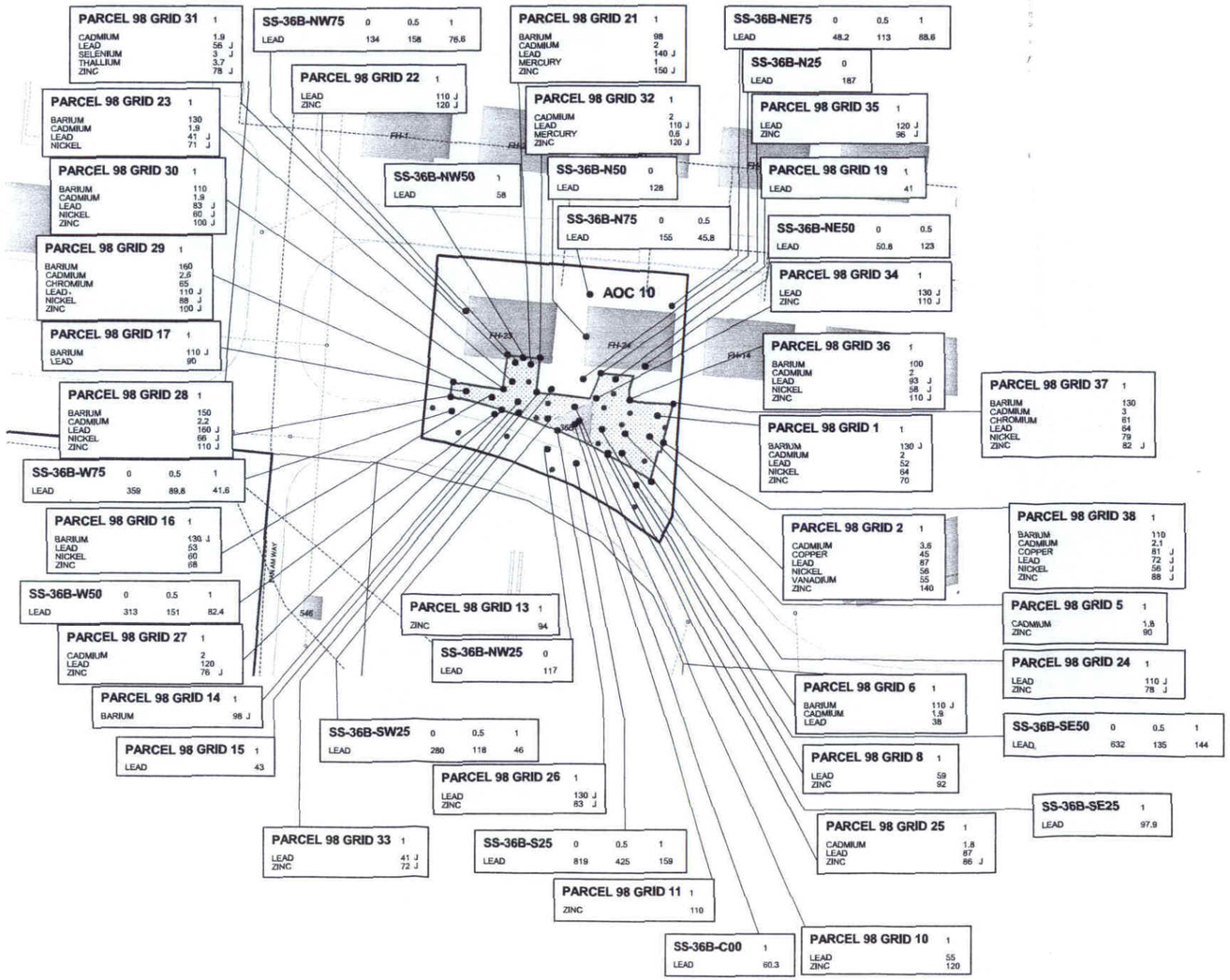
Figure 4-10

Concentrations of Metals in Soil Above Background – Area of Concern 5

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

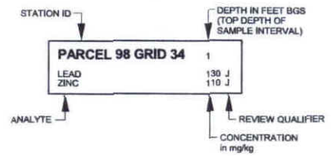
Date: 2/28/07
File No.: 077A15381
Job No.: 23818-077
Rev No.: C



LEGEND

- AOC AND DATA GAP BOUNDARIES WITHIN IR SITE 35
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- RAILROAD (CURRENT AND FORMER)
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 71 EBS PARCEL
- NTCRA REMOVAL LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- METALS SOIL SAMPLING LOCATION
- METALS SOIL SAMPLING LOCATION WITH CONCENTRATION GREATER THAN BACKGROUND

N



NOTES:

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
mg/kg – MILLIGRAMS PER KILOGRAM
NTCRA – NON-TIME-CRITICAL REMOVAL ACTION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

Analyte	Alameda Point Background 95th Percentile (mg/kg)
BARIUM	93.68
CADMIUM	1.72
CHROMIUM	54.84
COPPER	39.14
LEAD	37.66
MERCURY	0.52
NICKEL	55.72
SELENIUM	1.78
THALLIUM	0.50
VANADIUM	47.34
ZINC	67.48

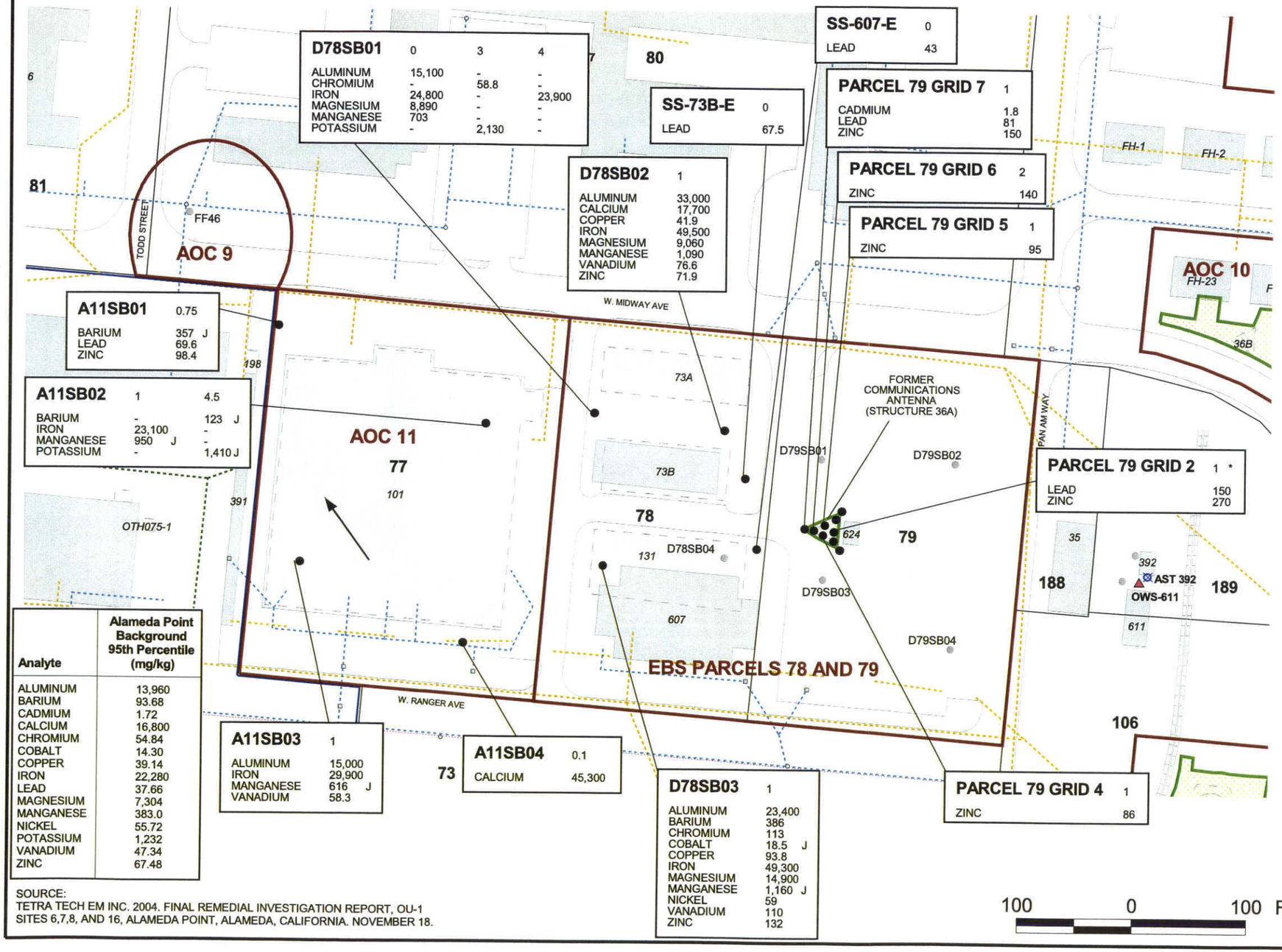
SOURCE:
TETRA TECH EM INC. 2004. FINAL REMEDIAL INVESTIGATION REPORT, OU-1 SITES 6,7,8, AND 16, ALAMEDA POINT, ALAMEDA, CALIFORNIA. NOVEMBER 18.

50 0 50 Feet

RI/FS Report for IR Site 35
Figure 4-11
Concentrations of Metals in Soil Above Background – Area of Concern 10
Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/28/07
File No.: 077A15353
Job No.: 23818-077
Rev No.: B



Analyte	Alameda Point Background 95th Percentile (mg/kg)
ALUMINUM	13,960
BARIUM	93.68
CADMIUM	1.72
CALCIUM	16,800
CHROMIUM	54.84
COBALT	14.30
COPPER	39.14
IRON	22,280
LEAD	37.66
MAGNESIUM	7,304
MANGANESE	383.0
NICKEL	55.72
POTASSIUM	1,232
VANADIUM	47.34
ZINC	67.48

SOURCE:
TETRA TECH EM INC. 2004. FINAL REMEDIAL INVESTIGATION REPORT, OU-1
SITES 6,7,8, AND 16, ALAMEDA POINT, ALAMEDA, CALIFORNIA. NOVEMBER 18.

LEGEND

- AOC AND DATA GAP BOUNDARIES WITHIN IR SITE 35
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- RAILROAD (CURRENT AND FORMER)
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- NTCRA REMOVAL LOCATION
- SWMU LOCATION
- ABOVEGROUND STORAGE TANK (REMOVED)
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- FUEL LINE (REMOVED)
- METALS SOIL SAMPLING LOCATION
- METALS SOIL SAMPLING LOCATION WITH CONCENTRATION GREATER THAN BACKGROUND

N

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

A11SB01 0.75
BARIUM 357 J
LEAD 69.6
ZINC 98.4

ANALYTE — REVIEW QUALIFIER
CONCENTRATION in mg/kg

NOTES:

*CONCENTRATIONS REPRESENT THE HIGHER VALUE OF EITHER THE SAMPLE OR THE DUPLICATE AT THIS DEPTH

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
mg/kg – MILLIGRAMS PER KILOGRAM
NTCRA – NON-TIME-CRITICAL REMOVAL ACTION
OWS – OIL/WATER SEPARATOR
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
- DASH INDICATES CONCENTRATION BELOW BACKGROUND

RI/FS Report for IR Site 35

Figure 4-12

Concentrations of Metals in Soil Above Background
Area of Concern 11 and EBS Parcels 78–79

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/28/07
File No.: 077A15351
Job No.: 23818-077
Rev No.: C

Analyte	Alameda Point Background 95th Percentile (mg/kg)
ALUMINUM	13,960
ARSENIC	9.14
BARIUM	93.68
CADMIUM	1.72
CALCIUM	16,800
CHROMIUM	54.84
COBALT	14.30
COPPER	39.14
IRON	22,280
LEAD	37.66
MAGNESIUM	7,304
MANGANESE	383.0
MERCURY	0.52
NICKEL	55.72
THALLIUM	0.50
VANADIUM	47.34
ZINC	67.48

SOURCE:
TETRA TECH EM INC. 2004. FINAL REMEDIAL INVESTIGATION REPORT, OU-1 SITES 6,7,8, AND 16, ALAMEDA POINT, ALAMEDA, CALIFORNIA. NOVEMBER 18.

PARCEL 106 GRID 30 2

ARSENIC	35

PARCEL 106 GRID 31 2

ARSENIC	20
CADMIUM	1.9
COPPER	42

GRID 21 TOWER 61 1

CADMIUM	2.5
CHROMIUM	61
LEAD	110
NICKEL	57
ZINC	100 J

PARCEL 106 GRID 29 2

LEAD	110
ZINC	79

PARCEL 106 GRID 17 2

LEAD	88 J
ZINC	75 J

GRID 6 TOWER 61 1

LEAD	170
ZINC	130

PARCEL 106 GRID 1 2

CADMIUM	2
LEAD	40 J

GRID 29 TOWER 61 1

CADMIUM	2.5
LEAD	42
ZINC	200

PARCEL 106 GRID 12 2

LEAD	130 J
ZINC	84 J

PARCEL 106 GRID 7 2

ZINC	90 J

GRID 28 TOWER 61 1

BARIUM	130
CADMIUM	3.4
CHROMIUM	96
LEAD	150
NICKEL	87
ZINC	160 J

GRID 13 TOWER 61 2

CADMIUM	7.8
LEAD	38

PARCEL 106 GRID 9 2

CADMIUM	2
LEAD	160 J
ZINC	120 J

GRID 15 TOWER 61 1

LEAD	80
ZINC	170 J

PARCEL 106 GRID 19 2

CADMIUM	1.8
LEAD	44 J
MERCURY	1.8
NICKEL	140
ZINC	150 J

GRID 27 TOWER 61 1

BARIUM	110
CADMIUM	3.1
CHROMIUM	58
LEAD	110
NICKEL	69
ZINC	120 J

PARCEL 106 GRID 24 2

LEAD	76
ZINC	270

GRID 26 TOWER 61 1

CADMIUM	2.1
ZINC	73 J

6G-2

LEAD	99.7

GRID 25 TOWER 61 1

BARIUM	100
CADMIUM	2.7
LEAD	62
NICKEL	64
ZINC	72 J

PARCEL 106 GRID 20 2

LEAD	39
ZINC	210

PARCEL 106 GRID 28 2

ARSENIC	38

GRID 24 TOWER 61 1

BARIUM	98
CADMIUM	2.5
LEAD	83
NICKEL	60
ZINC	120 J

GRID 7 TOWER 61 1

LEAD	160
ZINC	80

GRID 23 TOWER 61 1

BARIUM	150
CADMIUM	3.4
CHROMIUM	70
LEAD	150
NICKEL	79
ZINC	130 J

107-0001
107-0002 (FD) 1*

ALUMINUM	32,000 J
CALCIUM	75,200
CHROMIUM	96.7 J
COBALT	27.6
COPPER	60.7
IRON	35,000
MAGNESIUM	39,600
MANGANESE	943
NICKEL	110 J
THALLIUM	5.8 J
VANADIUM	116

GRID 22 TOWER 61 1

CADMIUM	2.8
CHROMIUM	58
LEAD	140
ZINC	99 J

AOC 12

61

107

108

153

THIS FIGURE DOES NOT SHOW ALL LEAD CONCENTRATIONS ABOVE BACKGROUND. LEAD CONCENTRATIONS GREATER THAN BACKGROUND ARE SHOWN ONLY FOR LOCATIONS WHERE ANOTHER METAL IS ALSO GREATER THAN BACKGROUND.

LEGEND

- AOC AND DATA GAP BOUNDARIES WITHIN IR SITE 35
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- RAILROAD (CURRENT AND FORMER)
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- NTCRA REMOVAL LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- FUEL LINE (REMOVED)
- METALS SOIL SAMPLING LOCATION
- METALS SOIL SAMPLING LOCATION WITH CONCENTRATION GREATER THAN BACKGROUND
- ⊕ RI SEDIMENT SAMPLING LOCATION 6G-2 (LOCATION 3G WAS COLLECTED DOWNFLOW OF AOC 12, ADJACENT TO THE WEST OF AOC 23. SEE FIGURE 4-16)

N

STATION ID (SAMPLE ID FOR EBS LOCATIONS) — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

PARCEL 106 GRID 7 2

ZINC	90 J

ANALYTE — REVIEW QUALIFIER — CONCENTRATION in mg/kg

NOTES:

*CONCENTRATIONS REPRESENT THE HIGHER VALUE OF EITHER THE SAMPLE OR THE DUPLICATE AT THIS DEPTH

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
FD – FIELD DUPLICATE
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
mg/kg – MILLIGRAMS PER KILOGRAM
NTCRA – NON-TIME-CRITICAL REMOVAL ACTION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

50 0 50 Feet

RI/FS Report for IR Site 35

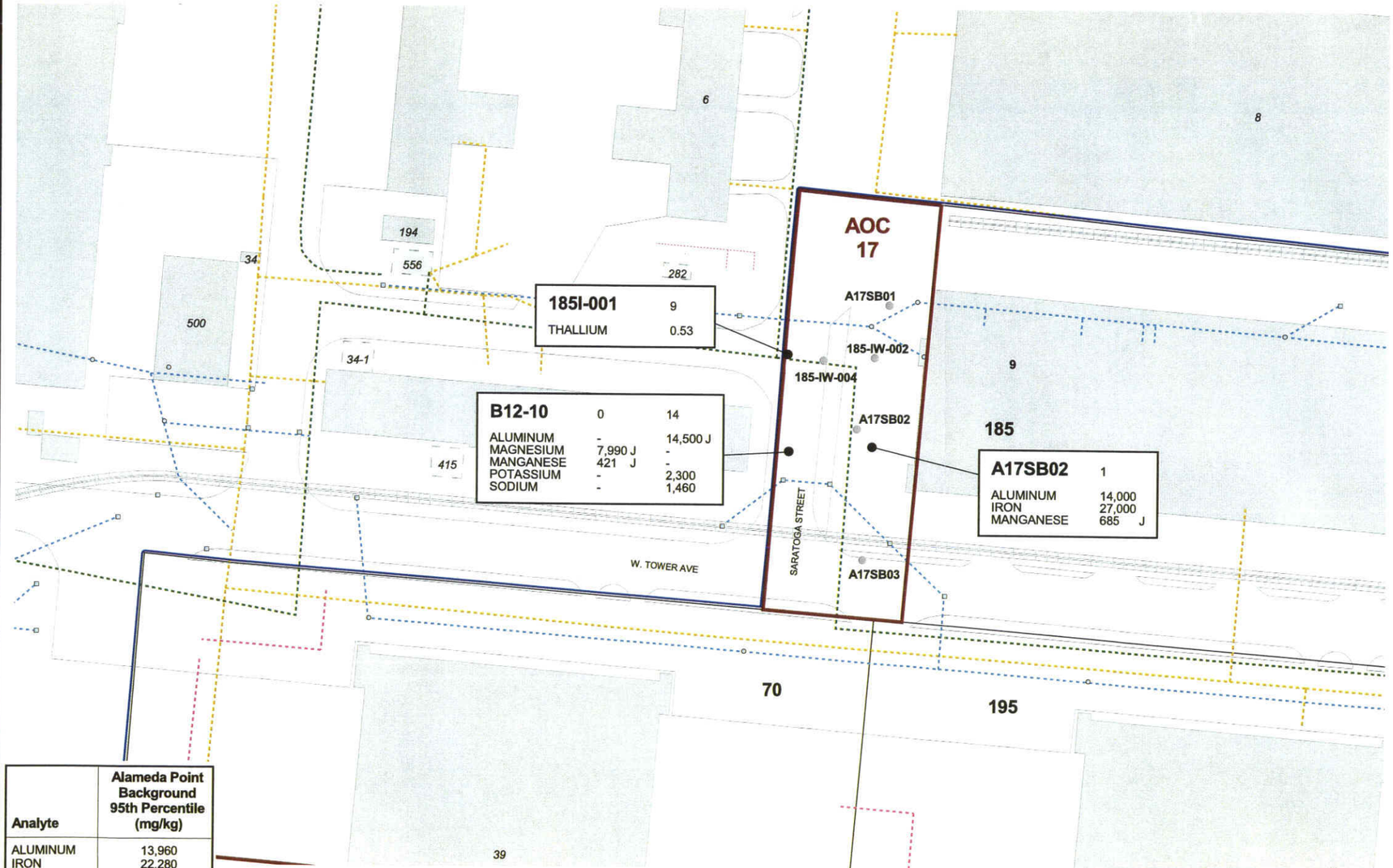
Figure 4-13

Concentrations of Metals Other than Lead in Soil Above Background – Area of Concern 12

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/28/07
File No.: 077A15395
Job No.: 23818-077
Rev No.: E



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- FUEL LINE (ABANDONED IN-PLACE)
- FUEL LINE (REMOVED)
- METALS SOIL SAMPLING LOCATION
- METALS SOIL SAMPLING LOCATION WITH CONCENTRATION GREATER THAN BACKGROUND

STATION ID (SAMPLE ID FOR EBS LOCATIONS) — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

A17SB02 1

ANALYTE	CONCENTRATION in mg/kg	REVIEW QUALIFIER
ALUMINUM	14,000	
IRON	27,000	
MANGANESE	685	J

N

Analyte	Alameda Point Background 95th Percentile (mg/kg)
ALUMINUM	13,960
IRON	22,280
MAGNESIUM	7,304
MANGANESE	383.0
POTASSIUM	1,232
SODIUM	1,230
THALLIUM	0.50

SOURCE:
TETRA TECH EM INC. 2004. FINAL REMEDIAL INVESTIGATION REPORT, OU-1 SITES 6,7,8, AND 16, ALAMEDA POINT, ALAMEDA, CALIFORNIA. NOVEMBER 18.

NOTES:

AOC – AREA OF CONCERN
BGS -- BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
mg/kg – MILLIGRAMS PER KILOGRAM
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
- DASH INDICATES CONCENTRATION BELOW BACKGROUND

100 0 100 Feet

RI/FS Report for IR Site 35

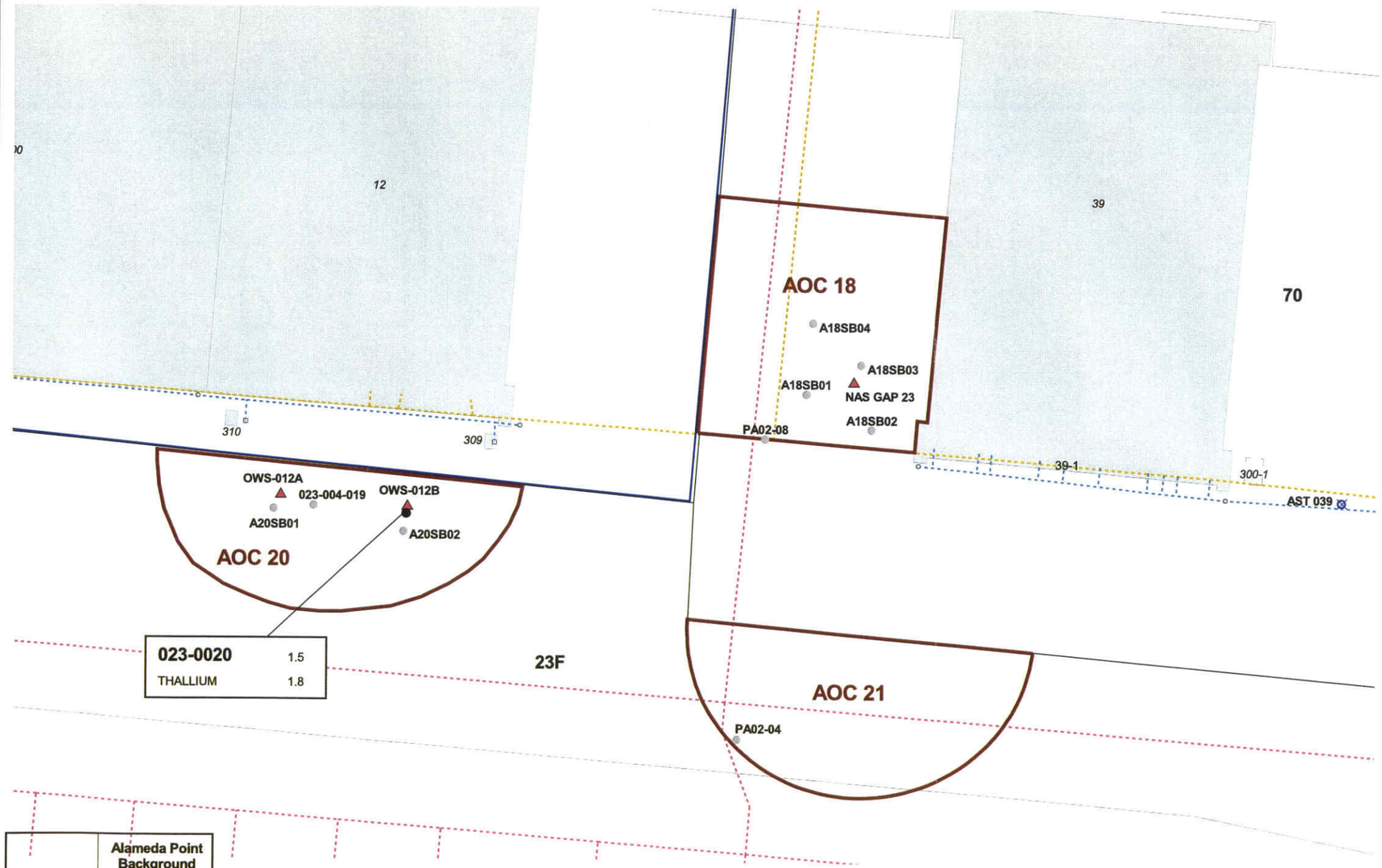
Figure 4-14

Concentrations of Metals in Soil Above Background – Area of Concern 17

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/28/07
File No.: 077A15352
Job No.: 23818-077
Rev No.: B



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- FUEL LINE (ABANDONED IN-PLACE)
- METALS SOIL SAMPLING LOCATION
- METALS SOIL SAMPLING LOCATION WITH CONCENTRATION GREATER THAN BACKGROUND

SAMPLE ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

023-0020	1.5
THALLIUM	1.8

ANALYTE — CONCENTRATION in mg/kg

N

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
mg/kg – MILLIGRAMS PER KILOGRAM
NAS – NAVAL AIR STATION
OWS – OIL/WATER SEPARATOR
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT

Analyte	Alameda Point Background 95th Percentile (mg/kg)
THALLIUM	0.50

SOURCE:
TETRA TECH EM INC. 2004. FINAL REMEDIAL INVESTIGATION REPORT, OU-1 SITES 6,7,8, AND 16, ALAMEDA POINT, ALAMEDA, CALIFORNIA. NOVEMBER 18.

100 0 100 Feet

RI/FS Report for IR Site 35

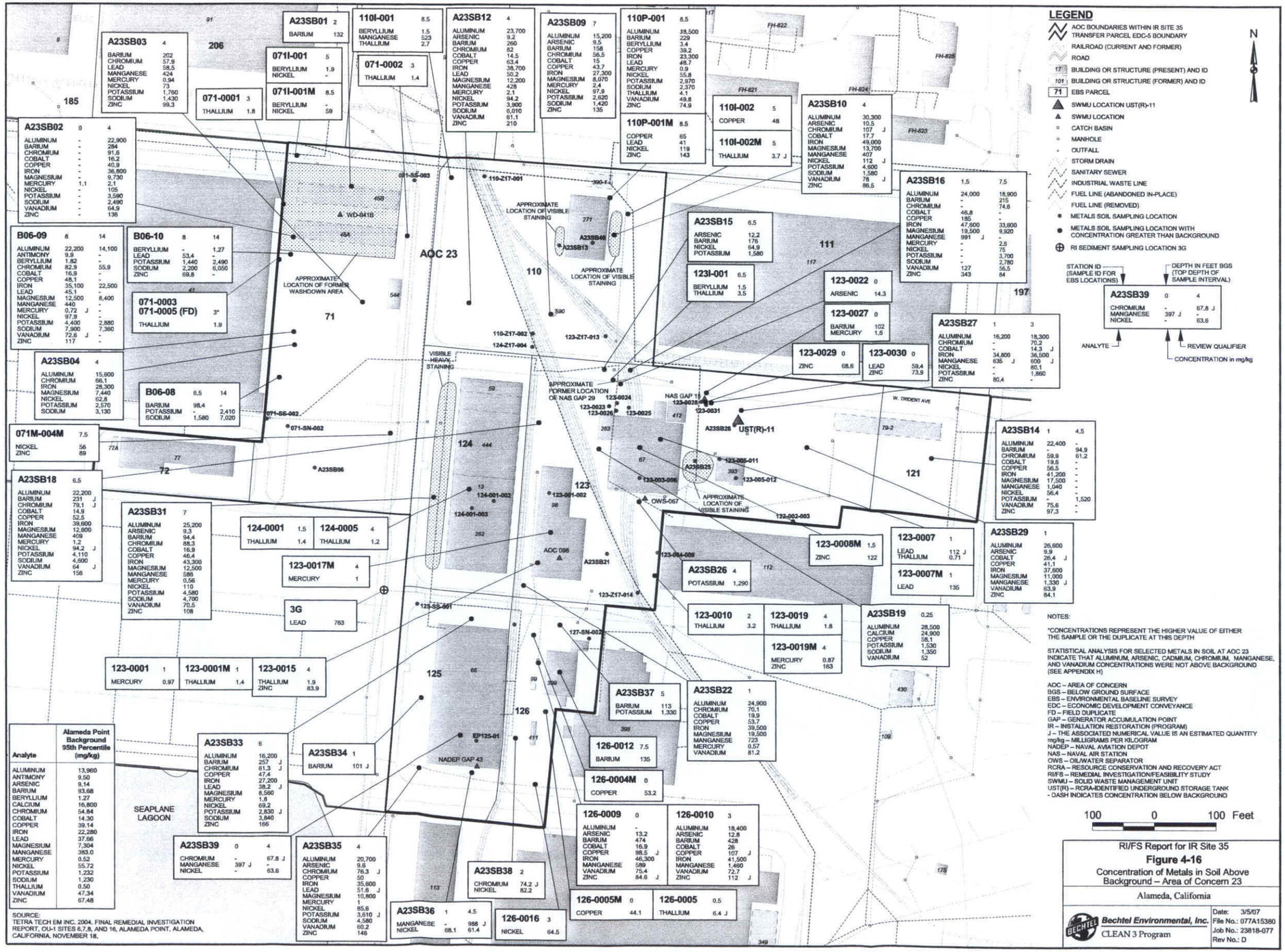
Figure 4-15

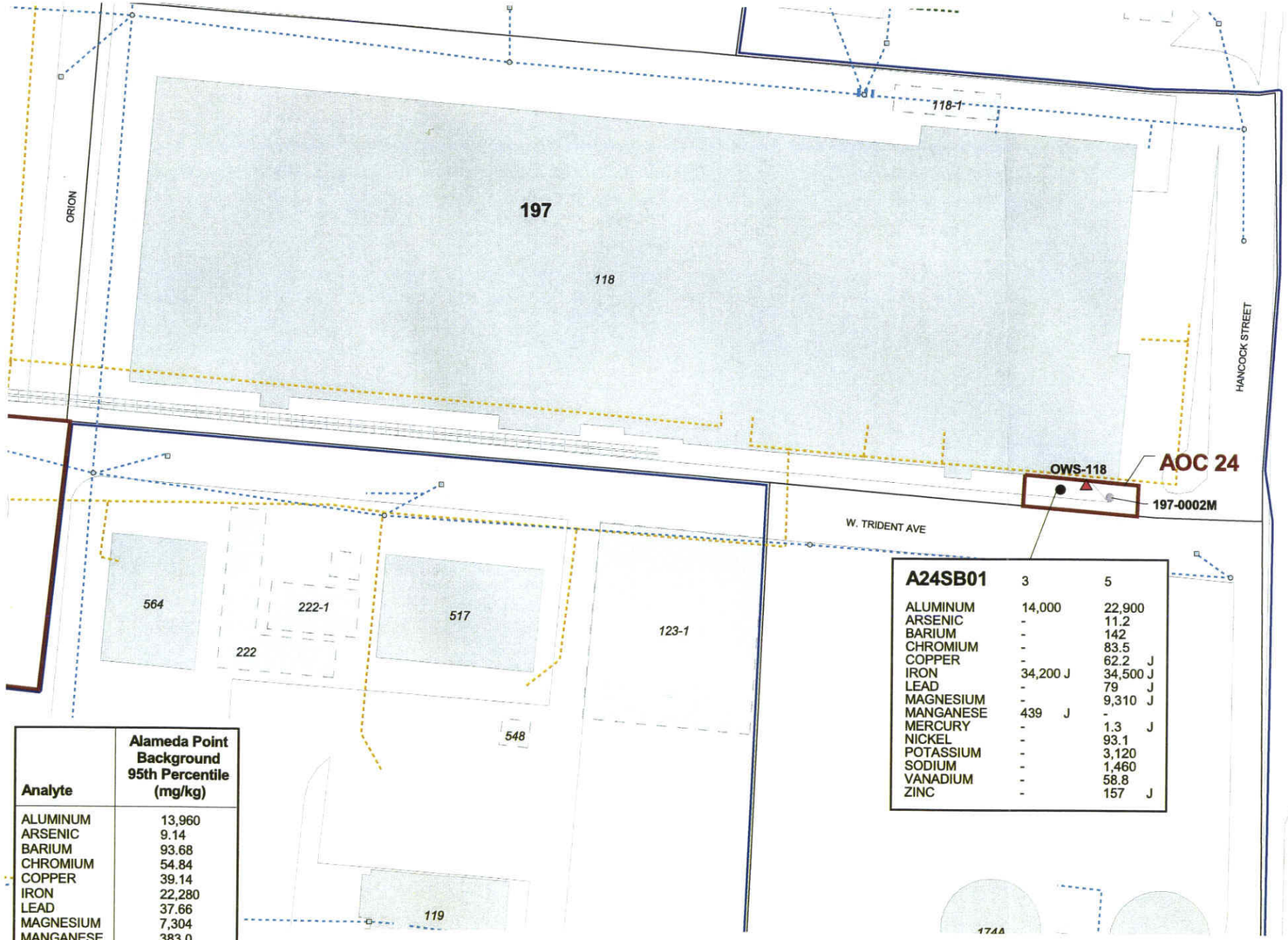
Concentrations of Metals in Soil Above Background Areas of Concern 18, 20, and 21

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/28/07
File No.: 077A15382
Job No.: 23818-077
Rev No.: C


AOC 23
A23SB01 2 BARIUM 132
110I-001 8.5 BERYLLIUM 1.5 MANGANESE 523 THALLIUM 2.7
071I-001 5 BERYLLIUM 1.9 NICKEL -
071I-001M 8.5 BERYLLIUM - NICKEL 59
071-0002 3 THALLIUM 1.4
071-0001 3 THALLIUM 1.8
A23SB03 4 BARIUM 202 CHROMIUM 57.9 LEAD 58.5 MANGANESE 424 MERCURY 0.94 NICKEL 73 POTASSIUM 1,760 SODIUM 1,430 ZINC 99.3
A23SB12 4 ALUMINUM 23,700 ARSENIC 9.2 BARIUM 260 CHROMIUM 82 COBALT 14.5 COPPER 63.4 IRON 38,700 LEAD 50.2 MAGNESIUM 12,200 MANGANESE 428 MERCURY 2.1 NICKEL 94.2 POTASSIUM 3,900 SODIUM 6,010 VANADIUM 61.1 ZINC 210
A23SB09 7 ALUMINUM 15,200 ARSENIC 9.5 BARIUM 158 CHROMIUM 56.5 COBALT 15 COPPER 43.7 IRON 27,300 MAGNESIUM 8,070 MERCURY 2.4 NICKEL 97.9 POTASSIUM 2,620 SODIUM 1,420 ZINC 135
110P-001 8.5 ALUMINUM 38,500 BARIUM 229 BERYLLIUM 3.4 COPPER 39.2 IRON 23,300 LEAD 48.7 MERCURY 0.9 NICKEL 55.8 POTASSIUM 2,970 SODIUM 2,370 THALLIUM 4.1 VANADIUM 49.8 ZINC 74.9
110P-001M 8.5 COPPER 65 LEAD 41 NICKEL 119 ZINC 143
110I-002 5 COPPER 48
110I-002M 5 THALLIUM 3.7 J
A23SB10 4 ALUMINUM 30,300 ARSENIC 10.5 CHROMIUM 107 J COBALT 17.7 IRON 49,000 MAGNESIUM 13,700 MANGANESE 407 NICKEL 112 J POTASSIUM 4,600 SODIUM 1,580 VANADIUM 78 J ZINC 86.5
A23SB16 1.5 7.5 ALUMINUM 24,000 18,900 BARIUM - 215 CHROMIUM - 74.6 COBALT 46.8 - COPPER 185 - IRON 47,600 33,600 MAGNESIUM 19,500 9,920 MANGANESE 991 J - MERCURY - 2.6 NICKEL - 75 POTASSIUM - 3,700 SODIUM - 2,780 VANADIUM 127 56.5 ZINC 343 84
A23SB02 0 4 ALUMINUM - 22,900 BARIUM - 284 CHROMIUM - 91.6 COBALT - 16.2 COPPER - 40.9 IRON - 36,800 MAGNESIUM - 9,730 MERCURY 1.1 2.1 NICKEL - 105 POTASSIUM - 3,590 SODIUM - 2,490 VANADIUM - 94.9 ZINC - 136
B06-09 8 14 ALUMINUM 22,200 14,100 ANTIMONY 9.9 - BERYLLIUM 1.82 - CHROMIUM 82.9 55.9 COBALT 16.9 - COPPER 48.1 - IRON 35,100 22,500 LEAD 45.1 - MAGNESIUM 12,500 8,400 MANGANESE 440 - MERCURY 0.72 J - NICKEL 97.9 - POTASSIUM 4,400 2,880 SODIUM 7,900 7,360 VANADIUM 72.6 J - ZINC 117 -
B06-10 8 14 BERYLLIUM - 1.27 LEAD 53.4 - POTASSIUM 1,440 2,490 SODIUM 2,200 6,050 ZINC 69.8 -
071-0003 071-0005 (FD) 3* THALLIUM 1.9
A23SB04 4 ALUMINUM 15,600 CHROMIUM 68.1 IRON 28,300 MAGNESIUM 7,440 NICKEL 62.8 POTASSIUM 2,570 SODIUM 3,130
B06-08 6.5 14 BARIUM 98.4 - POTASSIUM - 2,410 SODIUM 1,580 7,020
071M-004M 7.5 NICKEL 56 ZINC 89
A23SB18 6.5 ALUMINUM 22,200 BARIUM 231 J CHROMIUM 79.1 J COBALT 14.9 COPPER 52.5 IRON 39,600 MAGNESIUM 12,600 MANGANESE 409 MERCURY 1.2 NICKEL 94.2 J POTASSIUM 4,110 SODIUM 4,600 VANADIUM 64 J ZINC 156
A23SB31 7 ALUMINUM 25,200 ARSENIC 9.3 BARIUM 94.4 CHROMIUM 88.3 COBALT 16.9 COPPER 46.4 IRON 43,300 MAGNESIUM 12,500 MANGANESE 586 MERCURY 0.56 NICKEL 110 POTASSIUM 4,580 SODIUM 4,700 VANADIUM 70.5 ZINC 108
124-0001 1.5 THALLIUM 1.4
124-0005 4 THALLIUM 1.2
123-0017M 4 MERCURY 1
3G LEAD 763
123-0001 1 MERCURY 0.97
123-0001M 1 THALLIUM 1.4
123-0015 4 THALLIUM 1.9 ZINC 83.9
A23SB15 6.5 ARSENIC 12.2 BARIUM 176 NICKEL 64.9 POTASSIUM 1,580
123I-001 6.5 BERYLLIUM 1.5 THALLIUM 3.5
123-0022 0 ARSENIC 14.3
123-0027 0 BARIUM 102 MERCURY 1.6
123-0029 0 ZINC 68.6
123-0030 0 LEAD 59.4 ZINC 73.9
A23SB27 1 3 ALUMINUM 16,200 18,300 CHROMIUM - 70.2 COBALT - 14.3 J IRON 34,800 36,500 MANGANESE 635 J 600 J NICKEL - 80.1 POTASSIUM - 1,860 ZINC 80.4 -
A23SB14 1 4.5 ALUMINUM 22,400 - BARIUM - 94.9 CHROMIUM 59.9 61.2 COBALT 19.6 - COPPER 56.5 - IRON 41,200 - MAGNESIUM 17,500 - MANGANESE 1,040 - NICKEL 56.4 - POTASSIUM - 1,520 VANADIUM 75.6 - ZINC 97.3 -
A23SB29 1 ALUMINUM 26,600 ARSENIC 9.9 COBALT 26.4 J COPPER 41.1 IRON 37,600 MAGNESIUM 11,000 MANGANESE 1,330 J VANADIUM 63.9 ZINC 84.1
123-0007 1 LEAD 112 J THALLIUM 0.71
123-0007M 1 LEAD 135
123-0008M 1.5 ZINC 122
A23SB26 4 POTASSIUM 1,290
123-0010 2 THALLIUM 3.2
123-0019 4 THALLIUM 1.8
123-0019M 4 MERCURY 0.87 ZINC 163
A23SB19 0.25 ALUMINUM 28,500 CALCIUM 24,900 COPPER 58.1 POTASSIUM 1,530 SODIUM 1,350 VANADIUM 52
A23SB37 5 BARIUM 113 POTASSIUM 1,330
A23SB22 1 ALUMINUM 24,900 CHROMIUM 70.1 COBALT 19.9 COPPER 53.7 IRON 39,500 MAGNESIUM 19,500 MANGANESE 723 MERCURY 0.57 VANADIUM 81.2
126-0012 7.5 BARIUM 135
126-0004M 0 COPPER 53.2
126-0009 0 ALUMINUM - ARSENIC 13.2 BARIUM 474 COBALT 16.9 COPPER 98.5 J IRON 46,300 MANGANESE 589 VANADIUM 75.4 ZINC 84.6 J
126-0010 3 ALUMINUM 18,400 ARSENIC 12.8 BARIUM 428 COBALT 26 COPPER 107 J IRON 41,500 MANGANESE 1,460 VANADIUM 72.7 ZINC 112 J
126-0005M 0 COPPER 44.1
126-0005 0.5 THALLIUM 6.4 J
A23SB38 2 CHROMIUM 74.2 J NICKEL 82.2
A23SB36 1 4.5 MANGANESE - 988 J NICKEL 68.1 61.4
126-0016 3 NICKEL 64.5
A23SB33 6 ALUMINUM 16,200 BARIUM 257 J CHROMIUM 61.3 J COPPER 47.4 IRON 27,200 LEAD 38.2 J MAGNESIUM 8,560 MERCURY 1.8 NICKEL 69.2 POTASSIUM 2,830 J SODIUM 3,840 ZINC 166
A23SB34 1 BARIUM 101 J
A23SB39 0 4 CHROMIUM - 67.8 J MANGANESE 397 J - NICKEL - 63.6
A23SB35 4 ALUMINUM 20,700 ARSENIC 9.8 CHROMIUM 76.3 J COPPER 50 IRON 35,600 LEAD 51.6 J MAGNESIUM 10,800 MERCURY 1 NICKEL 85.6 POTASSIUM 3,610 J SODIUM 4,580 VANADIUM 60.2 ZINC 146
A23SB39 0 4 CHROMIUM - 67.8 J MANGANESE 397 J - NICKEL - 63.6
A23SB11 0 4 ALUMINUM 13,960 ANTIMONY 9.50 ARSENIC 9.14 BARIUM 93.68 BERYLLIUM 1.27 CALCIUM 16,800 CHROMIUM 54.84 COBALT 14.30 COPPER 39.14 IRON 22,280 LEAD 37.66 MAGNESIUM 7,304 MANGANESE 383.0 MERCURY 0.52 NICKEL 55.72 POTASSIUM 1,232 SODIUM 1,230 THALLIUM 0.50 VANADIUM 47.34 ZINC 67.48
Analyte | Alameda Point Background 95th Percentile (mg/kg)
SOURCE: TETRA TECH EM INC. 2004. FINAL REMEDIAL INVESTIGATION REPORT, OU-1 SITES 6,7,8, AND 16, ALAMEDA POINT, ALAMEDA, CALIFORNIA. NOVEMBER 18.
LEGEND
AOC BOUNDARIES WITHIN IR SITE 35
TRANSFER PARCEL EDC-5 BOUNDARY
RAILROAD (CURRENT AND FORMER)
ROAD
17 BUILDING OR STRUCTURE (PRESENT) AND ID
101 BUILDING OR STRUCTURE (FORMER) AND ID
71 EBS PARCEL
SWMU LOCATION UST(R)-11
SWMU LOCATION
CATCH BASIN
MANHOLE
OUTFALL
STORM DRAIN
SANITARY SEWER
INDUSTRIAL WASTE LINE
FUEL LINE (ABANDONED IN-PLACE)
FUEL LINE (REMOVED)
METALS SOIL SAMPLING LOCATION
METALS SOIL SAMPLING LOCATION WITH CONCENTRATION GREATER THAN BACKGROUND
RI SEDIMENT SAMPLING LOCATION 3G
STATION ID (SAMPLE ID FOR EBS LOCATIONS)
DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)
A23SB39 0 4 CHROMIUM - 67.8 J MANGANESE 397 J - NICKEL - 63.6
ANALYTE
REVIEW QUALIFIER
CONCENTRATION in mg/kg
N
NOTES:
*CONCENTRATIONS REPRESENT THE HIGHER VALUE OF EITHER THE SAMPLE OR THE DUPLICATE AT THIS DEPTH
STATISTICAL ANALYSIS FOR SELECTED METALS IN SOIL AT AOC 23 INDICATE THAT ALUMINUM, ARSENIC, CADMIUM, CHROMIUM, MANGANESE, AND VANADIUM CONCENTRATIONS WERE NOT ABOVE BACKGROUND (SEE APPENDIX H)
AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
FD – FIELD DUPLICATE
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
mg/kg – MILLIGRAMS PER KILOGRAM
NADEP – NAVAL AVIATION DEPOT
NAS – NAVAL AIR STATION
OWS – OILWATER SEPARATOR
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
- DASH INDICATES CONCENTRATION BELOW BACKGROUND
100 0 100 Feet
RI/FS Report for IR Site 35
Figure 4-16
Concentration of Metals in Soil Above Background – Area of Concern 23
Alameda, California
Bechtel Environmental, Inc.
CLEAN 3 Program
Date: 3/5/07
File No.: 077A15380
Job No.: 23818-077
Rev No.: D



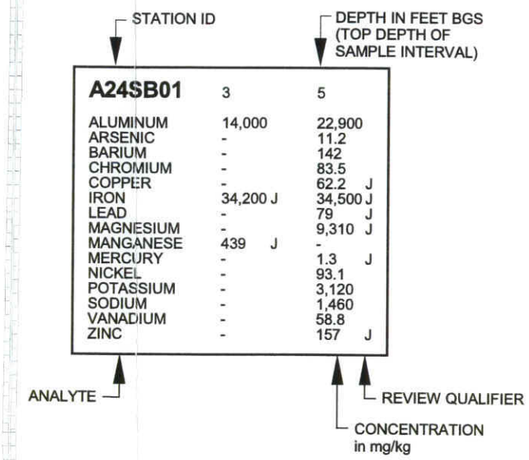
A24SB01	3	5
ALUMINUM	14,000	22,900
ARSENIC	-	11.2
BARIUM	-	142
CHROMIUM	-	83.5
COPPER	-	62.2 J
IRON	34,200 J	34,500 J
LEAD	-	79 J
MAGNESIUM	-	9,310 J
MANGANESE	439 J	-
MERCURY	-	1.3 J
NICKEL	-	93.1
POTASSIUM	-	3,120
SODIUM	-	1,460
VANADIUM	-	58.8
ZINC	-	157 J

Analyte	Alameda Point Background 95th Percentile (mg/kg)
ALUMINUM	13,960
ARSENIC	9.14
BARIUM	93.68
CHROMIUM	54.84
COPPER	39.14
IRON	22,280
LEAD	37.66
MAGNESIUM	7,304
MANGANESE	383.0
MERCURY	0.52
NICKEL	55.72
POTASSIUM	1,232
SODIUM	1,230
VANADIUM	47.34
ZINC	67.48

SOURCE:
TETRA TECH EM INC. 2004. FINAL REMEDIAL INVESTIGATION REPORT, OU-1 SITES 6,7,8, AND 16, ALAMEDA POINT, ALAMEDA, CALIFORNIA. NOVEMBER 18.

LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- METALS SOIL SAMPLING LOCATION
- METALS SOIL SAMPLING LOCATION WITH CONCENTRATION GREATER THAN BACKGROUND



N

NOTES:

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
mg/kg – MILLIGRAMS PER KILOGRAM
OWS – OIL/WATER SEPARATOR
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
- DASH INDICATES CONCENTRATION BELOW BACKGROUND

100 0 100 Feet

RI/FS Report for IR Site 35

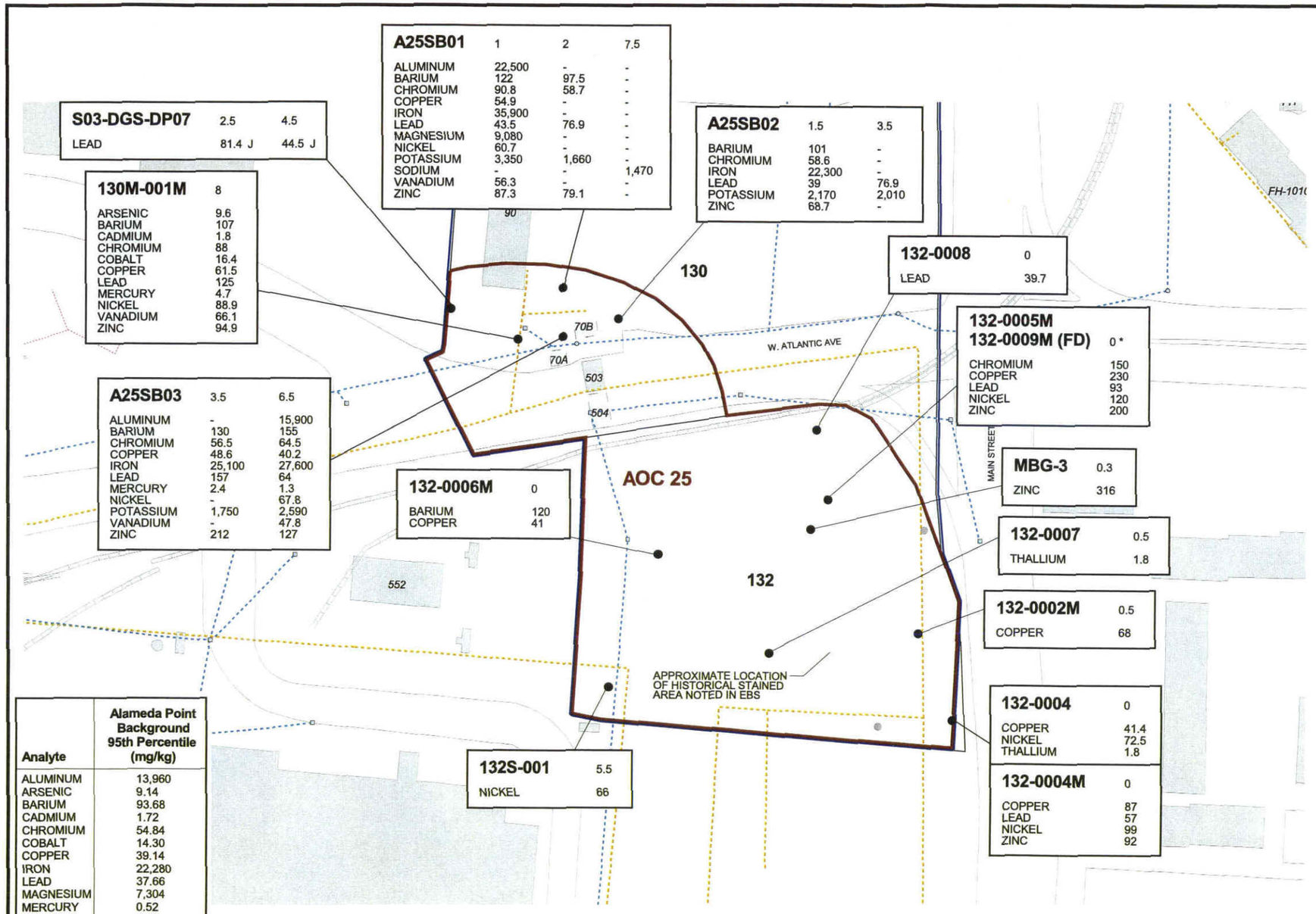
Figure 4-17

Concentrations of Metals in Soil Above Background – Area of Concern 24

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/28/07
File No.: 077A15379
Job No.: 23818-077
Rev No.: B



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- FUEL LINE (ABANDONED IN-PLACE)
- FUEL LINE (REMOVED)
- METALS SOIL SAMPLING LOCATION
- METALS SOIL SAMPLING LOCATION WITH CONCENTRATION GREATER THAN BACKGROUND

N

STATION ID (SAMPLE ID FOR EBS LOCATIONS) — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

S03-DGS-DP07	2.5	4.5
LEAD	81.4 J	44.5 J

ANALYTE — CONCENTRATION in mg/kg — REVIEW QUALIFIER

Analyte	Alameda Point Background 95th Percentile (mg/kg)
ALUMINUM	13,960
ARSENIC	9.14
BARIUM	93.68
CADMIUM	1.72
CHROMIUM	54.84
COBALT	14.30
COPPER	39.14
IRON	22,280
LEAD	37.66
MAGNESIUM	7,304
MERCURY	0.52
NICKEL	55.72
POTASSIUM	1,232
SODIUM	1,230
THALLIUM	0.50
VANADIUM	47.34
ZINC	67.48

SOURCE:
TETRA TECH EM INC. 2004. FINAL REMEDIAL INVESTIGATION REPORT, OU-1 SITES 6,7,8, AND 16, ALAMEDA POINT, ALAMEDA, CALIFORNIA. NOVEMBER 18.

NOTES:

*CONCENTRATIONS REPRESENT THE HIGHER VALUE OF EITHER THE SAMPLE OR THE DUPLICATE AT THIS DEPTH

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
FD – FIELD DUPLICATE
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
mg/kg – MILLIGRAMS PER KILOGRAM
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
- DASH INDICATES CONCENTRATION BELOW BACKGROUND

100 0 100 Feet

RI/FS Report for IR Site 35

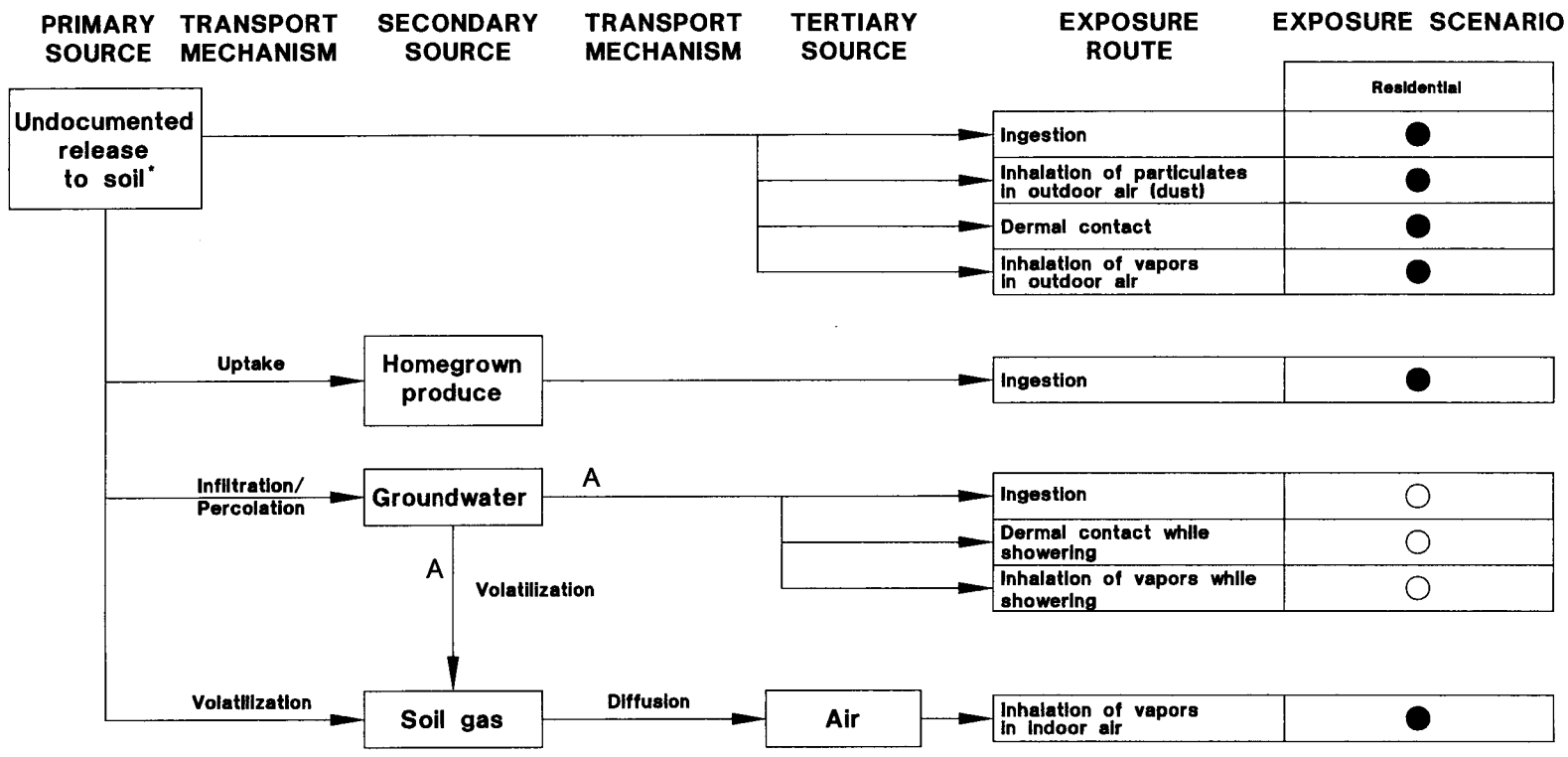
Figure 4-18

Concentrations of Metals in Soil Above Background – Area of Concern 25

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/28/07
File No.:077A15350
Job No.: 23818-077
Rev No.: B



LEGEND

- ● POTENTIALLY COMPLETE EXPOSURE PATHWAY
- ○ POTENTIALLY COMPLETE EXPOSURE PATHWAY; CONSIDERED AN UNLIKELY PATHWAY, BUT WAS EVALUATED IN THE HUMAN-HEALTH RISK ASSESMENT
- A THESE PATHWAYS WILL NOT BE INCLUDED FOR AREAS WITHOUT GROUNDWATER DATA

NOTE:

* 0–10 FEET BELOW GROUND SURFACE OR 0 FEET TO GROUNDWATER, WHICHEVER COMES FIRST

RI/FS Report for IR Site 35

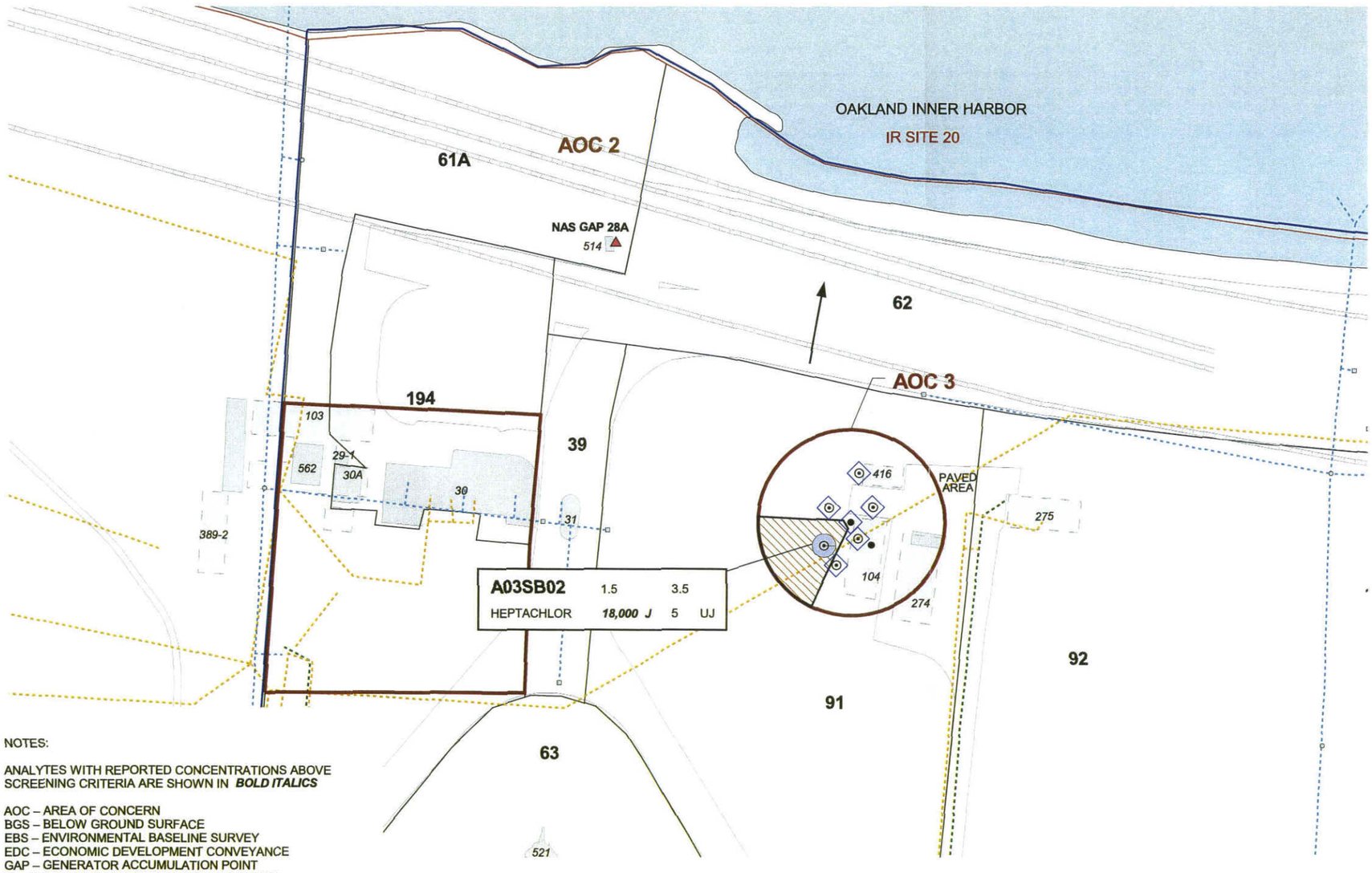
Figure 6-1

Baseline Human-Health Risk Assessment
Conceptual Site Model

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/26/06
File No: 077C14487
Job No: 23818-077
Rev No: C



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- WATER
- 71 EBS PARCEL
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL SOIL SAMPLING LOCATION
- RI SOIL SAMPLING LOCATION

SOIL SAMPLING LOCATION WITH ANALYTE(S) ABOVE PRELIMINARY RG FOR :

- PESTICIDES/PCBs

SOIL SAMPLING LOCATION WITH ANALYTE(S) BELOW PRELIMINARY RG FOR :

- PESTICIDES/PCBs

- ASSUMED IMPACTED AREA (3,500 SQUARE FEET UNPAVED)

N

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

A03SB02 1.5 3.5
HEPTACHLOR ***18,000 J*** 5 UJ

ANALYTE — REVIEW QUALIFIER — CONCENTRATION in µg/kg

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE SCREENING CRITERIA ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
µg/kg – MICROGRAMS PER KILOGRAM
NAS – NAVAL AIR STATION
PCB – POLYCHLORINATED BIPHENYL
PRG – PRELIMINARY REMEDIATION GOAL
RG – REMEDIATION GOAL
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
UJ – THE ANALYTE WAS NOT REPORTED ABOVE THE DETECTION LIMIT. THE SAMPLE QUANTITATION LIMIT IS AN ESTIMATED QUANTITY

Analyte	PRELIMINARY RG
HEPTACHLOR	110 µg/kg (Federal Residential PRG)

RI/FS Report for IR Site 35

Figure 11-1

Assumed Extent of Heptachlor-Impacted Soil at Area of Concern 3

Alameda, California

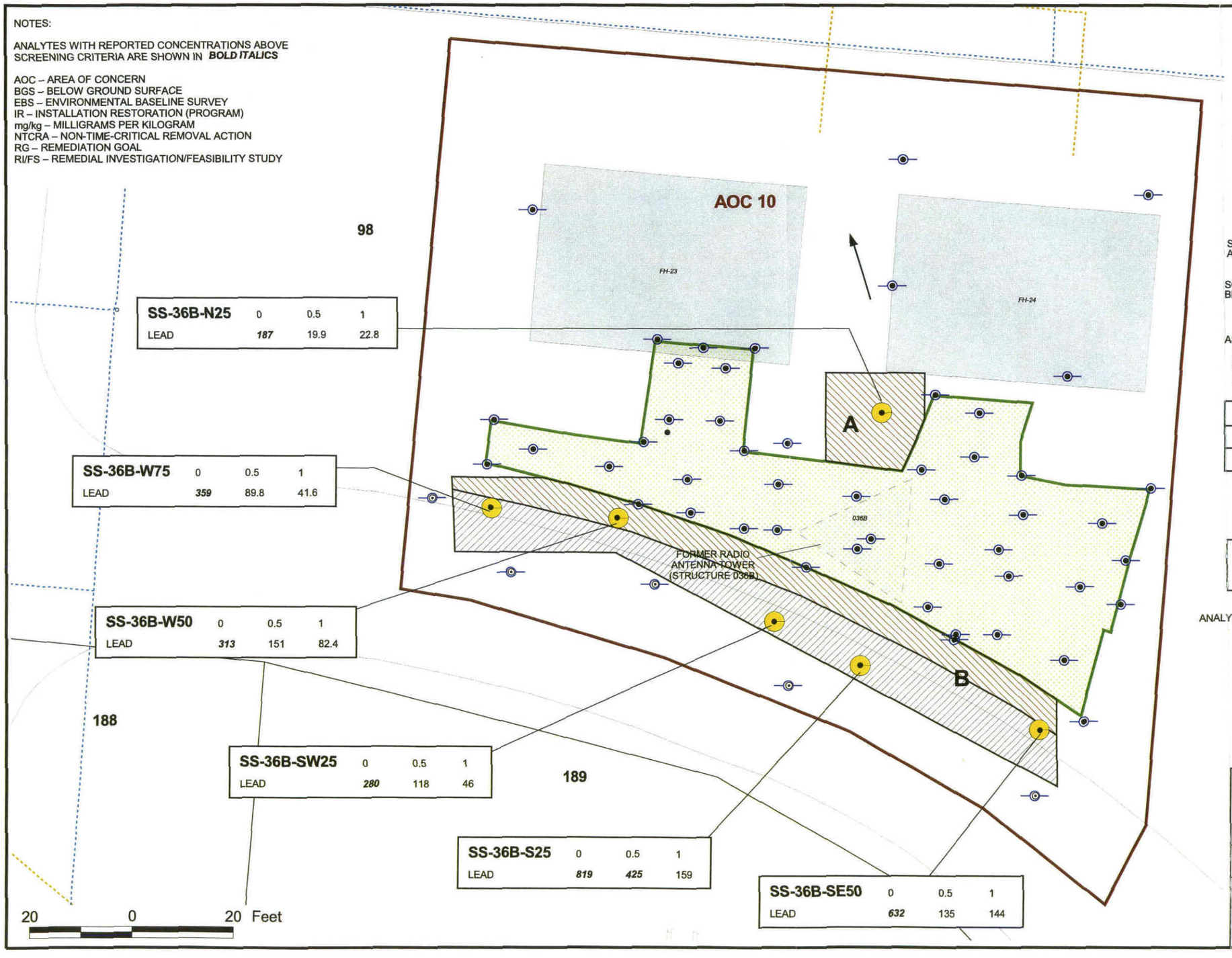
Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/28/07
File No.: 077L14574
Job No.: 23818-077
Rev No.: F

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE SCREENING CRITERIA ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
IR – INSTALLATION RESTORATION (PROGRAM)
mg/kg – MILLIGRAMS PER KILOGRAM
NTCRA – NON-TIME-CRITICAL REMOVAL ACTION
RG – REMEDIATION GOAL
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- NTCRA REMOVAL LOCATION
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL SOIL SAMPLING LOCATION
- RI SOIL SAMPLING LOCATION

SOIL SAMPLING LOCATION WITH ANALYTE(S) ABOVE PRELIMINARY RG FOR :
- METALS

SOIL SAMPLING LOCATION WITH ANALYTE(S) BELOW PRELIMINARY RG FOR :
- METALS

ASSUMED IMPACTED AREAS
- PAVED AREA
- UNPAVED AREA

Impacted Area	Area (square feet)
A	325
B	1,900

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

SS-36B-SW25 0 0.5 1
LEAD ***280*** 118 46

ANALYTE — CONCENTRATION in mg/kg

Analyte	PRELIMINARY RG
LEAD	184 mg/kg

RI/FS Report for IR Site 35

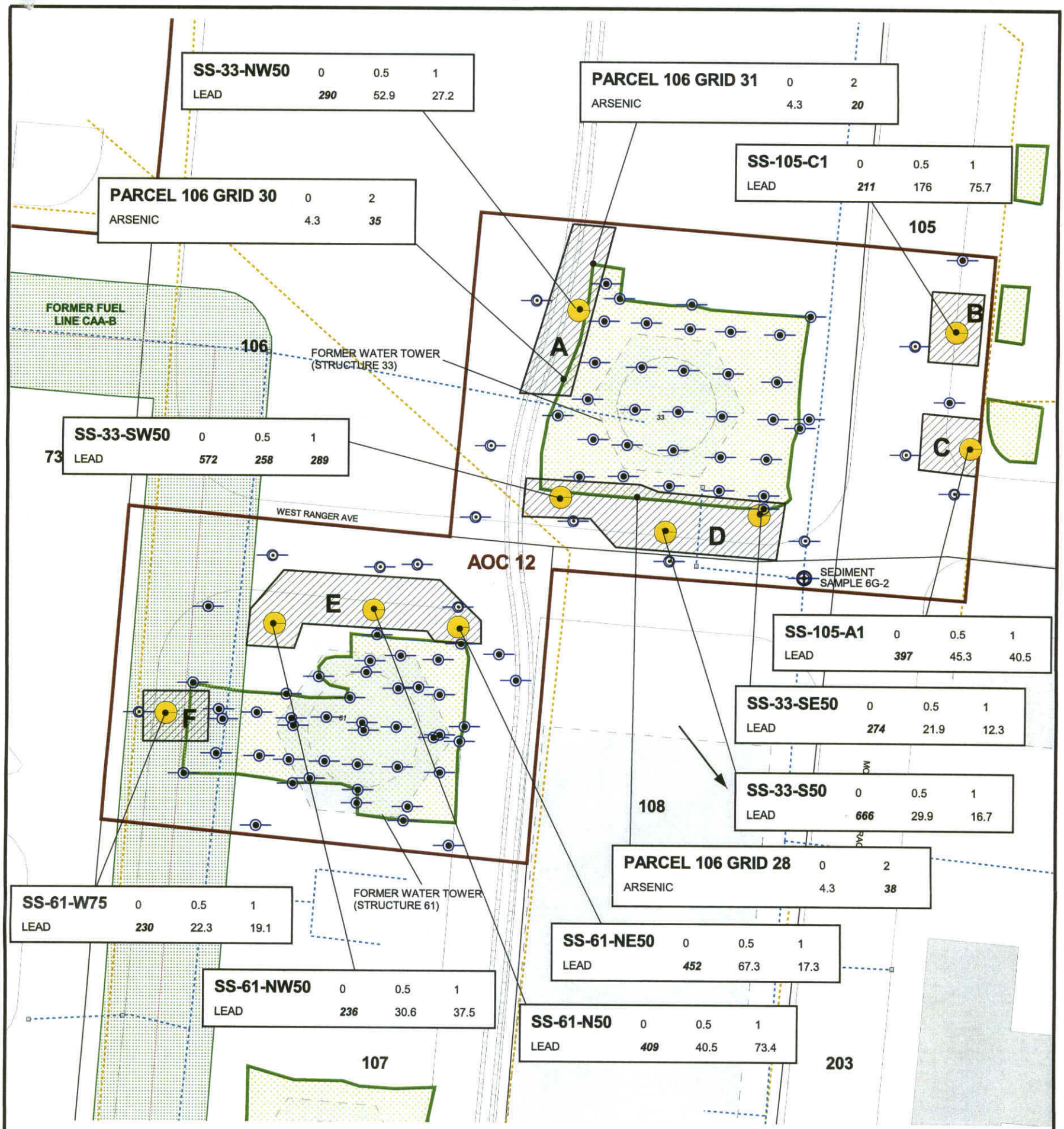
Figure 11-2

Assumed Extent of Lead-Impacted Soil
Area of Concern 10

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/28/07
File No.: 077L14575
Job No.: 23818-077
Rev No.: H



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- NTCRA REMOVAL LOCATION
- CORRECTIVE ACTION AREA (CAA)
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- FUEL LINE (REMOVED)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL SOIL SAMPLING LOCATION
- RI SOIL SAMPLING LOCATION
- RI SEDIMENT SAMPLING LOCATION 6G-2 (LOCATION 3G WAS COLLECTED DOWNFLOW OF AOC 12, ADJACENT TO THE WEST OF AOC 23. SEE FIGURE 11-10)

SOIL SAMPLING LOCATION WITH ANALYTE(S) ABOVE PRELIMINARY RG FOR :

- LEAD

SOIL SAMPLING LOCATION WITH ANALYTE(S) BELOW PRELIMINARY RG FOR :

- METALS

- ASSUMED IMPACTED AREAS (PAVED)

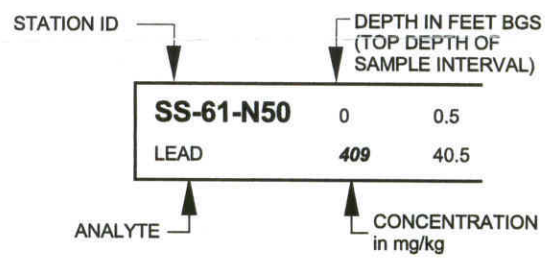
Analyte	PRELIMINARY RG
LEAD	184 mg/kg
Analyte	**Other Comparison Criteria**
ARSENIC	9.14 mg/kg (Background 95th Percentile)

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE SCREENING CRITERIA ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
IR – INSTALLATION RESTORATION (PROGRAM)
mg/kg – MILLIGRAMS PER KILOGRAM
NTCRA – NON-TIME-CRITICAL REMOVAL ACTION
RG — REMEDIATION GOAL
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

Impacted Area	Area (square feet)
A	990
B	440
C	425
D	1,700
E	1,555
F	405



40 0 40 Feet

RI/FS Report for IR Site 35

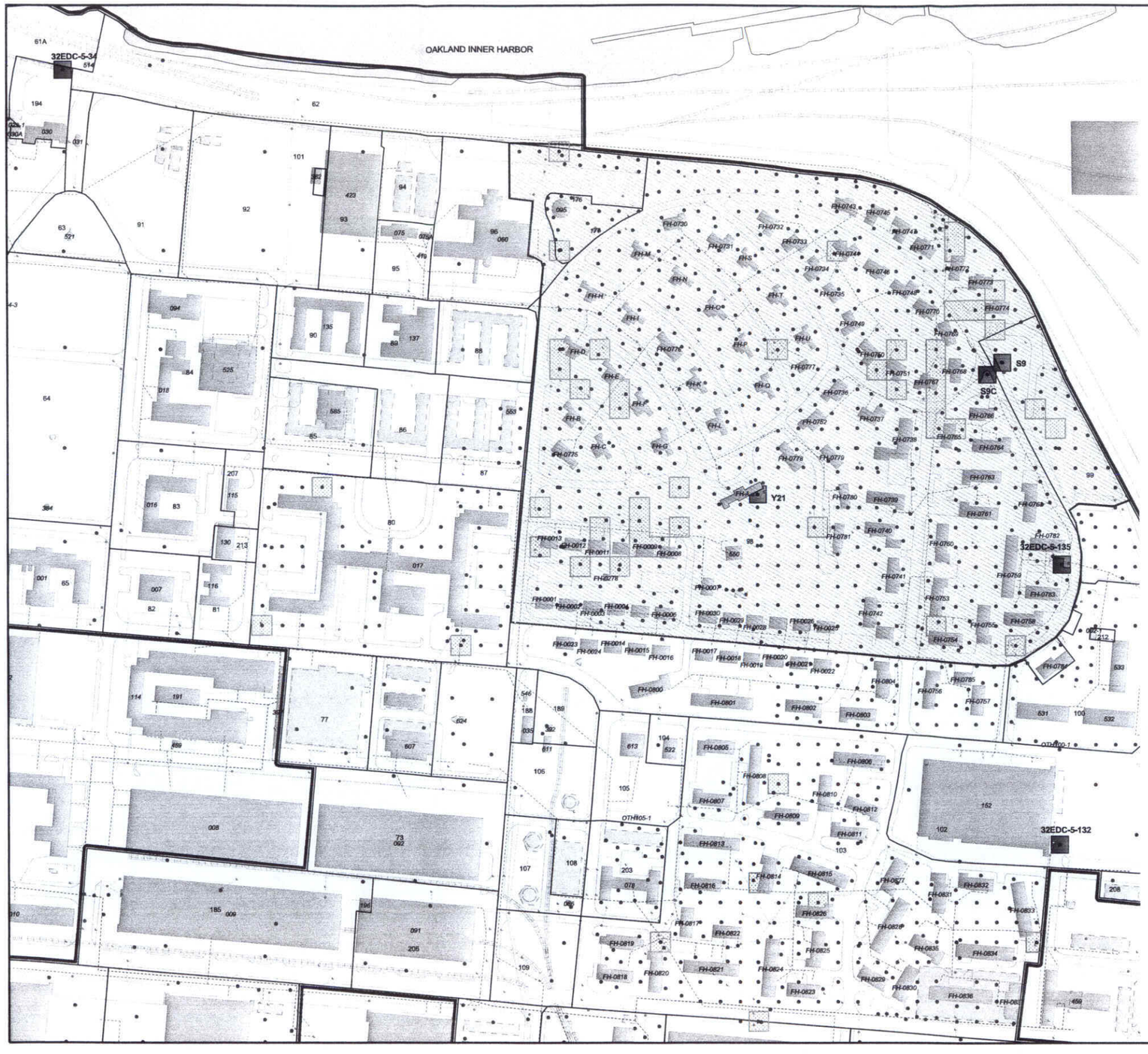
Figure 11-3

Assumed Extent of Lead-Impacted Soil at Area of Concern 12

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/28/07
File No.: 077L14576
Job No.: 23818-077
Rev No.: G



RI/FS Report for IR Site 35

Figure 11-4

Assumed ICs Area for PAH Alternatives and Excavation Areas for Alternatives PAH-3a and PAH-3b

Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 2/16/07
File No: 077L14595
Job No.: 23818-077
Rev No.: G

OAKLAND INNER HARBOR

32EDC-5-34

32EDC-5-42

32EDC-5-108

32EDC-5-126

32EDC-5-135

32EDC-5-132

32EDC-5-120

EC46

GG5

103-017

TT21

WW16

W7

OTH005-1

OTH000-1

LEGEND

- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- BUILDING OR STRUCTURE (PRESENT)
- BUILDING OR STRUCTURE (FORMER)
- WATER
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- CATCH BASIN
- MANHOLE
- OUTFALL
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- FUEL LINE (PRESENT)
- FUEL LINE (REMOVED)
- HISTORIC BUILDING PLANNED FOR REUSE
- HISTORIC BUILDING PLANNED FOR REMOVAL AS PART OF REDEVELOPMENT
- PAH SOIL SAMPLING LOCATION
- PAH SOIL SAMPLING LOCATION WITH BENZO(A)PYRENE EQUIVALENT CONCENTRATION ABOVE 1,000 µg/kg (0–4 FEET BGS)

50'X50' AREA AROUND SOIL SAMPLING LOCATIONS WITH BENZO(A)PYRENE EQUIVALENT ABOVE 1,000 µg/kg (0–4 FEET BGS) WITH STATION ID

- PAVED AREA
- UNPAVED AREA

Analyte	PRELIMINARY RG
BENZO(A)PYRENE EQUIVALENT	1,000 µg/kg

NOTES:

HISTORIC BUILDING IN THE VICINITY OF PAH LOCATIONS WITH CONCENTRATIONS ABOVE PRELIMINARY RG IS SHOWN

BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
µg/kg – MICROGRAMS PER KILOGRAM
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
RG – REMEDIATION GOAL
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

N

200 0 200 Feet

RI/FS Report for IR Site 35

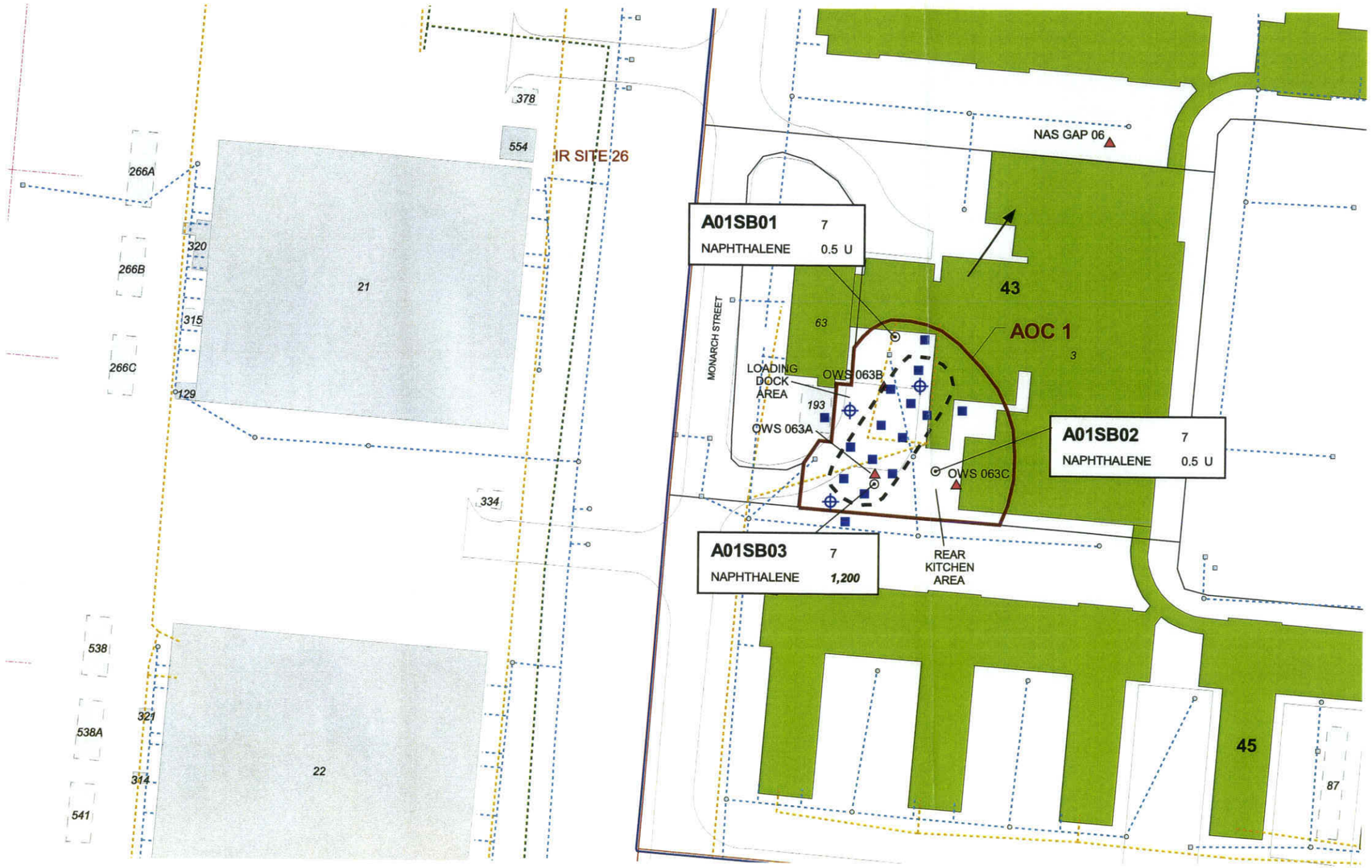
Figure 11-5

Assumed Excavation Areas for Alternatives PAH-4a and PAH-4b

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No: 077L14455
Job No.: 23818-077
Rev No.: F



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- SWMU LOCATION (APPROXIMATE)
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORIC BUILDING IDENTIFIED FOR REUSE
- RI GROUNDWATER SAMPLING LOCATION
- APPROXIMATE NAPHTHALENE PLUME BOUNDARY
- POTENTIAL HYDROPUNCH LOCATION
- POTENTIAL MONITORING WELL

N

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

A01SB02 7
NAPHTHALENE 0.5 U

ANALYTE — REVIEW QUALIFIER
CONCENTRATION in µg/L

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE SCREENING CRITERIA ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
µg/L – MICROGRAMS PER LITER
NAS – NAVAL AIR STATION
OWS – OIL/WATER SEPARATOR
RG – REMEDIATION GOAL
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
U – THE ANALYTE WAS NOT REPORTED ABOVE THE DETECTION LIMIT. THE ASSOCIATED NUMERICAL VALUE IS THE REPORTING LIMIT

Analyte	PRELIMINARY RG
NAPHTHALENE	100 µg/L

100 0 100 Feet

RI/FS Report for IR Site 35

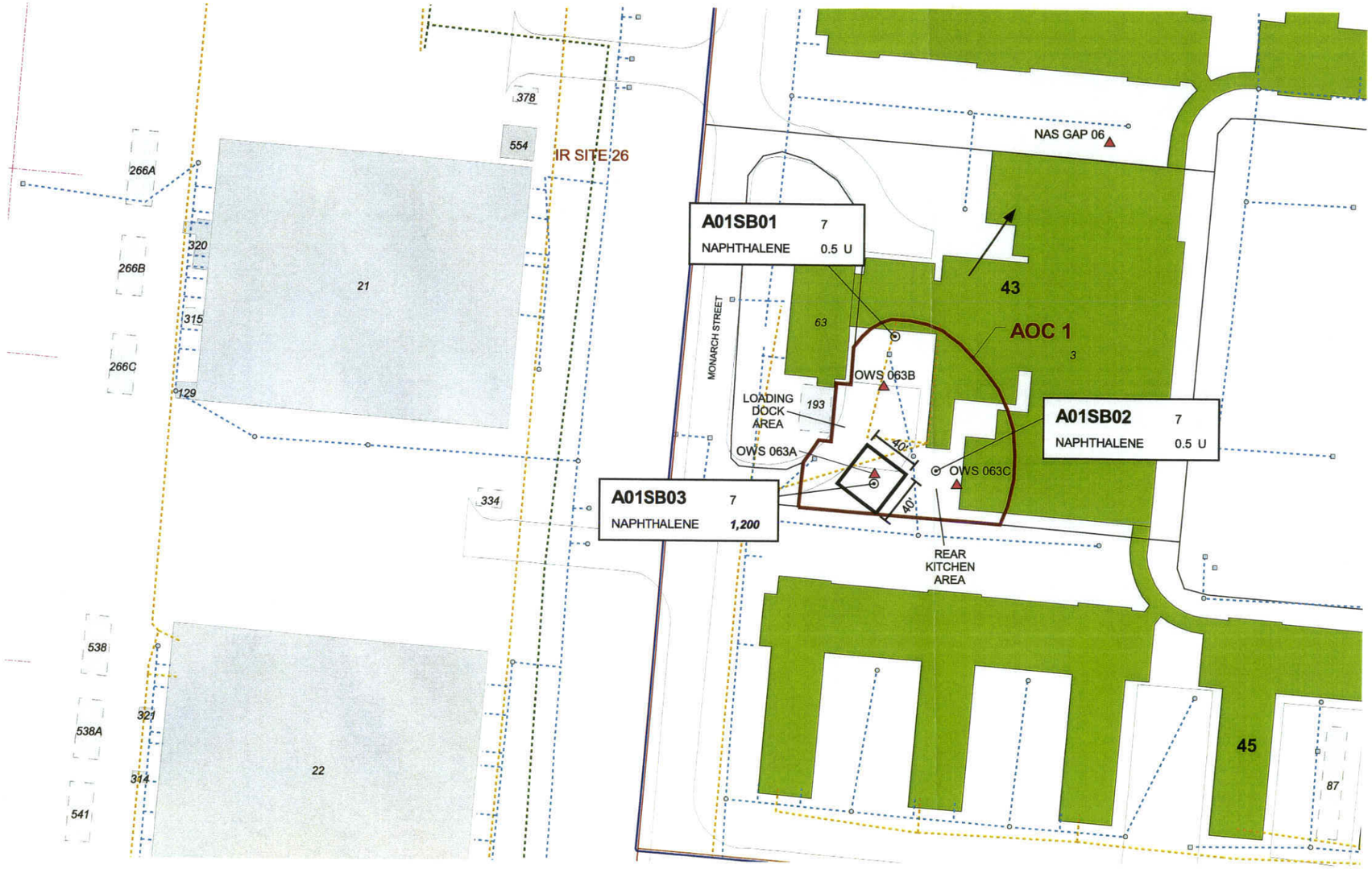
Figure 11-6

Potential Sampling Locations for Initial Investigation of Naphthalene in Groundwater at Area of Concern 1

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/28/07
File No.: 077L14594
Job No.: 23818-077
Rev No.: G



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- SWMU LOCATION (APPROXIMATE)
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORIC BUILDING IDENTIFIED FOR REUSE
- RI GROUNDWATER SAMPLING LOCATION
- APPROXIMATE SOURCE REMOVAL AND SOIL EXCAVATION AREA (0–14 FOOT INTERVAL)

N

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

A01SB02 7
NAPHTHALENE 0.5 U

ANALYTE — REVIEW QUALIFIER
CONCENTRATION in µg/L

Analyte	PRELIMINARY RG
NAPHTHALENE	100 µg/L

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE SCREENING CRITERIA ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
GAP – GENERATOR ACCUMULATION POINT
µg/L – MICROGRAMS PER LITER
NAS – NAVAL AIR STATION
OWS – OIL/WATER SEPARATOR
RG – REMEDIATION GOAL
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
U – THE ANALYTE WAS NOT REPORTED ABOVE THE DETECTION LIMIT. THE ASSOCIATED NUMERICAL VALUE IS THE REPORTING LIMIT

RI/FS Report for IR Site 35

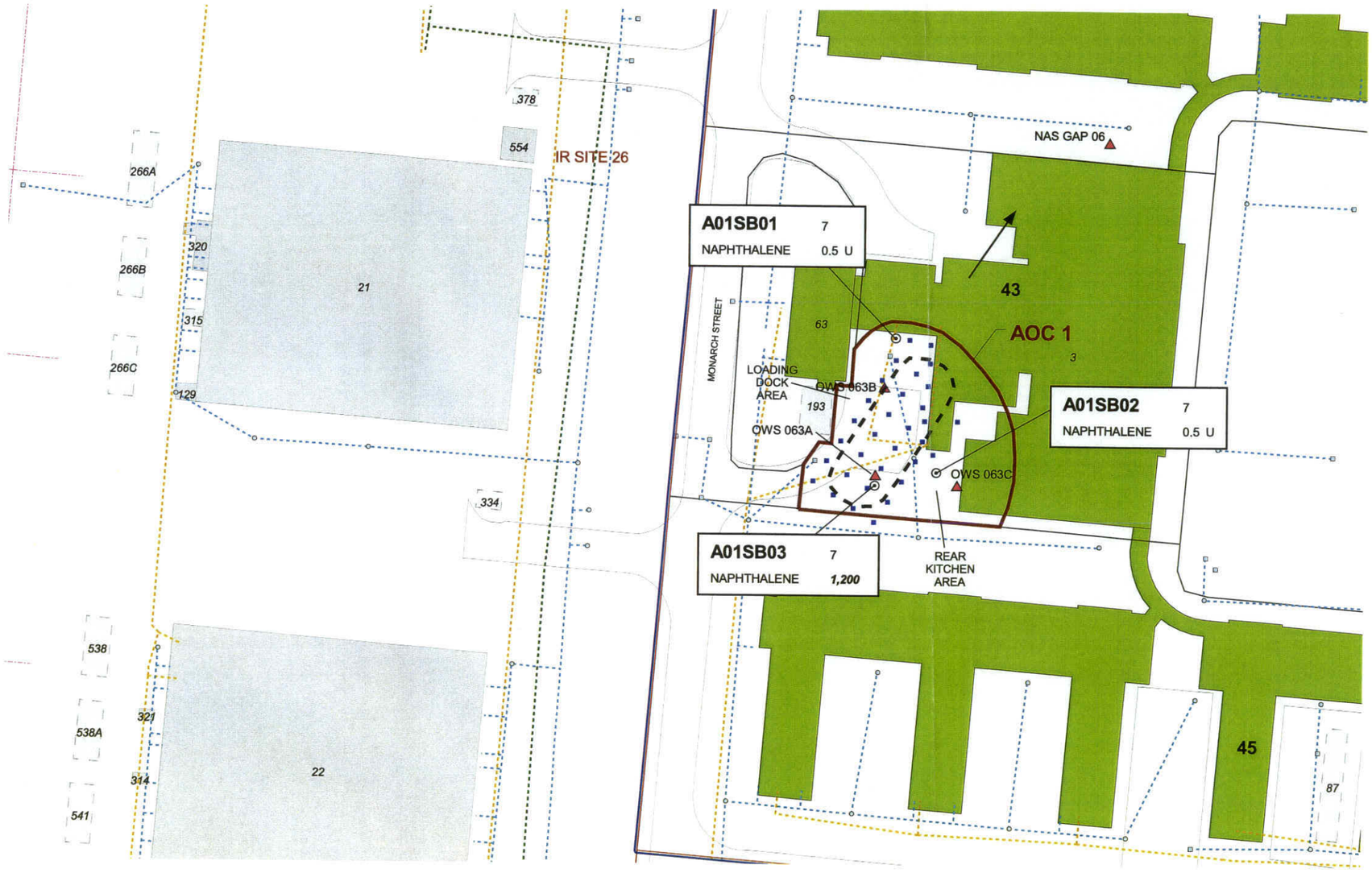
Figure 11-7

Assumed Treatment Approach for Alternative AOC 1-3

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/28/07
File No.: 077L14570
Job No.: 23818-077
Rev No.: E



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- SWMU LOCATION (APPROXIMATE)
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORIC BUILDING IDENTIFIED FOR REUSE
- RI GROUNDWATER SAMPLING LOCATION
- APPROXIMATE NAPHTHALENE PLUME BOUNDARY
- ASSUMED INJECTION POINT MATRIX FOR ISCO INJECTION (20' ON CENTER)

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

A01SB02 7
NAPHTHALENE 0.5 U

ANALYTE — REVIEW QUALIFIER
CONCENTRATION in µg/L

N

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE SCREENING CRITERIA ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
ISCO – IN SITU CHEMICAL OXIDATION
µg/L – MICROGRAMS PER LITER
OWS – OIL/WATER SEPARATOR
RG – REMEDIATION GOAL
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
U – THE ANALYTE WAS NOT REPORTED ABOVE THE DETECTION LIMIT. THE ASSOCIATED NUMERICAL VALUE IS THE REPORTING LIMIT

Analyte	PRELIMINARY RG
NAPHTHALENE	100 µg/L

100 0 100 Feet

RI/FS Report for IR Site 35

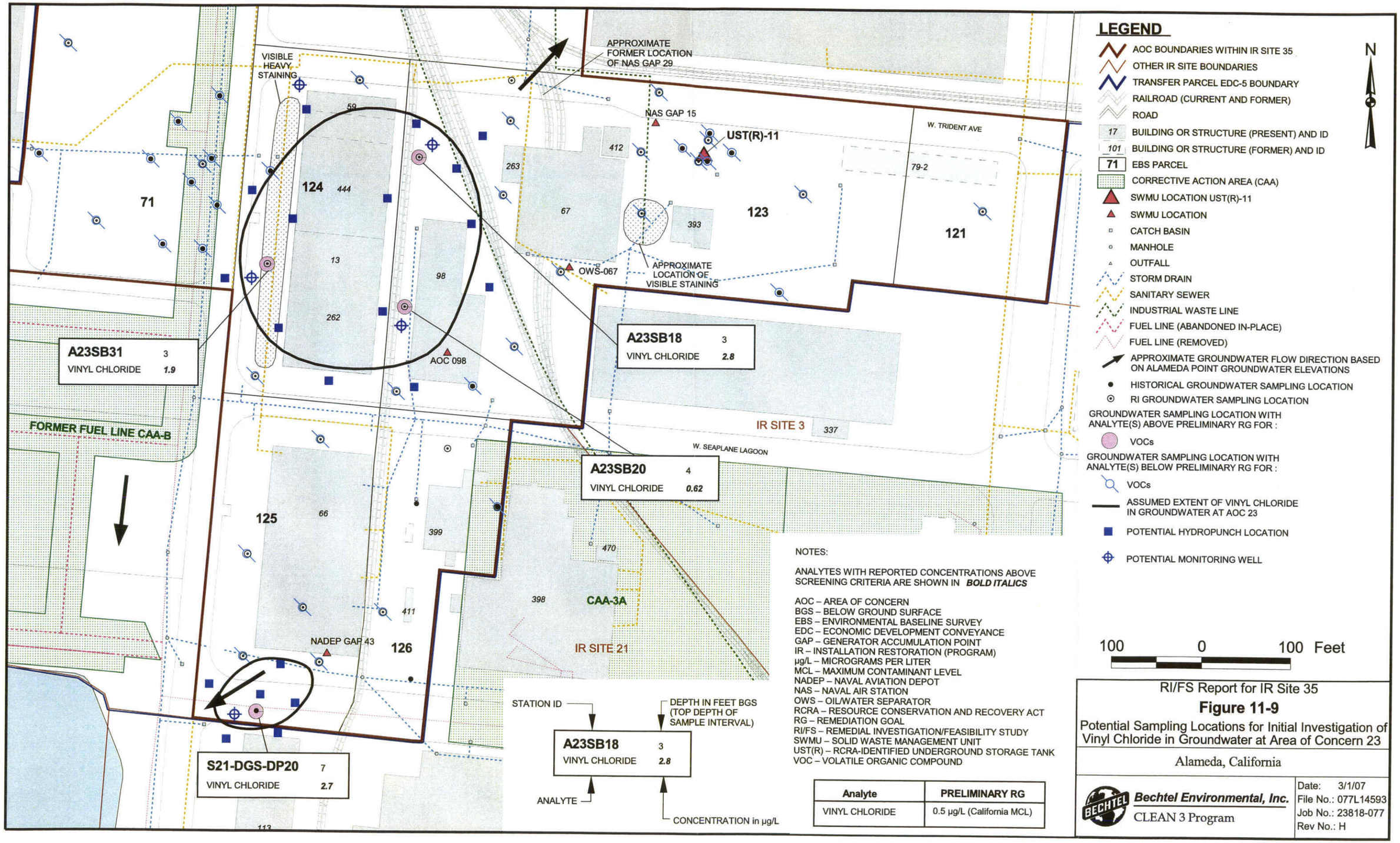
Figure 11-8

Assumed Treatment Approach for Alternative AOC 1-5

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/28/07
File No.: 077L14572
Job No.: 23818-077
Rev No.: E



NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE SCREENING CRITERIA ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
µg/L – MICROGRAMS PER LITER
MCL – MAXIMUM CONTAMINANT LEVEL
NADEP – NAVAL AVIATION DEPOT
NAS – NAVAL AIR STATION
OWS – OIL/WATER SEPARATOR
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RG – REMEDIATION GOAL
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOC – VOLATILE ORGANIC COMPOUND

Analyte	PRELIMINARY RG
VINYL CHLORIDE	0.5 µg/L (California MCL)

RI/FS Report for IR Site 35

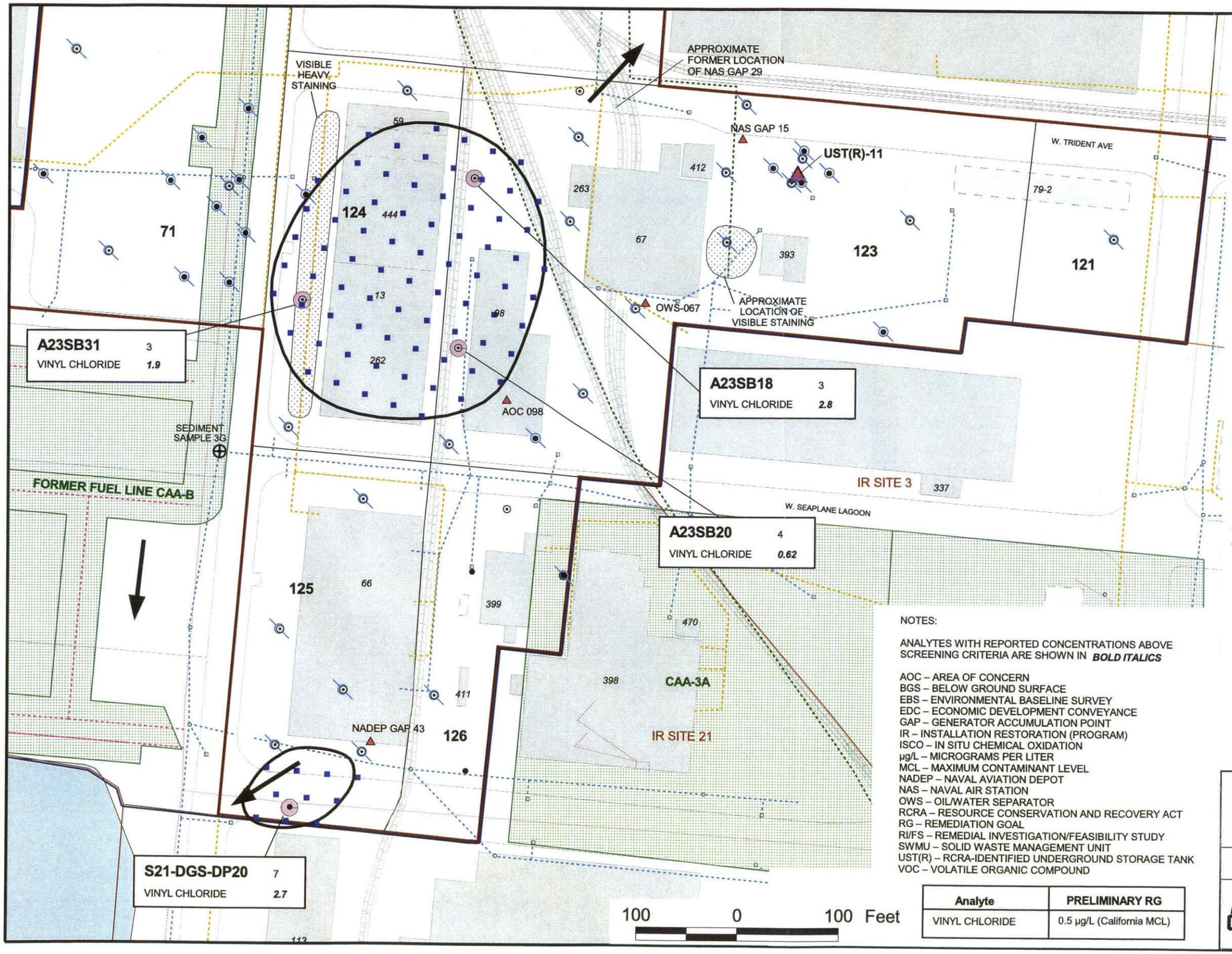
Figure 11-9

Potential Sampling Locations for Initial Investigation of Vinyl Chloride in Groundwater at Area of Concern 23

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 3/1/07
File No.: 077L14593
Job No.: 23818-077
Rev No.: H



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- CORRECTIVE ACTION AREA (CAA)
- SWMU LOCATION UST(R)-11
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- OUTFALL
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- FUEL LINE (ABANDONED IN-PLACE)
- FUEL LINE (REMOVED)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL GROUNDWATER SAMPLING LOCATION
- RI GROUNDWATER SAMPLING LOCATION
- RI SEDIMENT SAMPLING LOCATION

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) ABOVE PRELIMINARY RG FOR :
- VOCs

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) BELOW PRELIMINARY RG FOR :
- VOCs
- ASSUMED EXTENT OF VINYL CHLORIDE IN GROUNDWATER AT AOC 23
- ASSUMED INJECTION POINT MATRIX FOR ISCO INJECTION (30' ON CENTER)

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

A23SB18 3
VINYL CHLORIDE **2.8**

ANALYTE — CONCENTRATION in µg/L

N

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE SCREENING CRITERIA ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
ISCO – IN SITU CHEMICAL OXIDATION
µg/L – MICROGRAMS PER LITER
MCL – MAXIMUM CONTAMINANT LEVEL
NADEP – NAVAL AVIATION DEPOT
NAS – NAVAL AIR STATION
OWS – OIL/WATER SEPARATOR
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RG – REMEDIATION GOAL
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOC – VOLATILE ORGANIC COMPOUND

Analyte	PRELIMINARY RG
VINYL CHLORIDE	0.5 µg/L (California MCL)

RI/FS Report for IR Site 35

Figure 11-10

Assumed Treatment Approach for Alternative AOC 23-4

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/28/07
File No.: 077L14573
Job No.: 23818-077
Rev No.: G

N00236.002712
ALAMEDA POINT
SSIC NO. 5090.3

TABLES

FINAL
REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT
IR SITE 35, AREAS OF CONCERN IN TRANSFER PARCEL EDC-5

DATED 25 APRIL 2007

Table 1-1
Buildings and Historical Uses in Areas of Concern at IR Site 35

AOC	EBS Parcel(s)	Underground Conduits Present on Parcel	Building or Open Space Number	Construction Date	Demolition Date	Past Activities at Building or Open Space	Comments
1	43	Storm sewer, sanitary sewer, steam, gas, electric, communication	3	1940	NA	Enlisted barracks	
			OS43-1	NA	NA	Rear kitchen area	
			OS43-2	NA	NA	Loading docks	
			OS43-3	NA	NA	Parking, loading docks, landscaping	
2	194	Storm sewer, sanitary sewer, electric	30	1941	Unknown	Police station	
			30-A	Unknown	Unknown	Associated with dog kennel activities	Building appears in ArcView Query Station[a]. Use is assumed but not verified.
			103	Unknown	1953	Unknown	Building was partially located in EBS Parcel 61A.
			OS194	NA	NA	Parking, roadways, sidewalks	
	61A	Storm sewer, sanitary sewer, electric, industrial waste, communication	29	Unknown	1953	Unknown	ArcView Query Station[a] labels building as 29-1.
			103	Unknown	1953	Unknown	Building was located partially in EBS Parcel 194.
			562	1960s	Unknown	Sewage pump station	
			OS61	NA	NA	Hazardous material storage, parking, dog training	

Table 1-1 (continued)

AOC	EBS Parcel(s)	Underground Conduits Present on Parcel	Building or Open Space Number	Construction Date	Demolition Date	Past Activities at Building or Open Space	Comments
3	91	Sanitary sewer, electric, water, communication	104	1942	1993	Golf course clubhouse, youth center	
			274	1943	1962	Nursery building, lath house	
			416	1957	Pre-1963	Community storage, golf shed	1963 aerial photograph review log shows building is no longer present.
			458	1960	Unknown	Golf course	
			OS91	NA	NA	Material storage, parking, drum storage, recreation	
4	62	Storm sewer, sanitary sewer	OS62	NA	NA	Parking, railway	
	96	Storm sewer, steam, sanitary, electric, communication	OS96	NA	NA	Material storage, washdown, parking, disposal	
	97	Storm sewer, electric	95	Pre-1947	Unknown	Water storage tank (nonpotable)	
			176	Between 1942 and 1947	Unknown	Army well, potable water pump station	Shut down due to mercury contamination.
			177	Pre-1947	Unknown	Transformer house, storage of irrigation equipment	
			OS97	NA	NA	Grass	
	98		OS98	NA	NA	Barbars Point Road	

Table 1-1 (continued)

AOC	EBS Parcel(s)	Underground Conduits Present on Parcel	Building or Open Space Number	Construction Date	Demolition Date	Past Activities at Building or Open Space	Comments
5	98	Storm sewer, steam, sanitary sewer, gas, electric, communication, water	492/493	Unknown	Unknown	Sewage pump station	1994 EBS Report[b] states that maps identify this building as 493, but sign on building says 492.
			OS98	NA	NA	Landscaped and paved areas associated with housing units	
6	87	Storm sewer, steam, sanitary sewer, electric	85	1942	1968	Bachelor officers' quarters	
			553	Between 1970 and 1975	Unknown	Electrical substation #6	
			OS87-1	NA	NA	Parking	
7	98	Storm sewer, steam, sanitary sewer, gas, electric, communication, water	FH-9 through FH-12	1940 or 1961	NA	Family Housing and/or maintenance	
8	98	Storm sewer, steam, sanitary sewer, gas, electric, communication, water	550	Unknown	Unknown	Grounds maintenance	
			OS 98	NA	NA	Maintenance yard	
9	80	Storm sewer, steam, sanitary sewer, gas, electric, communication	17	1941	Unknown	Mess hall, bachelor officers' quarters, school	
			OS80-1	NA	NA	Parking	
			OS80-2	NA	NA	Landscaping, gardening and composting, parking	Grease trap is documented to have been located southwest of building.
	81	Storm sewer, steam, sanitary sewer, gas, electric, communication	28	1941	Unknown	Public works shop	Building does not appear in PEP or in ArcView Query Station[a].
			OS81	NA	NA	Todd Street	

Table 1-1 (continued)

AOC	EBS Parcel(s)	Underground Conduits Present on Parcel	Building or Open Space Number	Construction Date	Demolition Date	Past Activities at Building or Open Space	Comments
10	98	Storm sewer, steam, sanitary sewer, gas, electric, communication, water	FH-23 and FH-24	1940 or 1961	NA	Family Housing and/or maintenance	
			OS98	NA	NA	Former Radio Antenna Tower; landscaped and paved areas associated with housing units	
11	77	Storm sewer, steam, sanitary sewer, electric, communication	101	1942	Unknown	Navy administrative offices, classrooms, heating plant	
			OS77	NA	NA	Training, parking, material storage	
12	105	Storm sewer, steam, sanitary sewer, electric, communication	OS105	NA	NA	Parking	2001 EBS Report[c] provided new assessment of percent of parcel that is open space and percent of open space that is paved.
	106	Storm sewer, steam, sanitary sewer, gas, fuel (removed), electric, communication	33	1933	Unknown	Water tank	
			OS106	NA	NA	Parking, sidewalk, and/or landscaping	
	107	Storm sewer, steam, sanitary sewer, gas, fuel (removed), electric	61	1933	1992	Water storage tank	
			OS107	NA	NA	Pavement/grass	
13	103	Storm sewer, sanitary sewer, industrial waste, gas, electric, communication	FH-813, FH-814, FH-816	Unknown	Unknown	Apartments, family housing	Included various family housing units.
			OS103	NA	NA	Parking, recreation, landscaping; potentially former barracks and/or other buildings	Additional barracks and other buildings were located on EBS parcel; but it is unknown whether they were located in AOC 13.

Table 1-1 (continued)

AOC	EBS Parcel(s)	Underground Conduits Present on Parcel	Building or Open Space Number	Construction Date	Demolition Date	Past Activities at Building or Open Space	Comments
17	185	Storm sewer, steam, sanitary sewer, gas, industrial waste, electric, communication	9	1940	NA	Storage shed, maintenance, aircraft spare storage	
			OS185	NA	NA	Material storage, parking	
18	70	Storm sewer, steam, sanitary sewer, fuel, industrial waste, electric, communication	OS70	NA	NA	Hazardous materials storage, parking	
20	23F	Storm sewer, fuel, electric, communication	OS23	NA	NA	Taxiway, parking apron	
21	23F	Storm sewer, fuel, electric, communication	OS23	NA	NA	Taxiway, parking apron	
23	71	Storm sewer, steam, sanitary sewer, fuel (removed), industrial waste, electric, communication	45A	Unknown	Unknown	Storage shed	
			45B	1958	Unknown	Storage shed	Building described in 1994 EBS Report[b] but was not found during inspections.
			544	1974	Unknown	Liquid oxygen/nitrogen facility (nonindustrial)	
	72	Communication	77	1942	Unknown	Air cargo terminal, supply depot, heating plant, electric distribution shelter	
			77-A	Unknown	Unknown	Storage	Building appears in ArcView Query Station[a].
			OS72	NA	NA	Parking	

Table 1-1 (continued)

AOC	EBS Parcel(s)	Underground Conduits Present on Parcel	Building or Open Space Number	Construction Date	Demolition Date	Past Activities at Building or Open Space	Comments
23 (cont'd)	110	Storm sewer, steam, sanitary sewer, industrial waste, gas, electric, communication	271	1945	Unknown	Hazardous materials/flammable storehouse	
			590	Unknown	Unknown	Industrial Waste Pump Station #5	
			OS110	NA	NA	Material storage, parking, disposal, recycling center	
	121	Storm sewer, sanitary sewer, electric, communication	222	Pre-1947	Pre-1958	Garden shop	Reported in aerial photograph but not found upon inspection during 1994 EBS Report[b].
			OS121	NA	NA	Parking	
	123	Storm sewer, steam, sanitary sewer, industrial waste, gas, electric, communication	67	1942	NA	Switching substation, shelter, field maintenance shop, aircraft ground support equipment shop	
			79	1942	1961	Barracks without mess hall	ArcView Query Station[a] labels building as 79-2. Building appears in ArcView Query Station straddling boundary between EBS Parcels 121 and 123.
			98	1942	NA	Hazardous materials storehouse	
			263	1946	NA	Aircraft ground support equipment shop, storage	
			393	1953	Unknown	Paint and blasting shed	

Table 1-1 (continued)

AOC	EBS Parcel(s)	Underground Conduits Present on Parcel	Building or Open Space Number	Construction Date	Demolition Date	Past Activities at Building or Open Space	Comments
23 (cont'd)	123 (cont'd)		412	1943	NA	Electrical substation #2	PEP[d] lists it as Building 411; 1994 EBS Report[b] alternately identifies it as Buildings 411 and 412.
			OS123	NA	NA	Material storage, washdown, parking, outdoor repair, drum storage, disposal, recreational	
	124	Storm sewer, steam, sanitary sewer, gas, electric, communication	13	1942	NA	Hazardous/flammable storehouse; Public Works maintenance storage	
			59	Unknown	1953	Unknown	
			262	1943	1965	Lumber storage	
			444	1943	1968	Lumber storage	Formerly part of Building 222.
			OS124	NA	NA	Material storage, parking, disposal	
	125	Storm sewer, steam, sanitary sewer, gas, fuel (removed), electric, communication	66	1942	NA	Aircraft overhauling, engine test shop	
			OS125	NA	NA	Material storage, parking, disposal	
	126	Storm sewer, steam, sanitary, fuel (removed), electric, communication	99	Unknown	1953	Unknown	
			399	1957	NA	NADEP offices, compressor support	Aerial photographs show Building 399 present in 1947; other references indicate it was built in 1957–8.
			411	Pre-1947	NA	Electrical substation #4	
			OS126	NA	NA	Material storage, parking, drum storage, disposal	

Table 1-1 (continued)

AOC	EBS Parcel(s)	Underground Conduits Present on Parcel	Building or Open Space Number	Construction Date	Demolition Date	Past Activities at Building or Open Space	Comments
24	197	Storm sewer, sanitary sewer, electric	OS197	NA	NA	Railroad	
25	130	Storm sewer, sanitary sewer, gas, electric, communication	70A	1941	Unknown	Gate/sentry house	2001 EBS Report[c] states building was demolished.
			70B	1944	1965	Gatehouse	
			90	1938	Unknown	Administrative office/employment office	
			503	1965	Unknown	Gate/sentry house	
			504	1965	Unknown	Gate/sentry house	2001 EBS Report[c] states building was demolished.
			OS130	NA	NA	Open space	
	132	Storm sewer, sanitary sewer, gas, electric	OS132	NA	NA	Vehicle parking, farm	

Notes:
[a] ArcView Query Station
[b] ERM-West 1994a
[c] IT 2001a
[d] ERM-West 1994b

Acronyms/Abbreviations:
AOC – area of concern
EBS – environmental baseline survey
IR – Installation Restoration (Program)
NA – not applicable
NADEP – Naval Air Depot
PEP – parcel evaluation plan

Table 1-2
Investigation Focus at IR Site 35

Study Area	EBS Parcel	Primary Environmental Concerns
AOCs		
AOC 1	43	Three OWSs per agencies' request.
AOC 2	61A and 194	PAHs in soil; hazardous materials storage area.
AOC 3	91	Pesticides in soil.
AOC 4	97	PAHs in soil and metals in soil and groundwater.
AOC 5	98	Sewage pump station per agencies' request.
AOC 6	87	PCB-containing oil spill with no confirmation samples collected.
AOC 7	98	PAHs and PCBs in soil.
AOC 8	98	PCBs in soil.
AOC 9	80 and 81	Pesticides in soil and potential releases from grease trap per agencies' request.
AOC 10	98	Lead in soil outside lead removal area.
AOC 11/EBS Parcels 78–79	77	Chemical storage at the parcel, stains observed, and minimal sampling conducted. EBS Parcels 78–79 included at agencies' request.
AOC 12	105, 106, and 107	Lead in soil outside lead removal area; sediment samples to assess if lead-containing soil entered storm sewer system during removal action.
AOC 13	103	Pesticides in soil.
AOC 17	185	VOCs, TPH, and metals in soil and groundwater.
AOC 18	70	Hazardous materials storage area with limited sampling.
AOC 19	195	VOCs in groundwater; two OWSs per agencies' request.
AOC 20	23F	Two OWSs per agencies' request.
AOC 21	23F	VOCs in groundwater.
AOC 22	23F	SVOCs in groundwater.
AOC 23	71, 72, 110, 121, 123, 124, 125, 126	Areawide environmental concern: contamination in groundwater (various chemicals) in the area and the historic use of the parcels for industrial purposes. Additional parcel-specific concerns: VOCs and PAHs in soil at EBS Parcel 71; potential VOCs in groundwater at EBS Parcel 72; industrial waste pump station, extensive chemical storage and staining, and limited sampling at EBS Parcel 110; potential chemical releases at EBS Parcel 121; OWS per agencies' request and PCBs in soil at EBS Parcel 123; potential chemical releases at EBS Parcels 124 and 125; metals in soil and groundwater at EBS Parcel 126.
AOC 24	197	OWS per agencies' request; metals in soil and groundwater in the western portion of AOC 24 will be addressed under IR Site 3.
AOC 25	130 and 132	Metals in groundwater; proximity to IR Site 4 with known metals contamination in groundwater.

Table 1-2 (continued)

Study Area	EBS Parcel	Primary Environmental Concerns
Data Gap Site		
EBS Parcels 78–79	78 and 79	See AOC 11/EBS Parcels 78–79.
EBS Parcel 205	205	Assess whether soil and groundwater have been impacted by possible releases from NADEP GAP 73; per agencies' request.
SWMUs		
OWS 017	80	Assess oil trap and metals in groundwater.
AST 016	83	Assess whether chemicals from ASTs impacted soil and/or groundwater.
AST 039	70	
AST 152	102	
ASTs 173A,-B,-C	115	
AST 392	189	
UST(R)-11	NA	Confirm UST removal results.
PAH Areas		Areas sampled for PAHs only. Includes former AOCs 14, 15, and 16.

Acronyms/Abbreviations:
AOC – area of concern
AST – aboveground storage tank
EBS – environmental baseline survey
GAP – generator accumulation point
IR – Installation Restoration (Program)
NA – not applicable
NADEP – Naval Aviation Depot
OWS – oil/water separator
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
SWMU – solid waste management unit
TPH – total petroleum hydrocarbons
UST – underground storage tank
VOC – volatile organic compound

Table 1-3
Soil and Groundwater Samples Collected at IR Site 35 During Previous Investigations

Study Area	Medium	NUMBER OF SAMPLES ANALYZED PER ANALYTE										
		VOCs	TPH	SVOCs	TDS	PAHs	Pest/PCBs	Metals	Arsenic	Lead	Herbicides	Organotins
AOC 1	Soil	0	2	4	0	0	0	0	0	0	0	0
	Groundwater	0	0	0	0	0	0	0	0	0	0	0
AOC 2	Soil	0	5	14	0	9	5	5	0	0	0	0
	Groundwater	0	0	0	0	0	0	0	0	0	0	0
AOC 3	Soil	0	0	5	0	0	1	0	0	0	0	0
	Groundwater	0	0	0	0	0	0	0	0	0	0	0
AOC 4	Soil	4	4	4	0	141	11	11	0	0	0	0
	Groundwater	1	1	1	0	0	1	1	0	0	0	0
AOC 5	Soil	0	0	0	0	2	0	0	4	0	0	0
	Groundwater	0	0	0	0	0	0	0	0	0	0	0
AOC 6	Soil	0	0	0	0	18	0	0	0	0	0	0
	Groundwater	0	0	0	0	0	0	0	0	0	0	0
AOC 7	Soil	2	2	28	0	0	18	2	16	0	0	0
	Groundwater	0	0	0	0	0	0	0	0	0	0	0
AOC 8	Soil	0	4	0	0	11	4	0	0	0	0	0
	Groundwater	0	0	0	0	0	0	0	0	0	0	0
AOC 9	Soil	0	0	0	0	14	4	0	4	0	0	0
	Groundwater	0	0	0	0	0	0	0	0	0	0	0
AOC 10	Soil	38	38	38	0	3	38	79	0	50	0	0
	Groundwater	0	0	0	0	0	0	0	0	0	0	0
AOC 11	Soil	0	0	0	0	4	0	0	0	0	0	0
	Groundwater	1	0	0	0	0	0	0	0	0	0	0
AOC 12	Soil	66	68	68	0	0	68	140	0	66	0	0
	Groundwater	0	0	0	0	0	0	0	0	0	0	0
AOC 13	Soil	0	1	0	0	23	14	0	4	0	0	0
	Groundwater	0	0	0	0	0	0	0	0	0	0	0
AOC 17	Soil	7	8	9	0	0	6	11	0	0	2	2
	Groundwater	2	2	2	0	0	0	2	0	0	0	0

Table 1-3 (continued)

Study Area	Medium	NUMBER OF SAMPLES ANALYZED PER ANALYTE										
		VOCs	TPH	SVOCs	TDS	PAHs	Pest/PCBs	Metals	Arsenic	Lead	Herbicides	Organotins
AOC 18	Soil	6	5	0	0	4	0	0	0	2	0	0
	Groundwater	1	1	0	0	0	0	0	0	1	0	0
AOC 20	Soil	0	5	0	0	4	0	5	0	0	0	0
	Groundwater	0	0	0	0	0	0	0	0	0	0	0
AOC 21	Soil	8	8	6	0	0	0	0	0	2	0	0
	Groundwater	5	5	4	0	0	0	0	0	1	0	0
AOC 23	Soil	88	102	120	0	0	59	92	0	0	5	9
	Groundwater	23	20	13	0	0	4	4	0	0	0	0
AOC 24	Soil	1	1	1	0	0	0	1	0	0	0	0
	Groundwater	0	0	0	0	0	0	0	0	0	0	0
AOC 25	Soil	11	15	14	0	0	11	21	0	0	0	1
	Groundwater	14	14	4	3	0	1	12	0	0	0	0
AST 039	Soil	5	3	0	0	0	0	1	0	0	0	0
	Groundwater	2	2	2	0	0	0	0	0	0	0	0
AST 152	Soil	0	3	0	0	0	0	0	0	0	0	0
	Groundwater	0	0	0	0	0	0	0	0	0	0	0
AST 173	Soil	0	3	0	0	0	0	0	0	0	0	0
	Groundwater	0	0	0	0	0	0	0	0	0	0	0
AST 392	Soil	1	4	2	0	0	0	2	0	0	0	0
	Groundwater	0	0	0	0	0	0	0	0	0	0	0
EBS 78–79	Soil	9	9	9	0	5	9	19	0	2	0	0
	Groundwater	0	0	0	0	0	0	0	0	0	0	0
EBS 205	Soil	0	0	0	0	17	0	0	0	0	0	0
	Groundwater	0	0	0	0	0	0	0	0	0	0	0
OWS 17	Soil	0	0	0	0	11	0	0	0	0	0	0
	Groundwater	0	0	0	0	0	0	0	0	0	0	0

Table 1-3 (continued)

Acronyms/Abbreviations:
- AOC – area of concern
- AST – aboveground storage tank
- EBS – environmental baseline survey
- IR – Installation Restoration (Program)
- OWS – oil/water separator
- PAH – polynuclear aromatic hydrocarbon
- PCB – polychlorinated biphenyl
- Pest – pesticides
- SVOC – semivolatile organic compound
- TDS – total dissolved solids
- TPH – total petroleum hydrocarbons
- VOC – volatile organic compound

Table 1-4
Storm Sewer Infiltration Study Sampling Results

Outfall	Upflow IR Site	Sampling Point*	Analytes Reported at Concentrations Exceeding Detection Limits	Concentration (µg/L)	ERV (µg/L)
A	IR Site 5	S05-DGS-MH-7A-GW1	chloroform TPH-motor oil	0.4 J 740	28 1,400
		S05-DGS-OF-A-GW1	chloroform TPH-motor oil	0.5 J 370	28 1,400
B	IR Site 5	S05-DGS-MH-4B-GW1	None	NA	NA
D	IR Site 8	S05-DGS-MH-9D-GW1	None	NA	NA
G	IR Site 5	S05-DGS-MH-6G-18-GW-1	None	NA	NA
		S05-DGS-MH-9G-GW1	None	NA	NA
	IR Site 6	S05-DGS-MH-4G-1-GW1	None	NA	NA
	IR Sites 6, 12	S06-DGS-MH-5G1-GW1	bromoform chloroform 1,2-DCE (total) TPH-motor oil	1 J 2 2 330	6,400 28 590 1,400
	IR Sites 5, 6, 8, 12, 21	S21-DGS-OF-G-GW1	chloroethane 1,1-DCA 1,1-DCE 1,2-DCE (total) 1,1,1-TCE TCE vinyl chloride TPH-motor oil	0.9 J 1 0.4 J 3 2 1 J 0.3 J 400	100 47 25 590 62 360 782 1,400
H	IR Site 7	S21-DGS-MH-6H-GW1 (manhole is downflow from Transfer Parcel EDC-5)	1,2-DCE (total) MTBE TCE vinyl chloride TPH-motor oil	5 2 J 2 J 0.4 J 270	590 8,000 360 782 1,400

Note:

* Sampling Point ID: MH – manhole sampling location; OF – outfall sampling location (note: there were no catch basin samples collected as part of this investigation within EDC-5)

Acronyms/Abbreviations:

DCA – dichloroethane
DCE – dichloroethene
EDC – economic development conveyance
ERV – ecological reference value
IR – Installation Restoration (Program)
µg/L – micrograms per liter
MTBE – methyl tert-butyl ether
NA – not applicable
TCE – trichloroethene
TPH – total petroleum hydrocarbons

Table 1-5
Storm Sewer Bedding Study Sampling Results

IR Site	Adjacent/ Downflow AOCs	Sampling Point	Permeability of Bedding Material Relative to Nearby Soil
IR Site 5	AOCs 1, 2, 9, 11	S05-DGS-DP29 S05-DGS-VE01	Similar
IR Site 5	AOCs 11, 17	S05-DGS-DP30 S05-DGS-VE02	Less permeable
IR Site 6	AOC 23	S06-DGS-DP09 S06-DGS-VE01	Similar
		S06-DGS-DP10 S06-DGS-VE02	Similar
IR Site 21	AOC 23	S21-DGS-DP09 S21-DGS-VE01	Less permeable
		S21-DGS-DP10 S21-DGS-VE02	Less permeable
IR Site 4	AOC 25	S04-DGS-DP22 S04-DGS-VE01	More permeable

Acronyms/Abbreviations:
AOC – area of concern
IR – Installation Restoration (Program)

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Table 2-1
Monthly Temperature and Rainfall Summary*

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average maximum temperature (°F)	57.3	61.6	63.3	66.5	69.0	71.7	72.6	73.6	74.6	72.0	63.9	57.4	66.9
Average minimum temperature (°F)	44.5	47.9	49.1	50.6	53.5	55.7	57.0	58.3	58.3	55.3	49.6	44.5	52.0
Average total precipitation (inches)	4.85	4.40	3.56	1.35	0.56	0.12	0.07	0.10	0.32	1.31	3.45	3.33	23.4

Source:
* Oakland Museum data from October 1, 1970, to July 31, 2000

Acronym/Abbreviation:
°F – degrees Fahrenheit

Table 2-2
Alameda Island Stratigraphic Units*

Period	Geologic Age	Stratigraphic Unit	Estimated Maximum Thickness (feet)	General Lithology
Quaternary	Holocene (unconformity)	Fill material	16	Dredged materials consisting of olive-brown, fine- to medium-grained sand with lenses of silty sand, gravelly sand, or sandy gravel; thickness increases from east to west.
		Bay Sediment Unit	35	Upper bay sediments consisting of estuarine deposits of moist, stiff, dark olive clay with discontinuous silty and clayey sand layers with shell fragments (also referred to as Young Bay Mud); lower bay sediments consisting of estuarine deposits of silty sand with interbedded layers of fine sand.
	Late Pleistocene to Holocene (unconformity)	Merritt Sand Formation	53	Eolian deposits of yellow-brown clayey sand, silty sand, poorly graded fine-grained sand with some shell fragments; thickens toward the southeast.
		Upper San Antonio Formation	35	Alluvial deposits of interbedded layers of silty sand and green-gray silty clay.
	Late Pleistocene (unconformity)	Lower San Antonio Formation	90	Estuarine deposits of firm, gray, silty clay and clay of Yerba Buena Mud; laterally continuous.
Tertiary	Pliocene to Late Pleistocene	Alameda Formation	200 to 400	Terrestrial and estuarine deposits; regional aquifer.
Jurassic to Cretaceous	NA	Franciscan Formation	400 to 800	Metamorphosed sandstone, siltstone, shale, greywacke, and igneous bedrock.

Note:
* source material from TtEMI 1999 and Norfleet Consultants 1998

Acronym/Abbreviation:
NA – not applicable

Table 2-3
TDS Statistics for IR Site 35

Study Area	TDS Average Measurement (mg/L)	Minimum TDS Reported During RI (mg/L)	Maximum TDS Reported During RI (mg/L)	Total Number of TDS Measurements at Site During RI	Number of Reported TDS Concentrations > 3,000 mg/L	Number of Reported TDS Concentrations > 10,000 mg/L
AOC 1	1,781	444	2,490	3	0	0
AOC 2	10,650	3,600	17,700	2	2	1
AOC 5	8,470	3,240	13,700	2	2	1
AOC 9	2,830	2,830	2,830	1	0	0
AOC 11	4,225	2,310	6,140	2	1	0
AOC 17	1,871	462	2,910	3	0	0
AOC 18	385	337	432	2	0	0
AOC 20	472	366	577	2	0	0
AOC 21	359	230	487	2	0	0
AOC 23	3,638	371	21,900	38	15	3
AOC 24	1,670	1,670	1,670	1	0	0
AOC 25	6,067	374	20,400	5	2	1
AST 016	980	980	980	1	0	0
AST 039	192	192	192	1	0	0
AST 152	3,070	3,070	3,070	1	1	0
AST 392	1,630	1,630	1,630	1	0	0
ASTs 173A,-B,-C	8,370	8,370	8,370	1	1	0
EBS 205	259	184	334	2	0	0
EBS 78–79	3,636	1,010	7,720	8	6	0
OWS 017	1,060	1,060	1,060	1	0	0
UST(R)-11	1,278	996	1,560	2	0	0
Totals				**81**	**30**	**6**

Table 2-3 (continued)

Acronyms/Abbreviations:
AOC – area of concern
AST – aboveground storage tank
EBS – environmental baseline survey
IR – Installation Restoration (Program)
mg/L – milligrams per liter
OWS – oil/water separator
RI – remedial investigation
TDS – total dissolved solids
U.S. EPA – United States Environmental Protection Agency
UST – underground storage tank

Table 2-4
Special-Status Species
Potentially Occurring at Alameda Point

Scientific Name	Common Name	Federal Status	State Status	CNPS Listing	AP[a]	Habitat
Plants						
Astragalus tener var. *tener*	Alkali milk vetch	FSC	—[b]	1B	U	G
Chorizanthe cuspidata var. *cuspidata*	San Francisco Bay spineflower	FSC	—	1B	U	S
Chorizanthe robusta var. *robusta*	Robust spineflower	FE	—	1B	U	S
Cordylanthus maritimus palustris	Point Reyes bird's-beak	FSC	—	1B	U	W
Holocarpha macradenia	Santa Cruz tarplant	FT	SE	1B	U	G,S
Horkelia cuneata ssp. *sericea*	Kellogg's horkelia	FSC	—	1B	U	S
Lasthenia conjugens	Contra Costa goldfields	FE	—	1B	U	W,G
Sanicula maritime	Adobe sanicle	FSC	SR	1B	U	G,S
Suaeda californica	California seablite	FE	—	1B	U	W
Fish						
Acipenser medirostris	Green sturgeon	—	CSC	NA	P	E
Eucyclogobius newberryi	Tidewater goby	FE	CSC	NA	U	E
Hypomesus transpacificus	Delta smelt	FT	ST	NA	U	E
Oncorhynchus mykiss	Steelhead	FT	CSC	NA	P	E
Oncorhynchus tshawytscha	Chinook salmon, winter run	FE	SE	NA	P	E
Spirinichus thaleichthys	Longfin smelt	FSC	CSC	NA	P	E
Reptiles						
Clemmys marmorata	Western pond turtle	—	CSC	NA	P	W
Masticophis lateralis euryxanthus	Alameda whipsnake	FT	ST	NA	U	S

Table 2-4 (continued)

Scientific Name	Common Name	Federal/Status	State Status	CNPS Listing	AP[a]	Habitat
Mammals						
Antrozous pallidus	Pallid bat	—	CSC	NA	P	G,S
Corynorhinus townsendii townsendii	Townsend's western big-eared bat	FSC	CSC	NA	P	G,S
Eumetopias jubatus	Northern (Steller) sea lion	FT	—	NA	C	E
Eumops perotis californicus	California mastiff bat	FSC	CSC	NA	U	G,S
Neotoma fuscipes annectens	San Francisco dusky-footed wood rat	FSC	CSC	NA	U	S
Reithrodontomys raviventris	Salt marsh harvest mouse	FE	SE	NA	U	W
Scapanus latimanus parvus	Alameda Island mole	FSC	CSC	NA	U	G,S
Sorex vagrans halicoetes	Salt marsh wandering shrew	FSC	CSC	NA	U	W
Birds						
Aquila chrysaetos	Golden eagle	—	CSC	NA	U	G,S
Athene cunicularia	Burrowing owl	FSC	CSC	NA	C	G
Charadrius alexandrinus nivosus	Western snowy plover	FT	CSC	NA	C	W
Circus cyaneus	Northern harrier	—	CSC	NA	C	W,G,S
Elanus leucurus	White-tailed kite	FSC	CFP	NA	U	W,G,S
Eremophila alpestris actia	California horned lark	—	CSC	NA	C	G
Falco columbarius	Merlin	—	CSC	NA	C	W,G,S
Falco peregrinus anatum	American peregrine falcon	FSC	SE	NA	C	W
Geothlypis trichas sinuosa	Salt marsh common yellowthroat	FSC	CSC	NA	P	W
Lanius ludovicianus	Loggerhead shrike	FSC	CSC	NA	C	G,S
Laterallus jamaicensis coturniculus	California black rail	FSC	ST	NA	P	W
Melospiza melodia pusillula	Alameda song sparrow	FSC	CSC	NA	C	W
Numenius americanus	Long-billed curlew	FSC	CSC	NA	U	W,G
Pelecanus occidentalis californicus	California brown pelican	FE	SE	NA	C	E
Phalacrocorax auritus	Double-crested cormorant	—	CSC	NA	C	E
Rallus longirostris obsoletus	California clapper rail	FE	SE	NA	P	W
Sterna antillarum browni	California least tern	FE	SE	NA	C	E
Sterna caspia	Caspian tern	FSC	—	NA	C	E

Table 2-4 (continued)

Notes:
[a] likelihood of occurrence at Alameda Point
[b] dash indicates no status listed

Acronyms/Abbreviations:
1B – plants rare, threatened, or endangered in California and elsewhere
AP – Alameda Point
C – confirmed presence
CFP – California fully protected species
CNPS – California Native Plant Society
CSC – California special-concern species
E – estuarine habitat
FE – federally listed – endangered
FSC – federal special-concern species
FT – federally listed – threatened
G – grassland habitat
NA – not applicable
P – possible presence
S – scrub habitat
SE – California state listed – endangered
SR – California state listed – rare
ST – California state listed – threatened
U – unlikely presence
W – wetland habitat

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Table 3-1
Data Quality Objectives for AOCs and Data Gap Areas at IR Site 35

STEP 1 State the Problem*	STEP 2 Identify the Decisions	STEP 3 Identify Decision Inputs	STEP 4 Define Study Boundaries	STEP 5 Develop Decision Rules	STEP 6 Specify Tolerable Limits on Decision Errors	STEP 7 Optimize the Sampling Design
An RI will be conducted for several areas within Transfer Parcel EDC-5 (referred to as IR Site 35) identified by the Navy and regulatory agencies as needing further evaluation before early property transfer can occur. To accomplish this objective, the RI, FS, Proposed Plan, and ROD will be conducted on an accelerated schedule. Areas requiring further evaluation were initially identified in the final SI Report for Transfer Parcel EDC-5 (BEI 2005a). This report recommended further evaluation of 25 AOCs based on a combined assessment of the historical uses of the EBS parcels, the results of data evaluation, risk evaluation, and input received from regulatory agencies. After the final SI Report was issued, the Navy and regulatory agencies refined the areas that they deemed necessary for additional evaluation and sampling. It was agreed that: • 2 AOCs (AOC 19 and 22) will be removed from IR Site 35 and included in adjacent IR Site 6 and CAA-B, respectively; • 19 AOCs (AOCs 1, 2, 3, 5, 6, 8 through 13, 15, 17, 18, 20, 21, 23, 24, and 25) require additional sampling and analysis; and • 4 AOCs (AOCs 4, 7, 14, and 16) have sufficient data to evaluate risk to human health. The regulatory agencies requested additional sampling at: • three data gap areas (EBS Parcels 78, 79, and 205) and • nine SWMUs (OWS 017, AST 016, AST 039, AST 152, AST 173A, AST 173B, AST 173C, AST 392, and UST[R]-11). PAH areas were also added to IR Site 35 in response to comments from U.S. EPA and DTSC on the draft version of this Work Plan. PAH areas identified for inclusion in the FS address residual B(a)P equivalent concentrations that are above	Decisions will be based on a compilation of IR Site 35–specific data gathered during previous investigations and the proposed field investigation. These data, along with results of a human-health risk assessment, will be used to answer the following questions. • Have the nature and extent of contamination been defined? • Are contaminants present in soil or groundwater at concentrations that pose unacceptable risk to potential future residents? • Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?	Data inputs will be chemical and geotechnical data, including concentrations of target chemicals in soil and groundwater collected during previous investigations and the IR Site 35 RI. Data from adjacent IR sites will also be reviewed to assess whether contaminants are associated with these sites or historical IR Site 35 activities. Also included are human-health risk assessment inputs, assumptions, and results. Soil and groundwater data will be compared to the following criteria: • Alameda Point comparison criteria for PAHs in soil (DON 2001a) • RWQCB ESLs for petroleum-contaminated sites (RWQCB 2005) • U.S. EPA Region 9 or California-modified residential PRGs for contaminants in soil (U.S. EPA 2004) • Alameda Point background concentrations for metals in soil and groundwater The Navy and regulatory agencies have initiated discussions to revisit the background concentrations and the data set for Alameda Point at a meeting held on October 18, 2005 (DON 2005a). The following comparison criteria that will be used in the RI report will reflect any updated agreements reached by the time that the RI report is prepared: • MCLs for contaminants in groundwater • California Toxics Rule for contaminants in groundwater at areas adjacent to or near	The boundaries of the study area are as follows. • The lateral boundaries will include the AOCs, data gap areas, and SWMUs, as shown on Figure 1-4. The boundaries may need to be revised based on the RI/FS results. • The vertical soil boundary will be the vadose zone. • The vertical groundwater boundary will be 5 to 10 feet below the water table (to allow for sufficient sample volume). • The temporal boundary will be determined by the timing of the fieldwork. As agreed by the regulatory agencies in telephone conference calls held on November 14 and 21, fieldwork was initiated on November 29, 2005, before the Work Plan was finalized (DON 2005b).	Data from previous investigations and data collected during this investigation will be used to evaluate the nature and extent of contamination. The following general decision rules will be applied. • If the nature and extent of contamination have been defined (based on comparison criteria in Step 3), then no further assessment will be recommended. • If the extent of contamination has not been defined, and data show that contamination is associated with an adjacent IR site(s), then outstanding delineation issues will be addressed by the adjacent IR site(s). • If the extent of contamination has not been defined, and data are not sufficient to support performing a human-health risk assessment and an FS (if there are sufficient data available to assess the nature and magnitude of contamination), then further delineation will be recommended. If follow-up delineation is performed, results will be submitted in an RI addendum. • If the extent of contamination has not been defined, but data are sufficient to support performing a human-health risk assessment and an FS (if there are sufficient data available to assess the nature and magnitude of contamination), then a risk assessment will be performed as part of the RI. If results of the human-health risk assessment indicate unacceptable risk, then further delineation may be recommended to support a removal action or inclusion as a component of remedial alternatives in the FS. Human-health risk will be assessed for individual areas at IR Site 35. The risk assessment approach and a discussion of acceptable risk are presented in the Human-Health Risk Assessment Work Plan, which is Attachment E to the Work Plan. The following general decision rules will be applied. • If human-health risk assessment results indicate acceptable risk, then no further action will be recommended. • If human-health risk assessment results indicate unacceptable risk, then further action will be recommended (e.g., removal action, inclusion of that area in the FS).	Site-specific sampling objectives limit the use of statistical methods for selecting sampling locations at IR Site 35. Judgmental sampling has been chosen by the Navy and regulatory agencies to further assess the nature and extent of contamination in specific areas. Because judgmental sampling will be used, statistical limits on decision errors are not quantifiable. The most severe study decision error would be to conclude that action is not required when an unacceptable level of human-health risk actually exists. Data collected during the RI will be evaluated conservatively.	The sampling design was developed to generate data to meet the DQOs. The sampling strategy uses judgmental sampling to provide additional data for assessment of issues identified in various areas. Soil and discrete groundwater samples to be collected during this investigation are summarized for each area in Appendix A1 to this SAP. Samples will be analyzed using one or more of the following methods, as agreed to by the Navy and regulatory agencies: • VOCs, using U.S. EPA Methods 5035A and 8260B • TPH, using U.S. EPA Method 8015-M for purgeable-range hydrocarbons and U.S. EPA Method 8015B-M for extractable-range hydrocarbons • SVOCs, using U.S. EPA Method 8270C (with SIM for PAHs [some samples will be analyzed for PAHs only]) • pesticides, using U.S. EPA Method 8081A • PCBs, using U.S. EPA Method 8082 • metals, using U.S. EPA Method 6010B/7000 Series Groundwater samples will also be analyzed for TDS using U.S. EPA Method 160.1 if sufficient volume can be obtained. Selected groundwater samples will be analyzed for hexavalent chromium using U.S. EPA Method 7196A and mercury using U.S. EPA Method 1631 to detect concentrations down to 0.1 nanogram per liter. The number of proposed borings and samples, types of samples, soil sample depths, and chemical analyses were agreed to by the Navy and regulatory agencies at four planning meetings held from May through July 2005, and refined in two telephone conference calls with DTSC on November 17 and 21 (San Francisco Bay RWQCB staff participated in a portion of

Table 3-1 (continued)

STEP 1 State the Problem*	STEP 2 Identify the Decisions	STEP 3 Identify Decision Inputs	STEP 4 Define Study Boundaries	STEP 5 Develop Decision Rules	STEP 6 Specify Tolerable Limits on Decision Errors	STEP 7 Optimize the Sampling Design
the Alameda Point screening criterion of 620 micrograms per kilogram but do not drive risk above 10^{-5}. No additional samples are proposed in the PAH areas that are outside of AOCs. Also, as agreed upon with U.S. EPA on November 14, 2005, baseline risks will not be calculated for the PAH areas. The AOCs, data gap areas, and SWMUs are listed in Table 1-5 and on Figure 1-4. The boundaries of some areas of IR Site 35 shown on Figure 1-4 may need to be revised based on the RI/FS results. Specific problem statements for the individual AOCs, data gap areas, and SWMUs are detailed in Appendix A1 to this SAP.		surface-water bodies (i.e., AOCs 2, 3, 4, 20, 21, and the southern portion of 23; and EBS Parcel 205)		Data from previous investigations and data collected during this investigation will be used to evaluate whether contaminants are present in groundwater at concentrations that potentially could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon. The following general decision rules will be applied. • If contaminant concentrations in groundwater at AOCs adjacent to or near surface water are below ecological comparison criteria, then it will be concluded that risk to potential aquatic receptors is acceptable, and no further action will be recommended. • If contaminant concentrations in groundwater at AOCs adjacent to or near surface water are above ecological comparison criteria, then further action may be recommended (e.g., additional sampling, modeling).		the November 21 conference call) (DON 2005b). Soil samples from selected locations and depths will be analyzed for the following physical (geotechnical) soil characteristics to support risk assessment modeling, fate-and-transport assessment, and FS evaluations: • air permeability • density and moisture content • effective porosity • grain-size distribution • liquid limits • hydraulic conductivity • total organic carbon Sampling designs for the individual AOCs, data gap areas, and SWMUs are detailed in Appendix A1 to this SAP.

Note:

* this problem statement for the RI Work Plan included a configuration of study areas at IR Site 35 that was subsequently modified; e.g., AOCs 14, 15, and 16 were redefined as part of the PAH areas

Acronyms/Abbreviations:

AOC – area of concern
AST – aboveground storage tank
B(a)P – benzo(a)pyrene
CAA – corrective action area
DQO – data quality objective
DTSC – (California Environmental Protection Agency) Department of Toxic Substances Control
EBS – environmental baseline survey
EDC – economic development conveyance
ESL – environmental screening level
FS – feasibility study
IR – Installation Restoration (Program)
MCL – maximum contaminant level
OWS – oil/water separator
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
RI – remedial investigation
ROD – record of decision
RWQCB – (California) Regional Water Quality Control Board
SAP – sampling and analysis plan
SI – site inspection
SIM – selected ion monitoring
SVOC – semivolatile organic compound
SWMU – solid waste management unit
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
U.S. EPA – United States Environmental Protection Agency
UST – underground storage tank
VOC – volatile organic compound

Table 3-2
Data Quality Objectives for Oil/Water Separators at IR Site 35

STEP 1 State the Problem	STEP 2 Identify the Decisions	STEP 3 Identify Decision Inputs	STEP 4 Define Study Boundaries	STEP 5 Develop Decision Rules	STEP 6 Specify Tolerable Limits on Decision Errors	STEP 7 Optimize the Sampling Design
The regulatory agencies requested further evaluation of the following OWSs within Transfer Parcel EDC-5 as part of the IR Site 35 RI/FS: • OWS 063A, B, and C (located in AOC 1) • OWS 12A and B (located in AOC 20) • OWS 067 (located in AOC 23) • OWS 118 (located in AOC 24) • OWS 017 (identified as a SWMU outside of the AOCs) All OWSs are proposed for removal by the Navy or City of Alameda in preparation for site redevelopment. It is anticipated that impacted soil will be removed and that soil samples will be collected and analyzed as part of these removal activities. The timing for removal of the OWSs, however, has not been determined and the soil data generated may not be available for this RI/FS. Groundwater will need to be sampled and analyzed to aid in the assessment of whether releases have occurred at the OWS sites. The Work Plan, therefore, includes the collection and analysis of soil and groundwater samples to aid in the determination of whether a release may have occurred.	Decisions regarding OWSs will be based on evaluation of the analytical results generated from targeted soil samples. These data will be used to make the following decision. • Are contaminants present in soil that indicate releases have occurred from the OWSs? Groundwater data targeting the OWSs will be combined with other area-specific data to evaluate the nature and extent of contamination and human-health risk. Results of human-health risk assessments will be used to make the following decision. • Have the nature and extent of contamination been defined? • Are contaminants present at concentrations that contribute to an unacceptable risk to potential future residents?	Data inputs will be chemical and geotechnical data, including concentrations of target chemicals in soil and groundwater collected during previous investigations and during the IR Site 35 RI. Also included are risk assessment inputs, assumptions, and results. Data associated with the OWSs will be compared with the following criteria: • RWQCB ESLs for petroleum-contaminated sites (RWQCB 2005) • U.S. EPA Region 9 or California-modified residential PRGs for soil (U.S. EPA 2004) • Alameda Point background concentrations for metals in soil and groundwater. The Navy and regulatory agencies have initiated discussions to revisit background concentrations and the data set for Alameda Point at a meeting held on October 18, 2005 (DON 2005a). The comparison criteria that will be used in the RI report will reflect any updated agreements reached by the time that the RI report is prepared. • MCLs for contaminants in groundwater None of the OWSs are located near surface water; therefore, groundwater results will not be compared to surface water criteria.	The boundaries associated with OWSs at IR Site 35 are the following. • The lateral study boundaries will encompass the immediate vicinity of each OWS. • The vertical soil boundary will be the vadose zone. • The vertical groundwater boundary will be 5 to 10 feet below the water table (to allow for sufficient sample volume), or the bottom of the OWS, if it is deeper than 10 feet bgs. • The temporal boundary will be determined by the timing of the fieldwork. As agreed by the regulatory agencies in telephone conference calls held on November 14 and 21, fieldwork was initiated on November 29, 2005, before the Work Plan was finalized (DON 2005b).	Soil results will be compared to criteria in Step 3. The following general decision rules will be applied. • If soil contaminant concentrations are below comparison criteria, then removal of additional soil during the OWS removal will not be necessary. • If soil contaminant concentrations are above comparison criteria, then removal of additional soil during the OWS removal will be recommended. Any additional characterization of the extent of contamination will be performed at that time. Discrete groundwater results will be combined with other area-specific data to evaluate the nature and extent of contamination. The following general decision rules will be applied. • If the nature and extent of contamination have been defined (based on comparison criteria in Step 3), then no further assessment will be recommended. • If the extent of contamination has not been defined, and data are not sufficient to support performing a human-health risk assessment and an FS, then further delineation will be recommended. If follow-up delineation is performed, results will be submitted in an RI addendum. • If the extent of contamination has not been defined, but data are sufficient to support performing a human-health risk assessment and an FS (if there are sufficient data available to assess the nature and magnitude of contamination), then a risk assessment will be performed as part of the RI. If results of the human-health risk assessment indicate unacceptable risk, then further delineation may be recommended to support a removal action or inclusion as a component of remedial alternatives in the FS. Discrete groundwater results will be combined with other area-specific data to evaluate human-health risk. Since it is presumed that impacted soil associated with OWSs will be removed, these data will not be included in the evaluation of human-health risk. The following general decision rules will be applied.	Site-specific sampling objectives limit the use of statistical methods for selecting sampling locations to target OWSs. Judgmental sampling has been chosen by the Navy and regulatory agencies to further assess whether soil or groundwater has been impacted by possible releases from OWSs. Because judgmental sampling will be used, statistical limits on decision errors are not quantifiable. The most severe study decision error would be to conclude that action is not required when an unacceptable level of human-health risk actually exists. Data collected during the RI will be evaluated conservatively.	The sampling design was developed to generate data to meet the DQOs and in accordance with regulator agency requests. Soil and discrete groundwater samples will be collected (using the direct-push sampling method) from one boring adjacent to and on the estimated downgradient side (where possible) of each OWS; two or three soil samples will be collected from each boring (0 to 2, 2 to 4, and 4 to 8 feet bgs). A groundwater sample will be collected from a soil boring beneath each OWS (if the depth is available) using a HydroPunch or an equivalent sampling method. Soil and discrete groundwater samples will be analyzed for some or all of the following chemicals, as agreed to by the Navy and regulatory agencies: • VOCs, using U.S. EPA Methods 5035A and 8260B • TPH, using U.S. EPA Method 8015B-M for extractable-range hydrocarbons • metals, using U.S. EPA Method 6010B/7000 Series Groundwater samples will also be analyzed for TDS using U.S. EPA Method 160.1, if sufficient volume can be obtained.

Table 3-2 (continued)

STEP 1 State the Problem	STEP 2 Identify the Decisions	STEP 3 Identify Decision Inputs	STEP 4 Define Study Boundaries	STEP 5 Develop Decision Rules	STEP 6 Specify Tolerable Limits on Decision Errors	STEP 7 Optimize the Sampling Design
				• If human-health risk assessment results indicate acceptable risk, then no further action will be recommended. • If human-health risk assessment results indicate unacceptable risk, then further action will be recommended (e.g., removal action, inclusion of the area in the FS).		

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
DQO – data quality objective
EDC – economic development conveyance
ESL – environmental screening level
FS – feasibility study
IR – Installation Restoration (Program)
MCL – maximum contaminant level
OWS – oil/water separator
PRG – preliminary remediation goal
RI – remedial investigation
RWQCB – (California) Regional Water Quality Control Board
SWMU – solid waste management unit
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Table 3-3
Data Quality Objectives for ASTs and One UST at IR Site 35

STEP 1 State the Problem	STEP 2 Identify the Decisions	STEP 3 Identify Decision Inputs	STEP 4 Define Study Boundaries	STEP 5 Develop Decision Rules	STEP 6 Specify Tolerable Limits on Decision Errors	STEP 7 Optimize the Sampling Design
Seven ASTs (ASTs 016, 039, 152, 173A, 173B, 173C, and 392) and one UST (UST[R]-11) were identified as SWMUs for further evaluation under IR Site 35. In a letter to the DTSC and San Francisco Bay RWQCB dated July 26, 2005, the Navy requested that the seven above-mentioned ASTs be removed from the list of SWMUs evaluated in Transfer Parcel EDC-5 because they were known to contain only petroleum hydrocarbons, and would therefore meet the CERCLA petroleum exclusion criteria. DTSC responded in a letter dated August 29, 2005, and acknowledged that this issue falls under the jurisdiction of the RWQCB. The time frame for resolving the Navy's request is, however, not known. This Work Plan proposes the collection and analysis of soil and groundwater samples to assess possible impact from these ASTs.	Decisions regarding AST/UST SWMUs will be based on evaluation of the analytical results generated from targeted samples. These data will be used to make the following decision. • Are contaminants present in soil or groundwater that indicate releases from the AST/UST SWMUs? Soil and groundwater data targeting the AST/UST SWMUs will be combined with other area-specific data to evaluate the nature and extent of contamination and will be used to make the following decision. • Have the nature and extent of contamination been defined?	Data inputs will be chemical data, including concentrations of target analytes in soil and discrete groundwater collected during previous investigations and during the IR Site 35 RI. Constituents in soil and groundwater associated with the AST/UST SWMUs will be compared to the following: • RWQCB ESLs for petroleum-contaminated sites (RWQCB 2005) • U.S. EPA Region 9 or California-modified residential PRGs for soil (U.S. EPA 2004) • Alameda Point background concentrations for metals in soil and groundwater The Navy and regulatory agencies have initiated discussions to revisit background concentrations and the data set for Alameda Point at a meeting held on October 18, 2005 (DON 2005a). The comparison criteria that will be used in the RI report will reflect any updated agreements reached by the time that the RI report is prepared. • MCLs for contaminants in groundwater None of the AST/UST SWMUs are located near surface water; therefore, groundwater results will not be compared to surface water criteria.	The boundaries associated with AST/UST SWMUs are the following. • The lateral study boundaries will encompass the immediate vicinity of each AST or UST. • The vertical soil boundary will be the vadose zone underlying the immediate vicinity of the AST or UST. • The vertical groundwater boundary for ASTs will be 5 to 10 feet below the water table (to allow for sufficient sample volume); based on excavation samples collected during removal of UST(R)-11, the tank was within 10 feet of ground surface. • The temporal boundary will be determined by the timing of the fieldwork. As agreed by the regulatory agencies in telephone conference calls held on November 14 and 21, fieldwork was initiated on November 29, 2005, before the Work Plan was finalized (DON 2005b).	Soil and discrete groundwater results will be compared to criteria listed in Step 3. If the only contaminants present above comparison criteria are petroleum-related constituents, then the following general decision rules will be applied. • If contaminants are present in soil and groundwater at concentrations below RWQCB ESLs for petroleum-contaminated sites, then no further action will be recommended. • If contaminants are present in soil or groundwater at concentrations above RWQCB ESLs for petroleum-contaminated sites, then the AST or UST will be recommended for further evaluation under the Alameda Point TPH Program. If nonpetroleum contaminants are present, then the following general decision rules will be applied regarding nature and extent. • If the nature and extent of contamination have been defined (based on comparison criteria in Step 3), then no further assessment will be recommended. • If the extent of contamination has not been defined, and data are not sufficient to support performing an FS, then further delineation will be recommended. If follow-up delineation is performed, results will be submitted in an RI addendum. • If the extent of contamination has not been defined, but data are sufficient to support performing an FS (if there are sufficient data available to assess the nature and magnitude of contamination), then the AST or UST SWMU will be carried forward to the FS. Further delineation may be recommended to support a removal action or inclusion as a component of remedial alternatives in the FS.	Site-specific sampling objectives limit the use of statistical methods for selecting sampling locations to target AST/UST SWMUs. Judgmental sampling has been chosen by the Navy and regulatory agencies to further assess whether soil or groundwater has been impacted by possible releases from these SWMUs. Because judgmental sampling will be used, statistical limits on decision errors are not quantifiable. The most severe study decision error would be to conclude that action is not required when an unacceptable level of human-health risk actually exists. Data collected during the RI will be evaluated conservatively.	The sampling design was developed to generate data to meet the DQOs and in accordance with regulatory agency requests. Soil and discrete groundwater samples will be collected (using direct-push sampling method) from one boring at each AST and two borings at the UST. The borings will be adjacent to and on the estimated downgradient side (where possible) of each AST and the UST; soil samples will be collected at two depths from each boring (0 to 2 and 2 to 4 feet bgs). The groundwater sample will be collected (using a HydroPunch or an equivalent sampling method) from the soil borings at a depth of approximately 5 to 10 feet below the groundwater table. Soil and discrete groundwater samples will be analyzed for the following chemicals, as agreed to by the Navy and regulatory agencies: • VOCs, using U.S. EPA Methods 5035A and 8260B • TPH, using U.S. EPA Method 8015B-M for extractable-range hydrocarbons Additionally, proposed samples targeting UST(R)-11 will also be analyzed for the following: • TPH, using U.S. EPA Method 8015-M for purgeable-range hydrocarbons • metals, using U.S. EPA Method 6010B/7000 Series Groundwater samples will also be analyzed for TDS using U.S. EPA Method 160.1, if sufficient volume can be obtained.

Table 3-3 (continued)

Acronyms/Abbreviations:
AST – aboveground storage tank
bgs – below ground surface
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
DQO – data quality objective
DTSC – (California Environmental Protection Agency) Department of Toxic Substances Control
EDC – economic development conveyance
ESL – environmental screening level
FS – feasibility study
IR – Installation Restoration (Program)
RI – remedial investigation
RWQCB – (California) Regional Water Quality Control Board
SWMU – solid waste management unit
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
U.S. EPA – United States Environmental Protection Agency
UST – underground storage tank
VOC – volatile organic compound

Table 3-4
Remedial Investigation Activities and Rationales for IR Site 35

Study Area	EBS Parcel	Description of Boring Locations [Boring No.]	Total No. of Sampling Locations	NO. OF SAMPLES PER MEDIUM		ANALYSES FOR SOIL SAMPLES U.S. EPA Method											ANALYSES FOR GW SAMPLES U.S. EPA Method											Soil Sampling Depth Intervals[c] (feet bgs)	Rationale
				Soil	GW	VOCs	TPH-gas	TPH-ff	SVOCs (no PAHs)	PAHs	Pest	PCBs	Metals	Hex Chrom	Lead	Geotech[a]	VOCs	TPH-gas	TPH-ff	SVOCs (no PAHs)	PAHs	Pest	PCBs	Metals	Hex Chrom	Mercury	TDS[b]		
AOCs						5035A/ 8260B	8015-M	8015B-M	8270C	8270C SIM	8081A	8082	6010B/ 7000	7196A	ICP		5035A/ 8260B	8015-M	8015B-M	8270C	8270C SIM	8081A	8082	6010B/ 7000	7196A	1631	160.1		
AOC 1	43	Adjacent to OWS-063A and -C [A01SB02-B03]	2	6	2	6		6									2		2								2	0-2, 2-4, 10-12	Assess possible releases from OWS. OWS-063A and -063C extended to 10 feet bgs; therefore, the deepest samples from the adjacent borings were collected from 10-12 feet bgs.
		Adjacent to OWS-063B [A01SB01]	1	3	1	3		3									1		1								1	0-2, 2-4, 4-8	
Total AOC 1			**3**	**9**	**3**	**9**		**9**									**3**		**3**								**3**		
AOC 2[d]	61A, 194	Around Bldg. 562 [A02SB01-B04]	4	12	2	12			12	12	12	12	12			2	2			2	2	2	2	2[e]		2	2	0-2, 2-4, 4-8	Assess whether there have been releases from possible hazardous waste storage.
AOC 3	91	In the area of EBS sample 091-0001 [A03SB01-03]	3	6							6																	0-2, 2-4	Assess extent of pesticides in soil and address regulatory request regarding GW.
		At the three borings closest to EBS sample 091-0001 [A03SB04-B06]	3	9							9											[f]						0-2, 2-4, 4-8	GW samples were extracted and held by the laboratory; they were not analyzed because pesticides were not reported in the deepest soil samples.
Total AOC 3			**6**	**15**							**15**																		
AOC 4	97	NA																											No sampling; existing analytical results sufficient for risk assessment.
AOC 5	98	Around sewage pump station; GW samples from northernmost borings [A05SB01-B04]	4	12	2	12			12	12	12	12	12				2			[m]	1	[m]	[m]	2			2	0-2, 2-4, 4-8	Assess possible releases from Bldg. 493 sewage pump station.
AOC 6	87	West of Building 553 [A06SB01-B06]	6	12								12																0-2, 2-4	Assess possible PCBs in soil.
AOC 7	98	NA																											No sampling; existing analytical results sufficient for risk assessment.
AOC 8	98	In area of EBS soil sample with elevated PCBs (around former sampling location 098-0006) [A08SB01-B05]	5	10								10																0-2, 2-4	Assess extent of PCBs in soil.
AOC 9	80, 81	AOC 9 near IR Site 8 [A09SB01-B03]	3	9							9																	0-2, 2-4, 4-8	Assess pesticides in soil and assess whether GW has been impacted by possible releases from the grease trap.
		Adjacent to grease trap [A09SB04]	1	3	1			2[g]			3								1								1	0-2, 2-4, 4-8	
Total AOC 9			**4**	**12**	**1**			**2**			**12**								**1**								**1**		
AOC 10	98	Area outside lead removal area [A10SB01-B05]	5	15											15													0-2, 2-4, 4-8	Assess lead concentrations in soil outside of lead removal area.
AOC 11[d]	77	Around and downgradient side of former Bldg. 101 (GW samples from northernmost locations) [A11SB01-B03]	4	12	2	12			12	12	12	12	12			2	2			2	2	2	2	2			2	0-2, 2-4, 4-8	Assess whether chemical storage and staining observed at Bldg. 101 impacted soil and GW.
AOC 12	105, 106, 107	Area outside lead removal area [A12SB01-B14]	14	42		2[p]									42													0-2, 2-4, 4-8	Assess lead concentrations in soil outside of lead removal area.
		Sediment samples [A12S01-S02]	2	2[b]											2													surface	In response to comments, two sediment samples were collected and analyzed for lead to assess whether lead-containing soil may have entered the storm sewer system during the removal action at this AOC. One sample was collected from a catch basin at AOC 12; a second sample was collected from a catch basin or storm sewer line between AOC 12 and Seaplane Lagoon.
Total AOC 12			**16**	**44**		**2**									**44**														

Table 3-4
Remedial Investigation Activities and Rationales for IR Site 35

Study Area	EBS Parcel	Description of Boring Locations [Boring No.]	Total No. of Sampling Locations	NO. OF SAMPLES PER MEDIUM		ANALYSES FOR SOIL SAMPLES U.S. EPA Method											ANALYSES FOR GW SAMPLES U.S. EPA Method											Soil Sampling Depth Intervals[c] (feet bgs)	Rationale
				Soil	GW	VOCs	TPH-gas	TPH-ff	SVOCs (no PAHs)	PAHs	Pest	PCBs	Metals	Hex Chrom	Lead	Geotech[a]	VOCs	TPH-gas	TPH-ff	SVOCs (no PAHs)	PAHs	Pest	PCBs	Metals	Hex Chrom	Mercury	TDS[b]		
AOCs						5035A/ 8260B	8015-M	8015B-M	8270C	8270C SIM	8081A	8082	6010B/ 7000	7196A	ICP		5035A/ 8260B	8015-M	8015B-M	8270C	8270C SIM	8081A	8082	6010B/ 7000	7196A	1631	160.1		
AOC 13	103	In area of EBS locations 103-0002, 103-0020, and 103-0023 [A13SB01-B06]	6	12							12																0-2, 2-4	Assess extent of pesticides in soil at EBS locations 103-0002, 103-0020, and 103-0023.
		Sample closest to EBS location QQ25 [A13SB07]	1	2						2	2																0-2, 2-4	Assess concentrations of pesticides and PAHs in soil in area of QQ25.
Total AOC 13			**7**	**14**						**2**	**14**																	
AOC 14	103	NA																										No sampling; existing PAH analytical results sufficient for RI/FS.
AOC 15[d]	102	Around Bldg. 102 [A15SB01-B03]	3	9						9						2[l]											0-2, 2-4, 4-8	Asses extent of PAHs in soil.
AOC 16	103	NA																										No sampling; existing PAH analytical results sufficient for RI/FS.
AOC 17[d]	185	Northern, central, and southern portions of AOC [A17SB01-B03]	3	9	3	9		9					9	9		2[l]	3		3					3	3		3	0-2, 2-4, 4-8	Assess whether soil and GW have been impacted by VOCs, TPH, and metals from previous site activities. Confirm the presence of elevated chromium in groundwater and assess whether soil has been impacted.
AOC 18[d]	70	West of Bldg. 39 [1] and downgradient side of AOC 18; GW samples from southernmost (downgradient) locations [A18SB01-B04]	4	12	2	12	12	12	12	12	12	12	12			2	2	2	2	2	2	2	2	2			2	0-2, 2-4, 4-8	Assess whether possible releases from storage of hazardous wastes in the area west of Bldg. 39 impacted soil or GW.
AOC 19	195	NA																										OWS and any outstanding characterization issues to be addressed under IR Site 6 FS. AOC removed from IR Site 35.
AOC 20	23F	Adjacent to and downgradient of OWS 12A and 12B [A20SB01-B02]	2	6	2	6		6					6				2		2					2[e]		2	2	0-2, 2-4, 4-8	Assess whether soil and/or GW have been impacted by possible leaks from the two OWSs.
AOC 21	23F	Downgradient of EBS samples 023-0051 and 0054 [A21SB01-B02]	2	6	2	6											2										2	0-2, 2-4, 4-8	Assess the distribution of VOCs in GW from previous site activities and confirm that concentrations are below MCLs.
AOC 22	23F	NA																										Any outstanding characterization issues will be addressed under CAA-B. AOC removed from IR Site 35.
AOC 23[d]	71	Within WD-041B [A23SB01-B02]	2	6	2	6	6	6	6	6	6	6	6				2	2	2	2	2	2	2	2			2	0-2, 2-4, 4-8	Assess whether possible releases from the washdown area impacted soil or GW.
		South of former washdown area [A23SB03]	1	3	1	3	3	3	3	3	3	3	3				1[l]	1	1	1	1	1	1	1			1	0-2, 2-4, 4-8	Provide wider coverage of samples.
		South of sample B06-09 [A23SB04]	1	3	1	3	3[l]	3[l]	3[l]	3	3[l]	3[l]	3				1	1[l]	1[l]	1[l]	1[l]	1	1[l]	1[l]	1		1	0-2, 2-4, 4-8	Assess the distribution of VOCs and PAHs and confirm iron concentrations in soil and the possible impact to GW.
		Southern portion of the parcel [A23SB06]	1	3	1	3	3	3	3	3	3	3	3				1	1	1	1	1	1	1	1[e]		1	1	0-2, 2-4, 4-8	Provide wider coverage of samples.
		Southeastern portion of the parcel at sample 071M-004 [A23SB05]	1	2	1	2				2							1				1						1	0-2, 4-8	Confirm the presence of elevated PAHs in GW and benzene in soil.
	72	West of Bldg. 77 [A23SB07]	1		1												1										1	NA	Assess the impact, if any, of VOCs in GW from IR Site 6.
	110	North of Bldg. 271 [A23SB08]	1		1												1	1	1	1	1	1	1	1			1	NA	Assess possible impact from chemicals stored in or around Bldg. 271.
		Within stained area west of Bldg. 271 used for storage and on the downgradient side [A23SB13]	1	3	1	3	3	3	3	3	3	3	3				1	1	1	1	1	1	1	1			1	0-2, 2-4, 4-8	
		Beneath Bldg. 271 [A23SB40]	1	3	1	3	3	3	3	3	3	3	3				1	1	1	1	1	1	1	1				0-2, 2-4, 4-8	
		Within stained area east of Bldg. 271 [A23SB10]	1	3	1	3	3	3	3	3	3	3	3				1	1	1	1	1	1	1	1			1	0-2, 2-4, 4-8	
		South of Bldg. 271 [A23SB11]	1		1												1	1	1	1	1	1	1	1			1	NA	

Table 3-4
Remedial Investigation Activities and Rationales for IR Site 35

Study Area	EBS Parcel	Description of Boring Locations [Boring No.]	Total No. of Sampling Locations	NO. OF SAMPLES PER MEDIUM		ANALYSES FOR SOIL SAMPLES U.S. EPA Method										ANALYSES FOR GW SAMPLES U.S. EPA Method										Soil Sampling Depth Intervals[c] (feet bgs)	Rationale
				Soil	GW	VOCs	TPH-gas	TPH-ff	SVOCs (no PAHs)	PAHs	Pest	PCBs	Metals	Hex Chrom	Lead	Geotech[a]	VOCs	TPH-gas	TPH-ff	SVOCs (no PAHs)	PAHs	Pest	PCBs	Metals	Hex Chrom	Mercury	TDS[b]		
AOCs						5035A/ 8260B	8015-M	8015B-M	8270C	8270C SIM	8081A	8082	6010B/ 7000	7196A	ICP		5035A/ 8260B	8015-M	8015B-M	8270C	8270C SIM	8081A	8082	6010B/ 7000	7196A	1631	160.1		
AOC 23[d] (cont.)	110 (cont.)	Southwest portion of Parcel 110 [A23SB12]	1	3	1	3	3	3	3	3	3	3	3				1	1	1	1	1	1	1	1			1	0-2, 2-4, 4-8	Provide wider coverage of samples.
		Downgradient of industrial waste pump station [A23SB09]	1	3	1	3	3	3	3	3	3	3	3				1	1	1	1	1	1	1	1			1	0-2, 2-4, 4-8	Assess whether possible contaminants from the pump station impacted soil or GW.
	121	EBS Parcel 121 [A23SB14]	1	3	1	3	3	3	3	3	3	3	3				1	1	1	1	1	1	1	1			1	0-2, 2-4, 4-8	Provide wider coverage of samples.
	123	North of NAS GAP 29 [A23SB15-B16]	2	6	1							6	6			2							1	1			1	0-2, 2-4, 4-8	Assess PCBs in soil and address regulatory request to target this area for GW evaluation.
		South of NAS GAP 29 [A23SB17]	1		1												1[l]		1[l]	1	1	1	1	1			1	NA	Assess PCBs in GW south of NAS GAP 29 and possible contaminants north of Bldg. 263.
		Northwestern portion [A23SB18]	1	3	1	3	3	3	3	3	3	3	3				1	1	1	1	1	1	1	1			1	0-2, 2-4, 4-8	Provide wider coverage of samples in the parcel and assess soil and GW quality north of Bldg. 98, west of Bldg. 263, and east of Bldg. 13 (EBS Parcel 124).
		Downgradient of Bldg. 263 [A23SB19]	1	3	1	3	3	3	3	3	3	3	3				1	1	1	1	1	1	1	1			1	0-2, 2-4, 4-8	Address the presence of contaminants in addition to TPH. Also provide information north of Bldg. 263.
		West of Bldg. 98 [A23SB20]	1		1												1	1	1	1	1	1	1	1			1	NA	Assess whether possible releases at Bldg. 98 impacted soil or GW and provide wider coverage of samples east of Bldg. 98. The two westernmost borings also provide information east of Bldg. 13 (EBS Parcel 124).
		East of Bldg. 98 [A23SB21]	1	3	1	3	3	3	3	3	3	3	3				1[l]	1	1	1	1	1	1	1			1	NA	
		Downgradient of Bldg. 98 [A23SB22]	1	3	1	3	3	3	3	3	3	3	3				1	1	1	1	1	m	m	1[e]		1	m	0-2, 2-4, 4-8	
		Adjacent to NAS GAP 15 [A23SB23-B24]	2		2												2	2	2	2	2	2	2	2			2	NA	Address regulatory request to target this area to assess NAS GAP 15.
		Between Bldgs. 67 and 393 [A23SB25]	1	3	1	3	3	3	3	3	3	3	3				1	1	1	1	1	1	1	1			1	0-2, 2-4, 4-8	Assess stained area between Bldgs. 67 and 393.
		Adjacent to OWS 067 [A23SB26]	1	3	1	3	3	3	3[l]	3[l]	3[l]	3[l]	3				1	1	1					1			1	0-2, 2-4, 4-8	Assess whether possible releases from OWS-067 impacted soil or GW.
		Adjacent to UST(R)-11 [A23SB27-B28]	2	6	2	6		6	1[q]	1[q]	1[q]	1[q]	6				2		2					2			2	0-2, 2-4, 4-8	Assess current conditions.
		East portion of EBS Parcel 123 [A23SB29]	1	3	1	3	3	3	3	3	3	3	3				1	1	1	1	1	1	1	1			1	0-2, 2-4, 4-8	Provide wider coverage of samples.
	124	Around Bldg. 13; north and southwest of Bldg. 13 (GW only); west of Bldg. 13 (GW and soil) [A23SB30-B32]	3	3	3	3	3	3	3	3	3	3	3				3	3	3	3	3	3	3	3[j]		2	3	0-2, 2-4, 4-8	Assess whether chemicals stored in Bldg. 13 impacted soil or GW.
	125	North, west, and south of Bldg. 66 [A23SB33-B35]	3	9	3	9	9	9	9	9	9	9	9				3	3	3	3	3	3	3	3[e]		3	3	0-2, 2-4, 4-8	Assess whether possible releases at Bldg. 66 impacted soil or GW.
		Beneath Bldg. 66 [A23SB39]	1	3	1	3	3	m	m	3	m	m	3				1	m	m	m	m	m	m	1[e]		1		0-2, 2-4, 4-8	
		Adjacent to and downgradient of NADEP GAP 43 [A23SB36]	1	3	1	3	3	2[n]	2[n]	2[n]	2[n]	2[n]	2[n]				1	1	1	1	1	1	1	1[e]		1	1	0-2, 2-4, 4-8	
	126	Northern and southern portion of parcel [A23SB37-B38]	2	6	2	6							6			2	2							2[e]		2	2	0-2, 2-4, 4-8	Assess the distribution of metals and VOCs in soil and GW.
		A23398-MW1 [A23W01]	1		1												1							1[e]		1	1	NA	
Total AOC 23			**41**	**92**	**40**	**86**	**72**	**74**	**69**	**74**	**69**	**75**	**89**			**4**	**39**	**30**	**33**	**30**	**31**	**29**	**30**	**38**		**12**	**37**		
AOC 24	197	Adjacent to OWS 118 [A24SB01]	1	3	1	3		3					3				1		1					1			1	0-2, 2-4, 4-8	Confirm previous soil data and assess whether GW has been impacted by possible releases. Metals in soil and GW in the western portion of AOC 24 will be addressed in the IR Site 3 remedial action/remedial design.

Table 3-4
Remedial Investigation Activities and Rationales for IR Site 35

Study Area	EBS Parcel	Description of Boring Locations [Boring No.]	Total No. of Sampling Locations	NO. OF SAMPLES PER MEDIUM		ANALYSES FOR SOIL SAMPLES U.S. EPA Method											ANALYSES FOR GW SAMPLES U.S. EPA Method											Soil Sampling Depth Intervals[c] (feet bgs)	Rationale
				Soil	GW	VOCs	TPH-gas	TPH-ff	SVOCs (no PAHs)	PAHs	Pest	PCBs	Metals	Hex Chrom	Lead	Geotech[a]	VOCs	TPH-gas	TPH-ff	SVOCs (no PAHs)	PAHs	Pest	PCBs	Metals	Hex Chrom	Mercury	TDS[b]		
AOCs						5035A/ 8260B	8015-M	8015B-M	8270C	8270C SIM	8081A	8082	6010B/ 7000	7196A	ICP		5035A/ 8260B	8015-M	8015B-M	8270C	8270C SIM	8081A	8082	6010B/ 7000	7196A	1631	160.1		
AOC 25	130, 132	Three borings north of Bldg. 503 for soil and GW; one boring in southeast portion of AOC for GW only [A25SB01-B04]	4	9	4								9					4	4					4			4	0-2, 2-4, 4-8	Assess the distribution of metals (notably thallium) north of Bldg. 503, and TPH in GW in the southwestern portion of the AOC.
AOCs Total			**124**	**313**	**64**	**169**	**84**	**115**	**117**	**133**	**158**	**145**	**164**	**9**	**59**	**14**	**58**	**36**	**49**	**36**	**38**	**39**	**36**	**56**	**3**	**16**	**61**		
Data Gap Sites																													
EBS Parcel 78	78	Grid pattern across site [D78SB01-B04]	4	12	4	12	12	11	11	11	11	11	11				4	4	4	4	4	4	4	4			4	0-2, 2-4, 4-8	Data gap; agency requested.
EBS Parcel 79	79	Grid pattern across site [D79SB01-B04]	4	12	4	12	12	12	12	12	12	12	12				3	3	4	4	4	4	4	4			4	0-2, 2-4, 4-8	Data gap; agency requested.
EBS Parcel 205	205	East of Bldg. 523 on downgradient side of NADEP GAP 73 [D205SB01-B02]	2	6	2	6	6	6					6				2	2	2					2[e]		2	2	0-2, 2-4, 4-8	Assess whether soil and GW have been impacted by possible releases from this GAP.
Data Gap Sites Total			**10**	**30**	**10**	**30**	**30**	**29**	**23**	**23**	**23**	**23**	**29**				**9**	**9**	**10**	**8**	**8**	**8**	**8**	**10**		**2**	**10**		
SWMUs																													
SWMU OWS 017	80	Adjacent to and downgradient of SWMU [S017SB01]	1	2	1	2		2					2				1		1								1	0-2, 2-4	Assess oil trap and metals in GW.
SWMU AST 016	83	Adjacent to and downgradient of SWMU [S016SB01]	1	2	1	2		2									1		1								1	0-2, 2-4	Assess whether chemicals from AST impacted soil and/or GW.
SWMU AST 039	70	Adjacent to (if possible) and downgradient of SWMU [S039SB01]	1	2	1	2		2									1		1								1	0-2, 2-4	Assess whether chemicals from AST impacted soil and/or GW.
SWMU AST 152	102	Adjacent to SWMU [S152SB01]	1	2	1	2		2									1		1								1	0-2, 2-4	Assess whether chemicals from AST impacted soil and/or GW.
SWMU AST 173A/B/C	115	Adjacent to middle of AST-173B [S173SB01]	1	2	1	2		2									1		1								1	0-2, 2-4	Assess whether chemicals from AST impacted soil and/or GW.
SWMU AST 392	189	Adjacent to and downgradient of SWMU [S392SB01]	1	2	1	2		2									1		1								1	0-2, 2-4	Assess whether chemicals from AST impacted soil and/or GW.
SWMU UST(R)-11	NA[k]																												
SWMUs Total			**6**	**12**	**6**	**12**		**12**					**2**				**6**		**6**								**6**		
PAH Areas	NA																												No additional sampling other than PAH sampling proposed for individual study areas.
TOTALS			**140**	**355**	**80**	**211**	**114**	**156**	**140**	**156**	**181**	**168**	**195**	**9**	**59**	**14**	**73**	**45**	**65**	**44**	**46**	**47**	**44**	**66**	**3**	**18**	**77**		No sampling; existing analytical results sufficient for RI/FS.

Notes:

[a] see Table 2-2 in the SAP (BEI 2006) for geotechnical analytical methods
[b] GW samples will be collected for TDS analysis if sufficient sample volume can be collected from the boring
[c] GW samples will be collected from approximately 5 to 10 feet below the water table to allow for sufficient sample volume
[d] two soil samples will be collected from one boring at this AOC to be analyzed for geotechnical analyses as specified in Table 2-1 of the SAP (BEI 2006)
[e] does not include mercury
[f] extracted and held all GW samples from these locations, groundwater samples were not analyzed based on soil results
[g] the lower two soil samples from the boring next to the grease trap on downgradient side will also be analyzed for TPH
[h] sediment samples from catch basins and/or storm sewer lines
[i] borings will be located near drains, if identified
[j] does not include mercury for those samples also being analyzed for low-detection-limit mercury under separate analysis
[k] UST(R)-11 addressed under AOC 23
[l] sample performed during RI though not recommended in Work Plan (BEI 2006)
[m] analysis proposed in Work Plan (BEI 2006) but not performed during RI due to low yield from GW monitoring well
[n] only analyzed at two of the three depth intervals
[p] samples added at one depth at A12SB02 and 3 depths at A12SB 03 because FID/PID indicated "hits"
[q] sample collected at one depth at A23SB28

Acronyms/Abbreviations:

AOC – area of concern
AST – aboveground storage tank
bgs – below ground surface
Bldg. – building
CAA – corrective action area
EBS – environmental baseline survey
FS – feasibility study
GAP – generator accumulation point
GW – groundwater
IR – Installation Restoration (Program)
MCL – maximum contaminant level
NA – not applicable
NADEP – Naval Aviation Depot
NAS – Naval Air Station
OWS – oil/water separator
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
Pest – pesticide(s)
SAP – sampling and analysis plan
SVOC – semivolatile organic compound
SWMU – solid waste management unit
TPH – total petroleum hydrocarbons (purgeable- and extractable-range, unless otherwise noted)
UST – underground storage tank
VOC – volatile organic compound

Table 3-5
Geotechnical Analytical Results

Sample ID/Boring ID	AOC	Depth (feet bgs)	Soil Type[a]	Liquid Limit[b]	Plastic Limit[b]	Plasticity Index[b]	Dry Density (pcf)[c]	Moisture Content (percent)[d]	Effective Confined Pressure (psi)[e]	Saturated Hydraulic Conductivity (cm/sec)[e]	Effective Air Permeability (millidarcy)[f]	Air Conductivity (cm/sec)[f]	Total Porosity (dimensionless)[g]	Effective Porosity (dimensionless)[g]	Total Organic Carbon (percent)[h]
C077S026/A02SB02	2	4–4.5	SM	NP	NP	NP	108.9	13.7	3	9.6E-06	33.21	2.1E-06	0.350	0.350	1.38
C077S028/A02SB03	2	2.5–4.0	SM	17	14	3	112.1	10.6	3	9.8E-06	703.43	4.5E-05	0.335	0.335	1.64
C077S178/A11SB03	11	2.5–4.0	SP-SM	NP	NP	NP	98.5	6.6	3	1.3E-03	706.44	4.6E-05	0.416	0.416	0.47
C077S179/A11SB03	11	6.5–8.0	SP-SM	NP	NP	NP	103.3	16.5	4	1.3E-04	691.21	4.5E-05	0.387	0.387	0.52
C077S265/A15SB02	15	2.5–3.5	SC	19	12	7	114.4	15.2	3	8.6E-06	37.82	2.4E-06	0.319	0.319	1.81
C077S266/A15SB02	15	5–6	CL	47	23	24	66.2	54.1	3	5.4E-08	0.152	9.9E-09	0.607	0.607	4.50
C077S281/A17SB01	17	0.5–2.0	SM	NP	NP	NP	107.5	10.0	3	2.5E-04	606.88	3.9E-05	0.378	0.378	0.64
C077S282/A17SB01	17	2.5–4.0	SM	NP	NP	NP	102.8	7.6	3	8.6E-04	567.31	3.7E-05	0.389	0.389	0.47
C077S308/A18SB03	18	2.5–3.0	SP-SM	NP	NP	NP	103.8	6.3	3	1.4E-03	711.52	4.7E-05	0.385	0.385	0.16
C077S311/A18SB04	18	2.5–3.0	SP-SM	NP	NP	NP	96.5	8.3	3	2.1E-03	513.94	3.3E-05	0.428	0.428	0.33
C077S395/A23SB15	23	2.5–3.5	SP-SM	NP	NP	NP	102.7	10.8	3	1.7E-03	496.91	3.2E-05	0.390	0.390	0.60
C077S396/A23SB15	23	6.5–7.5	CL	38	16	22	74.7	49.9	3.6	1.7E-07	0.53	3.5E-08	0.564	0.564	2.87
C077S443/A23SB37	23	2.0–3.5	SP-SM	NP	NP	NP	103.2	9.5	3	3.6E-04	536.41	3.5E-05	0.390	0.39	0.47
C077S444/A23SB37	23	5.0–6.5	SM	NP	NP	NP	98.9	26.9	3.3	1.1E-05	181.35	1.2E-05	0.411	0.411	1.83

Notes:
[a] analyzed by SWRCB method
[b] analyzed by ASTM Method D4318
[c] analyzed by ASTM Method D2937
[d] analyzed by ASTM Method D2216
[e] analyzed by ASTM Method D5084
[f] analyzed by API RP40
[g] analyzed by SWRCB method
[h] analyzed by Walkley-Black method

Acronyms/Abbreviations:
AOC – area of concern
API RP – American Petroleum Institute Recommended Practice
ASTM – American Society for Testing and Materials
bgs – below ground surface
CL – inorganic clay of low to medium plasticity; lean clay
cm/sec – centimeters per second
NP – nonplastic
pcf – pounds per cubic foot
psi – pounds per square inch
SC – clayey sand; sand-clay mixture
SM – silty sand
SP – sand, poorly sorted
SWRCB – (California) State Water Resources Control Board

Table 3-6
Comparison Criteria Using PRGs in Soils

Analyte	Federal PRG (µg/kg)	California-Modified PRG (µg/kg)[a]
Volatile Organic Compound		
acetone	14,000,000	—[b]
benzene	640	—
bromoform	62,000	—
2-butanone	22,000,000	—
sec-butylbenzene	220,000	—
carbon disulfide	360,000	—
chlorobenzene	150,000	—
chloroform	220	940
chloromethane	47,000	—
1,2-dichlorobenzene	600,000	—
1,1-dichloroethene	120,000	—
cis-1,2-dichloroethene	43,000	—
trans-1,2-dichloroethene	69,000	—
ethylbenzene	400,000	—
2-hexanone	—	—
isopropylbenzene	570,000	—
p-isopropyltoluene	—	—
methyl tert-butyl ether	17,000	—
methylene chloride	9,100	—
4-methyl-2-pentanone	5,300,000	—
naphthalene	56,000	1,700
n-propylbenzene	240,000	—
tetrachloroethene	480	—
toluene	520,000	—
trichloroethene	53	2,900
1,3,5-trimethylbenzene	21,000	—
vinyl chloride	79	—
xylenes, total	270,000	—
Semivolatile Organic Compound		
acenaphthene	3,700,000	—
acenaphthylene	—	—
anthracene	22,000,000	—
benz(a)anthracene	[c]	—
benzo(b)fluoranthene	[c]	—
benzo(k)fluoranthene	[c]	[c]
benzo(g,h,i)perylene	—	—
benzo(a)pyrene	[c]	—
bis(2-ethylhexyl)phthalate	35,000	—
butyl benzyl phthalate	12,000,000	—
carbazole	24,000	—

Table 3-6 (continued)

Analyte	Federal PRG (µg/kg)	California-Modified PRG (µg/kg)[a]
Semivolatile Organic Compound (continued)		
4-chloro-3-methylphenol	—	—
2-chlorophenol	63,000	—
chrysene	c	c
dibenz(a,h)anthracene	c	—
di-n-butyl phthalate	6,100,000	—
dibenzofuran	150,000	—
diethyl phthalate	49,000,000	—
dimethyl phthalate	100,000,000	—
2,4-dinitrotoluene	720	—
di-n-octyl phthalate	2,400,000	—
fluoranthene	2,300,000	—
fluorene	2,700,000	—
indeno(1,2,3-cd)pyrene	c	—
2-methylnaphthalene	—	—
4-methylphenol	310,000	—
naphthalene	c	c
4-nitrophenol	—	—
N-nitrosodiphenylamine	99,000	—
N-nitroso-di-n-propylamine	69	—
pentachlorophenol	3,000	—
phenanthrene	—	—
phenol	18,000,000	—
pyrene	2,300,000	—
1,2,4-trichlorobenzene	62,000	—
Pesticides/PCBs		
Aroclor 1254	220	—
Aroclor 1260	220	—
alpha-BHC	90	—
beta-BHC	320	—
delta-BHC	—	—
gamma-BHC (lindane)	440	—
alpha-chlordane	1,600	—
gamma-chlordane	1,600	—
4,4′-DDD	2,400	—
4,4′-DDE	1,700	—
4,4′-DDT	1,700	—
dieldrin	30	—
endosulfan I	370,000	—
endosulfan II	370,000	—
endrin	18,000	—
endrin aldehyde	—	—

Table 3-6 (continued)

Analyte	Federal PRG (µg/kg)	California-Modified PRG (µg/kg)[a]
Pesticides/PCBs (continued)		
heptachlor	110	—
heptachlor epoxide	53	—
methoxychlor	310,000	—
Metals		
aluminum	76,000,000	—
antimony	31,000	—
arsenic	390	62
barium	5,400,000	—
beryllium	150,000	—
cadmium	37,000	—
calcium	—	—
chromium	210,000	—
chromium, hexavalent	30,000	—
cobalt	900,000	—
copper	3,100,000	—
iron	23,000,000	—
lead	400,000	150,000
magnesium	—	—
manganese	1,800,000	—
mercury	23,000	—
molybdenum	390,000	—
nickel	1,600,000	—
potassium	—	—
selenium	390,000	—
silver	390,000	—
sodium	—	—
thallium	5,200	—
vanadium	78,000	—
zinc	23,000,000	—

Notes:
[a] California-modified PRG is used, where available (U.S. EPA 2004b)
[b] dash indicates not available
[c] the Alameda Point benzo(a)pyrene equivalent concentration screening level of 620 µg/kg is used for the eight PAHs classified as carcinogenic

Acronyms/Abbreviations:
BHC – benzene hexachloride
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
µg/kg – micrograms per kilogram
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal

Table 3-7
Comparison Criteria for TPH in
Soil, Groundwater, and Surface Water

TPH Range	Soil ESL[a] (mg/kg)	Groundwater ESL[a] (µg/L)	Surface Water ESL[b] (µg/L)
Gasoline	100	100	3,700
Diesel	100	100	640
Jet propellant	100	100	640
Motor oil	500	100	640

Notes:
[a] RWQCB 2005: Table A, shallow soil screening levels (<3 meters below ground surface), residential land use, groundwater is a current or potential source of drinking water
[b] RWQCB 2005: Table F, surface water marine screening levels

Acronyms/Abbreviations:
ESL – environmental screening level
µg/L – micrograms per liter
mg/kg – milligrams per kilogram
TPH – total petroleum hydrocarbons

Table 3-8
Comparison Criteria Using MCLs[a] for Groundwater

Analyte	Federal MCL (µg/L)	California-Modified MCL (µg/L)
Volatile Organic Compounds		
acetone	—[b]	—
benzene	5	1
2-butanone	—	—
tert-butyl alcohol	—	—
sec-butylbenzene	—	—
tert-butylbenzene	—	—
carbon disulfide	—	—
chloromethane	—	—
1,2-dichlorobenzene	600	600
1,3-dichlorobenzene	—	—
1,1-dichloroethane	—	5
1,2-dichloroethane	5	0.5
cis-1,2-dichloroethene	70	6
trans-1,2-dichloroethene	100	10
1,4-dioxane	—	—
ethylbenzene	700	300
isopropylbenzene	—	—
p-isopropyltoluene	—	—
methyl tert-butyl ether	—	13
methylene chloride	5	5
naphthalene	—	—
n-propylbenzene	—	—
tetrachloroethene	5	5
toluene	1,000	150
1,2,4-trichlorobenzene	70	5
trichloroethene	5	5
trichlorofluoromethane	—	150
1,2,4-trimethylbenzene	—	—
1,3,5-trimethylbenzene	—	—
vinyl chloride	2	0.5
xylenes, total	10,000	1,750
Semivolatile Organic Compounds		
acenaphthene	—	—
acenaphthylene	—	—
anthracene	—	—
benz(a)anthracene	—	—

Table 3-8 (continued)

Analyte	Federal MCL (µg/L)	California-Modified MCL (µg/L)
Semivolatile Organic Compounds (continued)		
benzo(b)fluoranthene	—	—
benzo(g,h,i)perylene	—	—
benzo(a)pyrene	0.2	0.2
bis(2-ethylhexyl)phthalate	6	4
butyl benzyl phthalate	—	—
chrysene	—	—
1,2-dichlorobenzene	600	600
fluoranthene	—	—
fluorene	—	—
indeno(1,2,3-cd)pyrene	—	—
2-methylnaphthalene	—	—
4-methylphenol	—	—
naphthalene	—	—
phenanthrene	—	—
phenol	—	—
pyrene	—	—
Pesticides/PCBs		
Aroclor 1016	0.5	0.5
Aroclor 1260	0.5	0.5
alpha-BHC	—	—
gamma-BHC (lindane)	0.2	0.2
alpha-chlordane	2	0.1
gamma-chlordane	2	0.1
4,4′-DDE	—	—
4,4′-DDT	—	—
dieldrin	—	—
endosulfan I	—	—
endosulfan II	—	—
endosulfan sulfate	—	—
endrin aldehyde	—	—
heptachlor	0.4	0.01
heptachlor epoxide	0.2	0.01
Metals		
aluminum	1,000	1,000
antimony	6	6
arsenic	10	50
barium	2,000	1,000
beryllium	4	4

Table 3-8 (continued)

Analyte	Federal MCL (µg/L)	California-Modified MCL (µg/L)
Metals (continued)		
cadmium	5	5
calcium	—	—
chromium	100	50
cobalt	—	—
copper	—	—
iron	—	—
lead [c]	15	—
magnesium	—	—
manganese	—	—
mercury	2	2
molybdenum	—	—
nickel	—	100
potassium	—	—
selenium	50	50
silver	—	—
sodium	—	—
thallium	2	2
vanadium	—	—
zinc	—	—

Notes:
[a] MCLs are used for comparison purposes only, even though they are not directly applicable to groundwater quality at IR Site 35
[b] dash indicates MCL not established
[c] lead advisory

Acronyms/Abbreviations:
BHC – benzene hexachloride
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
IR – Installation Restoration (Program)
µg/L – micrograms per liter
MCL – maximum contaminant level
PCB – polychlorinated biphenyl

Table 3-9
Comparison Criteria[a] for Surface Water (CTR and NRWQC)

Analyte	CCC (µg/L)		HHCO (µg/L)	
	NRWQC	CTR	NRWQC	CTR
Volatile Organic Compounds				
benzene	—[b]	—	51	71
2-butanone	—	—	—	—
tert-butylbenzene	—	—	—	—
carbon disulfide	—	—	—	—
1,3-dichlorobenzene	—	—	960	2,600
1,1-dichloroethane	—	—	—	—
1,2-dichloroethane	—	—	37	99
cis-1,2-dichloroethene	—	—	—	—
trans-1,2-dichloroethene	—	—	10,000	140,000
isopropylbenzene	—	—	—	—
methyl tert-butyl ether	—	—	—	—
naphthalene	—	—	—	—
tetrachloroethene	—	—	3.3	8.9
toluene	—	—	15,000	200,000
1,2,4-trichlorobenzene	—	—	70	—
trichloroethene	—	—	30	81
1,2,4-trimethylbenzene	—	—	—	—
vinyl chloride	—	—	2.4	525
xylenes, total	—	—	—	—
Semivolatile Organic Compounds				
acenaphthene	—	—	990	2700
acenaphthylene	—	—	—	—
anthracene	—	—	40,000	110,000
benzo(g,h,i)perylene	—	—	—	—
butyl benzyl phthalate	—	—	1,900	5,200
fluoranthene	—	—	140	370
fluorene	—	—	5,300	14,000
naphthalene	—	—	—	—
phenanthrene	—	—	—	—
pyrene	—	—	4,000	11,000
Metals				
aluminum	—	—	—	—
arsenic	36	36	0.14	—
barium	—	—	—	—
beryllium	—	—	—	—
cadmium	8.8	9.3	—	—
calcium	—	—	—	—
chromium	—	—	—	—

Table 3-9 (continued)

Analyte	CCC (µg/L)		HHCO (µg/L)	
	NRWQC	CTR	NRWQC	CTR
Metals (continued)				
cobalt	—	—	—	—
copper	3.1	3.1	—	—
iron	—	—	—	—
magnesium	—	—	—	—
manganese	—	—	—	—
mercury	0.94	0.025	—	0.051
nickel	8.2	8.2	4,600	4,600
potassium	—	—	—	—
selenium	71	71	4,200	—
sodium	—	—	—	—
vanadium	—	—	—	—
zinc	81	81	26,000	—
General Chemicals				
total dissolved solids	—	—	—	—

Notes:
[a] these surface water criteria are used for comparison purposes only, even though they are not directly applicable to groundwater quality at IR Site 35
[b] dash indicates no criterion exists

Acronyms/Abbreviations:
CCC – criterion continuous concentration
CTR – California Toxics Rule
HHCO – human-health consumption of organisms only
IR – Installation Restoration (Program)
µg/L – micrograms per liter
NRWQC – National Recommended Water Quality Criteria

Table 3-10
Background Concentrations of Metals in Soil and Groundwater at Alameda Point

Analyte	SOIL			GROUNDWATER		
	Maximum Detected Result in Background Data Set (mg/kg)	Alameda Point Background 95th Percentile (mg/kg)	Coefficient of Variation	Maximum Detected Result in Background Data Set (µg/L)	Alameda Point Background 95th Percentile (µg/L)	Coefficient of Variation
aluminum	22,600	13,960	0.06	4,530	1,070	0.27
antimony	8.6	9.50	0.24	4.2	37.50	0.38
arsenic	15.6	9.14	0.15	40.7	20.72	0.13
barium	156	93.68	0.08	1,260	569.5	0.19
beryllium	1.47	1.27	0.75	3	2.50	0.21
cadmium	3.19	1.72	0.24	NA	NA	NA
calcium	66,600	16,800	0.11	NA	NA	NA
chromium	66.7	54.84	0.04	82.8	12.45	0.20
cobalt	49.7	14.30	0.08	NA	NA	NA
copper	49.1	39.14	0.09	27.3	24.03	0.18
iron	27,900	22,280	0.05	24,400	6,586	0.58
lead	165	37.66	0.17	2.9	11.45	0.25
magnesium	8,800	7,304	0.06	NA	NA	NA
manganese	748	383.0	0.08	2,480	1,741	0.44
mercury	2.71	0.52	0.23	NA	NA	NA
molybdenum	[a]	5.20	[b]	NA	NA	NA
nickel	80.4	55.72	0.05	NA	NA	NA
potassium	2,480	1,232	0.08	NA	NA	NA
selenium	[a]	1.78	[b]	2.5	8.58	0.11
silver	5.64	2.22	0.22	NA	NA	NA
sodium	1,580	1,230	0.10	NA	NA	NA

Table 3-10 (continued)

Analyte	SOIL			GROUNDWATER		
	Maximum Detected Result in Background Data Set (mg/kg)	Alameda Point Background 95th Percentile (mg/kg)	Coefficient of Variation	Maximum Detected Result in Background Data Set (µg/L)	Alameda Point Background 95th Percentile (µg/L)	Coefficient of Variation
thallium	NA	0.50	NA	5.2	16.15	0.12
titanium	518	518.0	NA	NA	NA	NA
vanadium	55.3	47.34	0.05	50.8	26.27	0.17
zinc	191	67.48	0.07	46,800	36.39	0.20

Reference:
TtEMI 2004

Notes:
[a] the background data set contained no detected data for this metal
[b] not calculated as the detection frequency in the background data set was 0%

Acronyms/Abbreviations:
µg/L – micrograms per liter
mg/kg – milligrams per kilogram
NA – not applicable; background values have not been developed

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Table 4-1
Volatile Organic Compounds in Soil
Exceeding Preliminary Screening Criteria

Study Area	Station ID[a]	Depth (feet bgs)	VOC	Concentration (µg/kg)	Preliminary Screening Criteria[b] (µg/kg)
AOC 23	A23SB22	5 to 6	vinyl chloride	210	79
AOC 23	071M-004M	7.5 to 8.5	benzene	27,000	640

Notes:
[a] sample ID used for EBS samples
[b] residential soil PRG (U.S. EPA 2004b)

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
EBS – environmental baseline survey
µg/kg – micrograms per kilogram
PRG – preliminary remediation goal
VOC – volatile organic compound

Table 4-2
Petroleum Hydrocarbons in Soil
Exceeding Preliminary Screening Criteria

Study Area	Station ID[a]	Depth (feet bgs)	TPH Range	Petroleum Hydrocarbon Concentration (mg/kg)	Preliminary Screening Criteria[b] (mg/kg)
AOC 17	185I-001	9 to 9.5	motor oil	920 J	500
	185I-002	9 to 9.5	diesel	2,540 J	100
AOC 21	023-0052	1 to 2	diesel	5,200 J	100
	023-0052	1 to 2	gasoline	850 J	100
AOC 23	071-0002	3 to 3.5	motor oil	670 J	500
	071I-001	5 to 9	diesel	850 J	100
	071I-001	5 to 9	gasoline	750 J	100
	071M-004M	7.5 to 8.5	gasoline	580	100
	123-0011M	2 to 2.5	motor oil	600	500
	123-0024	2 to 2.5	diesel	210	100
	124-0003M	1.5 to 2	motor oil	680	500
	124-0004M	0 to 0.5	motor oil	700	500
	125-0003M/125-0007M[c]	0.5 to 1	gasoline	1,700/2,000[c]	100
	125-0002M	0.5 to 1	diesel	300	100
	125M-001M	9 to 10	motor oil	590	500
	126-0001M	0 to 0.5	diesel	1,900	100
	126-0001M	0 to 0.5	motor oil	27,000	500
	126-0004M	0 to 0.5	motor oil	560	500
	126-0008M[c]	0 to 0.5	diesel	1,300	100
	126-0008M[c]	0 to 0.5	motor oil	18,000	500
	A23SB02	4 to 8	diesel	210	100
	A23SB10	4 to 5.5	diesel	370	100
	A23SB13	4 to 5	diesel	130	100
	A23SB18	6.5 to 8	diesel	130	100
	A23SB26	0.3 to 1.3	diesel	440	100
	A23SB35	4 to 8	diesel	470	100
	A23SB35	4 to 8	motor oil	970	500
AOC 25	130M-001M	8 to 9	diesel	210	100
	130M-001M	8 to 9	motor oil	1,100	500
	132-0004M[d]	0 to 0.5	motor oil	12,000	500
	S03-DGS-DP05	0 to 5	motor oil	1,800	500
EBS Parcels 78–79	D78SB01	0 to 1	diesel	150	100
	D79SB02	0 to 1	diesel	460	100
	D79SB03	0 to 1	diesel	390	100

Table 4-2 (continued)

Study Area	Station ID[a]	Depth (feet bgs)	TPH Range	Petroleum Hydrocarbon Concentration (mg/kg)	Preliminary Screening Criteria[b] (mg/kg)
ASTs 173A,-B,-C	115-0001	0.5 to 1	motor oil	730 J	500
	115-0001M	0.5 to 1	motor oil	3,000	500
	115-0002	0.5 to 1	motor oil	570 J	500

Notes:
[a] sample ID used for EBS samples
[b] San Francisco Bay Regional Water Quality Control Board ESLs
[c] duplicate sample
[d] motor oil–range TPH was below the screening criterion in the duplicate sample

Acronyms/Abbreviations:
AOC – area of concern
AST – aboveground storage tank
bgs – below ground surface
EBS – environmental baseline survey
ESL – environmental screening level
mg/kg – milligrams per kilogram
TPH – total petroleum hydrocarbons

Review Qualifier:
J – estimated value

Table 4-3
Benzo(a)pyrene Equivalents in Soil
Exceeding Preliminary Screening Criteria in Study Areas

AOC	Station ID[a]	Depth (feet bgs)	B(a)P Equivalent Concentration (µg/kg)[b]
2	32EDC-5-33	4 to 8	1,400
	32EDC-5-34[c]	0.5 to 2	3,900
	A02SB01	3 to 4	760
4	32EDC-5-89	4 to 8	2,200
	H29	4 to 8	1,200
	H30	4 to 8	2,400
	H31	2 to 4	4,400
		4 to 8	3,600
	H32	4 to 8	930
	H33	2 to 4	690
		4 to 8	1,400
	I26	2 to 4	640
		4 to 8	2,300
	J25	2 to 4	1,300
	J26	4 to 8	2,400
5	A05SB04	3 to 4	760
6	U33	0 to 0.5	760
		2 to 4	2,200
	U34	2 to 4	8,300
		4 to 8	690
	V33	2 to 4	1,800
	V34/V34[d]	0.5 to 2	810
		2 to 4	1,700/760[d]
7	098-010	6 to 8	25,000
	BB30	1.5 to 2	780
	CC27	1 to 1.5	980
13	QQ25	0.5 to 2	740
17	B12-10	0 to 0.5	980
23	B06-09	8 to 9.5	5,000
		14 to 15.5	2,300
	B06-10	8 to 9.5	780
	A23SB02	4 to 8	660
	A23SB04	0 to 2	700
		4 to 8	6,300
	A23SB18	6.5 to 8	640
	A23SB22	1 to 2	840
	A23SB31	1 to 2	880
	A23SB33	6 to 7.5	1,000
	A23SB35	4 to 8	1,300

Table 4-3 (continued)

Notes:
[a] sample ID used for EBS samples
[b] values exceed the residential soil screening criterion of 620 µg/kg
[c] not excavated because area is nonresidential (FWEC 2004)
[d] duplicate sample

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
bgs – below ground surface
EBS – environmental baseline survey
µg/kg – micrograms per kilogram

Table 4-4
Benzo(a)pyrene Equivalents in Soil Exceeding
Preliminary Screening Criteria in PAH Areas Outside Study Areas

PAH Areas	Station ID[a]	Depth (feet bgs)	B(a)P Equivalent Concentration (µg/kg)[b]
DA 1	32EDC-5-42	2 to 4	1,100
DA 2	32EDC-5-49	4 to 8	940
	32EDC-5-73	4 to 8	5,200
	BB46	2 to 4	710
	CC46	2 to 4	3,200
	V34/V34[c]	0.5 to 2	810
		2 to 4	1,700/760[c]
	V29/V29[c]	2 to 4	1,700/970[c]
	Y34	2 to 4	890
	Y36	4 to 8	1,900
	Y43	2 to 4	4,200
	Z34	0.5 to 2	970
		2 to 4	980
		4 to 8	1,100
	Z36	4 to 8	790
DA 4	098-005	4 to 6	2,900
		6 to 8	2,500
	32EDC-5-97	4 to 8	900
	R31	2 to 4	1,600
	S27	2 to 4	730
	S28	0.5 to 2	760
	S29	0.5 to 2	650
	T27	2 to 4	1,100
	T28	2 to 4	1,200
		4 to 8	750
	T31	2 to 4	1,200
	U23	0 to 0.5	670
		4 to 8	840
	U24	4 to 8	2,100
	U26	0 to 0.5	760
		0.5 to 2	780
	U27	2 to 4	1,000
	U28	2 to 4	1,800
		4 to 8	1,300
	U29	2 to 4	1,100
	U30	0.5 to 2	630
		2 to 4	910

Table 4-4 (continued)

PAH Areas	Station ID[a]	Depth (feet bgs)	B(a)P Equivalent Concentration (µg/kg)[b]
DA 4 (continued)	V23	4 to 8	5,800
	V24	4 to 8	8,700
	V25	0 to 0.5	800
	V27	0.5 to 2	1,000
		4 to 8	1,400
	V28	0.5 to 2	910
	V29	2 to 4	1,700
	V30	2 to 4	830
	V31	2 to 4	2,900
	W23/W23[c]	4 to 8	5,300/2,900[c]
	W25	2 to 4	1,900
	W27	0.5 to 2	680
	W28/W28[c]	0.5 to 2	890
		2 to 4	1,400/830[c]
		4 to 8	880
	W29	0.5 to 2	700
		2 to 4	2,000
	W31	0 to 0.5	670
	W32	2 to 4	2,400
	X27	2 to 4	1,300
	X28/X28[c]	2 to 4	810/760[c]
	X29/X29[c]	4 to 8	2,600/720[c]
	X30	4 to 8	2,300
	X31	2 to 4	750
DA 5	32EDC-5-108	2 to 4	13,000
		4 to 8	4,300
	N20	4 to 8	1,300
	N22	4 to 8	2,000
	O20	4 to 8	1,800
	P22/P22[c]	0.5 to 2	970
		4 to 8	3,100/2,300[c]
	P23	4 to 8	2,800
	P24	2 to 4	1,100
	Q18	4 to 8	1,200
	Q21/Q21[c]	0.5 to 2	800
		2 to 4	2,600/1,900[c]
		4 to 8	4,300
	Q22	2 to 4	1,400
		4 to 8	680

Table 4-4 (continued)

PAH Areas	Station ID[a]	Depth (feet bgs)	B(a)P Equivalent Concentration (µg/kg)[b]
DA 5 (continued)	Q23	4 to 8	1,200
	R18	2 to 4	820
	R19/R19[c]	4 to 8	2,100/2,000[c]
	R20	4 to 8	1,800
	S18	2 to 4	880
		4 to 8	880
	U20	2 to 4	660
	U21	4 to 8	2,500
	V21	4 to 8	2,400
DA 6	32EDC-5-126	0 to 0.5	950
		2 to 4	1,400
	M16	0 to 0.5	730
	O15/O15[c]	1 to 1.5	650/630[c]
	P13	0.5 to 1	830
	R10	1.5 to 2	710
	R12	2 to 4	2,500
	R13	0 to 0.5	710
		2 to 4	1,400
	R15	0.5 to 2	730
	S12	2 to 4	3,400
	S13	0 to 0.5	640
		2 to 4	6,600
	S15	2 to 4	830
	S9C[d]	1.5 to 2	1,400
	T11	0 to 0.5	690
	T12	2 to 4	2,100
	T13	2 to 4	1,100
		4 to 8	690
	T14	2 to 4	5,700
		4 to 8	1,500
DA 7	099-008	4 to 6	1,300
	P8	0.5 to 1	660
	Q8	1 to 1.5	810
	R9	1 to 1.5	930
	S9[d]	1.5 to 2	1,800
	S9B	1.5 to 2	790
	U8	1 to 1.5	690

Table 4-4 (continued)

PAH Areas	Station ID[a]	Depth (feet bgs)	B(a)P Equivalent Concentration (µg/kg)[b]
DA 8	32EDC-5-96	2 to 4	720
		4 to 8	990
	DD32	4 to 8	920
DA 9	32EDC-5-86	4 to 8	2,000
	AA24	1 to 1.5	730
	AA28	1 to 1.5	960
	BB19	0.5 to 1	640
	W19	4 to 8	1,200
	W21	4 to 8	700
	Y21[d]	1 to 1.5	13,000
	Z31	4 to 8	6,200
	Z32	2 to 4	1,900
		4 to 8	830
DA 10	098-006	6 to 8	2,300
	AA13	4 to 8	1,200
	U14	2 to 4	870
	W15	4 to 8	2,900
	Z14	4 to 8	8,700
DA 11	32EDC-5-125	2 to 4	750
	32EDC-5-135[d]	0 to 0.5	1,400
		0.5 to 2	640
	AA8	1 to 1.5	870
	BB11	0 to 0.5	700
	CC11	4 to 8	880
	CC12	0.5 to 2	810
		4 to 8	720
	EE13	4 to 8	1,700
	FF12	4 to 8	860
	FF13	4 to 8	2,700
	GG13	4 to 8	1,400
	U11	2 to 4	1,700
	V11	2 to 4	1,100
		4 to 8	7,700
	Y11	0 to 0.5	680
		2 to 4	790

Table 4-4 (continued)

PAH Areas	Station ID[a]	Depth (feet bgs)	B(a)P Equivalent Concentration (µg/kg)[b]
DA 12	32EDC-5-134	4 to 8	740
	BB5	0.5 to 1	730
	GG2	4 to 8	3,300
	GG5	2 to 4	1,500
	HH5	4 to 8	990
	II5/II5[c]	2 to 4	2,000/870[c]
	LL4	4 to 8	3,400
DA 13	II9	4 to 8	1,700
	II14/II14[c]	4 to 8	870/650[c]
	JJ9	4 to 8	1,600
	JJ12	2 to 4	860
	KK10	4 to 8	630
DA 15	32EDC-5-122	2 to 4	640
	32EDC-5-132	0 to 0.5	1,200
DA 16	103-017/017[c]	2 to 4	4,200
		4 to 6	11,000/4,800[c]
	32EDC-5-103	0.5 to 2	950
	QQ25	0.5 to 2	740
	TT21	2 to 4	3,500
DA 17	103-018	6 to 8	750
	UU19	2 to 4	740
	UU20/UU20[c]	0.5 to 2	630
		4 to 8	6,400/4,900[c]
	UU21	0.5 to 2	770
	VV17	4 to 8	25,000
	WW27	0.5 to 1	710
DA 18	RR13	0.5 to 2	1,000
	TT11	4 to 8	930
	32EDC-5-120	2 to 4	22,000
	VV7	2 to 4	1,100
		4 to 8	1,800
	VV8	2 to 4	1,000
	TT21	2 to 4	3,500
	WW16	2 to 4	9,600
	XX13	2 to 4	870
EBS 45	32EDC-5-7	2 to 4	990

Table 4-4 (continued)

Notes:
[a] sample ID used for EBS samples
[b] values exceed the residential soil screening criterion of 620 µg/kg
[c] duplicate sample
[d] not excavated because area is nonresidential (FWEC 2004)

Acronyms/Abbreviations:
B(a)P – benzo(a)pyrene
bgs – below ground surface
DA – decision area
EBS – environmental baseline survey
µg/kg – micrograms per kilogram
PAH – polynuclear aromatic hydrocarbon

Table 4-5
Benzo(a)pyrene Equivalent Concentrations by Decision Area

Area and Depth Interval (feet bgs)	Average B(a)P Equivalent Concentrations (µg/kg)
Decision Area 1	
0–2	506
0–4	461
0–8	417
Decision Area 2*	
0–2	99
0–4	234
0–8	250
Decision Area 3*	
0–2	121
0–4	165
0–8	256
Decision Area 4*	
0–2	242
0–4	338
0–8	428
Decision Area 5*	
0–2	81
0–4	174
0–8	276
Decision Area 6*	
0–2	149
0–4	262
0–8	251
Decision Area 7*	
0–2	189
0–4	195
0–8	196
Decision Area 8*	
0–2	108
0–4	129
0–8	397
Decision Area 9*	
0–2	199
0–4	188
0–8	240

Table 4-5 (continued)

Area and Depth Interval (feet bgs)	Average B(a)P Equivalent Concentrations (µg/kg)
Decision Area 10	
0–2	59
0–4	63
0–8	136
Decision Area 11*	
0–2	188
0–4	199
0–8	276
Decision Area 12	
0–2	118
0–4	155
0–8	215
Decision Area 13	
0–2	70
0–4	70
0–8	107
Decision Area 14	
0–2	99
0–4	100
0–8	105
Decision Area 15	
0–2	229
0–4	191
0–8	155
Decision Area 16*	
0–2	65
0–4	109
0–8	181
Decision Area 17*	
0–2	84
0–4	106
0–8	366
Decision Area 18*	
0–2	78
0–4	266
0–8	244
EBS 023F	
0–2	8
0–4	10
0–8	9

Table 4-5 (continued)

Area and Depth Interval (feet bgs)	Average B(a)P Equivalent Concentrations (µg/kg)
EBS 041	
0–2	26
0–4	34
0–8	38
EBS 043	
0–2	38
0–4	28
0–8	22
EBS 044	
0–2	35
0–4	38
0–8	40
EBS 045	
0–2	15
0–4	111
0–8	88
EBS 062	
0–2	28
0–4	30
0–8	85
EBS 063	
0–2	52
0–4	37
0–8	75
EBS 064	
0–2	25
0–4	19
0–8	19
EBS 065	
0–2	25
0–4	21
0–8	19
EBS 070	
0–2	6
0–4	7
0–8	7
EBS 071	
0–2	113
0–4	91
0–8	311

Table 4-5 (continued)

Area and Depth Interval (feet bgs)	Average B(a)P Equivalent Concentrations (µg/kg)
EBS 073	
0–2	8
0–4	7
0–8	17
EBS 077	
0–2	40
0–4	26
0–8	25
EBS 078	
0–2	7
0–4	9
0–8	8
EBS 079	
0–2	39
0–4	36
0–8	40
EBS 083	
0–2	23
0–4	74
0–8	61
EBS 084	
0–2	46
0–4	56
0–8	55
EBS 085	
0–2	150
0–4	113
0–8	108
EBS 088	
0–2	270
0–4	197
0–8	197
EBS 090	
0–2	415
0–4	430
0–8	430
EBS 091	
0–2	207
0–4	172
0–8	158

Table 4-5 (continued)

Area and Depth Interval (feet bgs)	Average B(a)P Equivalent Concentrations (µg/kg)
EBS 092	
0–2	34
0–4	61
0–8	72
EBS 093	
0–2	40
0–4	77
0–8	72
EBS 096	
0–2	37
0–4	50
0–8	47
EBS 106	
0–2	25
0–4	25
0–8	25
EBS 107	
0–2	25
0–4	25
0–8	25
EBS 108	
0–2	6
0–4	20
0–8	24
EBS 109	
0–2	11
0–4	12
0–8	14
EBS 110	
0–2	35
0–4	25
0–8	27
EBS 111	
0–2	194
0–4	179
0–8	152
EBS 115	
0–2	49
0–4	76
0–8	54

Table 4-5 (continued)

Area and Depth Interval (feet bgs)	Average B(a)P Equivalent Concentrations (µg/kg)
EBS 121	
0–2	7
0–4	17
0–8	21
EBS 123	
0–2	114
0–4	71
0–8	74
EBS 124	
0–2	127
0–4	84
0–8	143
EBS 125	
0–2	8
0–4	7
0–8	169
EBS 130	
0–2	28
0–4	29
0–8	37
EBS 132	
0–2	73
0–4	110
0–8	121
EBS 185	
0–2	144
0–4	115
0–8	94
EBS 189	
0–2	8
0–4	7
0–8	7
EBS 195	
0–2	9
0–4	8
0–8	7
EBS 197	
0–2	22
0–4	35
0–8	56

Table 4-5 (continued)

Area and Depth Interval (feet bgs)	Average B(a)P Equivalent Concentrations (µg/kg)
EBS 205	
0–2	6
0–4	6
0–8	6
EBS 206	
0–2	32
0–4	23
0–8	17
EDC-5	
0–2	116
0–4	164
0–8	221

Note:
* decision area subject to excavation during TCRA

Acronyms/Abbreviations:
B(a)P – benzo(a)pyrene
bgs – below ground surface
EBS – environmental baseline survey
EDC – economic development conveyance
µg/kg – micrograms per kilogram
TCRA – time critical removal action

Table 4-6
Pesticides and Polychlorinated Biphenyls in Soil
Exceeding Preliminary Screening Criteria

AOC	Station ID[a]	Depth (feet bgs)	Pesticide/PCB	Concentration (µg/kg)	Preliminary Screening Criteria[b] (µg/kg)
2	A02B03	7 to 8	Aroclor 1260	590 J	220
	A02B04	2.5 to 4	Aroclor 1260	670 J	220
3	A03B02	1.5 to 2	heptachlor	18,000 J	110
6	A06SB03	0.5 to 1	Aroclor 1260	430 J	220
7	BB30	1.5 to 2	Aroclor 1254	300	220
	CC27	1 to 1.5	Aroclor 1254	320	220
8	098-0006	0.5 to 1	Aroclor 1254	300	220
13	103-0002	0.5 to 1	4,4′-DDT	2,200 J	1,700
	103-0020	7 to 7.5	4,4′-DDD	5,300 J	2,400
		7 to 7.5	4,4′-DDT	2,600 J	1,700
	103-0023	0.5 to 1	dieldrin	50 J	30
23	123-0022/0044	0 to 0.5	Aroclor 1260	500 J/5 J[c]	220

Notes:
[a] sample ID used for EBS samples
[b] U.S. EPA 2004b
[c] duplicate sample

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDT – dichlorodiphenyltrichloroethane
EBS – environmental baseline survey
µg/kg – micrograms per kilogram
PCB – polychlorinated biphenyl

Review Qualifier:
J – estimated value

Table 4-7
Metals in Soil Exceeding Preliminary Screening Criteria

Study Area	Station ID[a]	Depth (feet bgs)	Metal	Concentration (mg/kg)	Background 95th Percentile Concentration (mg/kg)	Preliminary Screening Criteria[b] (mg/kg)	Lead Removal Action Level (mg/kg)[c]
AOC 4	MBG-1	3 to 3.5	iron	27,900	22,280	23,000	
AOC 5	A05SB02	1 to 2	iron	38,200 J	22,280	23,000	
	A05SB03	6.5 to 8	iron	26,100	22,280	23,000	
	A05SB03	6.5 to 8	manganese	3,780	383.0	1,800	
AOC 10	SS-36B-S25/S25[d]	0 to 0.5	lead	819/221[d]	37.66	150[c]	199
		0.5 to 1	lead	425/103[d]	37.66	150[c]	199
	SS-36B-SE50	0 to 0.5	lead	632	37.66	150[c]	199
	SS-36B-SW25	0 to 0.5	lead	280	37.66	150[c]	199
	SS-36B-W50	0 to 0.5	lead	313	37.66	150[c]	199
	SS-36B-W75	0 to 0.5	lead	359	37.66	150[c]	199
AOC 11/ EBS 78–79	A11SB02	1 to 2	iron	23,100	22,280	23,000	
	A11SB03	1 to 2	iron	29,900	22,280	23,000	
	D78SB01	0 to 1	iron	24,800	22,280	23,000	
	D78SB01	4 to 5	iron	23,900	22,280	23,000	
	D78SB02	1 to 2	iron	49,500	22,280	23,000	
	D78SB03	1 to 2	iron	49,300	22,280	23,000	
	D78SB03	1 to 2	vanadium	110	47.34	78	
AOC 12	107-0001	1 to 2	iron	35,000	22,280	23,000	
		1 to 2	vanadium	113	47.34	78	
	107-0002[d]	1 to 2	iron	34,300	22,280	23,000	
		1 to 2	thallium	5.8 J	0.50	5.2	
		1 to 2	vanadium	116	47.34	78	
	Parcel 106 Grid 28	2	arsenic	38	9.14	0.062[e]	
	Parcel 106 Grid 30/30[d]	2	arsenic	24/35[d]	9.14	0.062[e]	
	Parcel 106 rid 31	2	arsenic	20	9.14	0.062[e]	
	SS-33-NW50	0 to 0.5	lead	290	37.66	150[c]	199
	SS-33-S50	0 to 0.5	lead	666	37.66	150[c]	199
	SS-33-SE50	0 to 0.5	lead	274	37.66	150[c]	199
	SS-33-SW50	0 to 0.5	lead	572	37.66	150[c]	199
		0.5 to 1	lead	258	37.66	150[c]	199
		1 to 1.5	lead	289	37.66	150[c]	199
	SS-61-N50	0 to 0.5	lead	409	37.66	150[c]	199
	SS-61-NE50	0 to 0.5	lead	452	37.66	150[c]	199
	SS-61-NW50[d]	0 to 0.5	lead	236	37.66	150[c]	199
	SS-61-W75	0 to 0.5	lead	230	37.66	150[c]	199
	SS-105-A1	0 to 0.5	lead	397	37.66	150[c]	199
	SS-105-C1	0 to 0.5	lead	211	37.66	150[c]	199

Table 4-7 (continued)

Study Area	Station ID[a]	Depth (feet bgs)	Metal	Concentration (mg/kg)	Background 95th Percentile Concentration (mg/kg)	Preliminary Screening Criteria[b] (mg/kg)	Lead Removal Action Level (mg/kg)[c]
AOC 17	A17SB02	1	iron	27,000	22,280	23,000	
AOC 23	B06-09	8 to 9.5	iron	35,100	22,280	23,000	
	110P-001	8.5 to 9	iron	23,300 J	22,280	23,000	
	123-0022/0044[d]	0 to 0.5	arsenic	14.3	9.14	0.062[e]/8.6[d]	
	126-0005	0.5 to 1	thallium	6.4 J	0.50	5.2	
	126-0009	0 to 1	iron	46,300	22,280	23,000	
	126-0010	3 to 4	arsenic	12.8	9.14	0.062[e]	
	126-0010	3 to 4	iron	41,500	22,280	23,000	
	A23SB02	4 to 8	iron	36,800	22,280	23,000	
	A23SB04	4 to 8	iron	28,300	22,280	23,000	
	A23SB09	7 to 8	arsenic	9.5	9.14	0.062[e]	
	A23SB09	7 to 8	iron	27,300	22,280	23,000	
	A23SB10	4 to 5.5	arsenic	10.5	9.14	0.062[e]	
	A23SB10	4 to 5.5	iron	49,000	22,280	23,000	
	A23SB12	4 to 8	arsenic	9.2	9.14	0.062[e]	
	A23SB12	4 to 8	iron	38,700	22,280	23,000	
	A23SB14	1 to 2	iron	41,200	22,280	23,000	
	A23SB15	6.5 to 7.5	arsenic	12.2	9.14	0.062[e]	
	A23SB16	1.5 to 2	iron	47,600	22,280	23,000	
	A23SB16	1.5 to 2	vanadium	127	47.34	78	
	A23SB16	7.5 to 8	iron	33,600	22,280	23,000	
	A23SB18	6.5 to 8	iron	39,600	22,280	23,000	
	A23SB22	1 to 2	iron	39,500	22,280	23,000	
	A23SB22	1 to 2	vanadium	81.2	47.34	78	
	A23SB27	1 to 2	iron	34,800	22,280	23,000	
	A23SB27	3 to 4	iron	36,500	22,280	23,000	
	A23SB29	1 to 2	arsenic	9.9	9.14	0.062[e]	
	A23SB29	1 to 2	iron	37,600	22,280	23,000	
	A23SB31	7 to 8	arsenic	9.3	9.14	0.062[e]	
	A23SB31	7 to 8	iron	43,300	22,280	23,000	
	A23SB33	6 to 7.5	iron	27,200	22,280	23,000	
	A23SB35	4 to 8	arsenic	9.6	9.14	0.062[e]	
	A23SB35	4 to 8	iron	35,600	22,280	23,000	
AOC 24	A24SB01	3 to 4	iron	34,200 J	22,280	23,000	
	A24SB01	5 to 6	arsenic	11.2	9.14	0.062[e]	
	A24SB01	5 to 6	iron	34,500 J	22,280	23,000	

Table 4-7 (continued)

Study Area	Station ID[a]	Depth (feet bgs)	Metal	Concentration (mg/kg)	Background 95th Percentile Concentration (mg/kg)	Preliminary Screening Criteria[b] (mg/kg)	Lead Removal Action Level (mg/kg)[c]
AOC 25	130M-001M	8 to 9	arsenic	9.6	9.14	0.062[e]	
	A25SB01	1 to 1.5	iron	35,900	22,280	23,000	
	A25SB03	3.5 to 4	iron	25,100	22,280	23,000	
	A25SB03	6.5 to 7	iron	27,600	22,280	23,000	
	A25SB03	3.5 to 4	lead	157	37.66	150c	
UST(R)-11	A23SB27	1 to 2	iron	34,800	22,280	23,000	
	A23SB27	3 to 4	iron	36,500	22,280	23,000	

Notes:
[a] sample ID used for EBS samples
[b] U.S. EPA 2004b
[c] lead removal action objective
[d] duplicate samples
[e] California-modified PRG used; arsenic concentrations above PSC and below background are not shown

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
EBS – environmental baseline survey
mg/kg – milligrams per kilogram
PRG – preliminary remediation goal
PSC – preliminary screening criterion
UST – underground storage tank

Review Qualifier:
J – estimated value

Table 4-8
Volatile Organic Compounds in Groundwater
Exceeding Preliminary Screening Criteria

Study Area	Station ID[a]	Depth (feet bgs)	VOC	Concentration (µg/L)	Preliminary Screening Criteria[b] (µg/L)
AOC 23	S21-DGS-DP20	7 to 9	vinyl chloride	2.7	0.5
	A23SB03	5 to 9	benzene	1.1	1
	A23SB18	3 to 8	vinyl chloride	2.8	0.5
	A23SB20	4 to 9	vinyl chloride	0.62	0.5
	A23SB31	3 to 8	vinyl chloride	1.9	0.5
	A23SB37	5 to 10	1,2-DCA	0.91	0.5
	398-MW1	7 to 12	1,2-DCA	2.4	0.5
EBS Parcel 205	D205SB02	5 to 10	cis-1,2-DCE	8.3	6
	D205SB02	5 to 10	vinyl chloride	1.8	0.5

Notes:
[a] sample ID used for EBS samples
[b] MCL – the lower of either federal or California (U.S. EPA 2004b)

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
DCA – dichloroethane
DCE – dichloroethene
EBS – environmental baseline survey
µg/L – micrograms per liter
MCL – maximum contaminant level
VOC – volatile organic compound

Table 4-9
Petroleum Hydrocarbons in Groundwater
Exceeding Preliminary Screening Criteria

Study Area	Station ID[a]	Depth (feet bgs)	TPH Range	Concentration (µg/L)	Preliminary Screening Criteria[b] (µg/L)
AOC 20	A20SB02	5 to 10	diesel	3,200	100
	A20SB02	5 to 10	JP-5	2,600	100
AOC 21	023-0054	7 to 8	gasoline	190 J	100
	023-0054	7 to 8	diesel	520 J	100
	023-0061	7 to 8	diesel	620 J	100
AOC 23	03GB240	5 to 6	motor oil	860 J	100
	071M-011	7.5 to 8.5	motor oil	930 J	100
	071M-013	7.5 to 8.5	motor oil	330 J	100
	071M-017	7.5 to 8.5	diesel	110 J	100
	071M-019	7.5 to 8.5	motor oil	680 J	100
	071M-021	7.5 to 8.5	motor oil	660 J	100
	123-0041	4 to 8	diesel	200	100
	123-0041	4 to 8	motor oil	200	100
	123-0043	4 to 8	diesel	240	100
	126-0017	8 to 9	diesel	940 J	100
	03GB036	10 to 12	motor oil	610 J	100
	A23SB02	6 to 11	diesel	140	100
	A23SB03	5 to 9	diesel	250	100
	A23SB04	6 to 11	diesel	150	100
	A23SB06	6 to 11	diesel	150	100
	A23SB10	5 to 10	diesel	220 J	100
	A23SB12	8 to 13	diesel	180 J	100
	A23SB13	6 to 11	diesel	150 J	100
	A23SB14	2 to 7	diesel	180	100
	A23SB17	7 to 12	diesel	150	100
	A23SB18	3 to 8	diesel	150 J	100
	A23SB29	5 to 10	diesel	240 J	100
	A23SB31	3 to 8	diesel	220 J	100
	A23SB32	4 to 9	diesel	130	100
	A23SB33	6.5 to 11.5	diesel	120	100
	A23SB34	7 to 12	diesel	120	100
	A23SB35	6 to 11	diesel	160	100

Table 4-9 (continued)

Study Area	Station ID[a]	Depth (feet bgs)	TPH Range	Concentration (µg/L)	Preliminary Screening Criteria[b] (µg/L)
AOC 24	A24SB01	1 to 6	diesel	110	100
AOC 25	S03-DGS-DP05	0 to 10	diesel	760	100
	M03-11	26 to 36	diesel	220	100
	MBG-3	5 to 15	diesel	380	100
	MBG-3	5 to 15	motor oil	270 J	100
SWMU AST 152	S152SB01	3.5 to 8.5	diesel	110	100
SWMU AST 173	S173SB01	5 to 10	diesel	540	100
	S173SB01	5 to 10	motor oil	840	100
EBS Parcel 205	D205SB02	5 to 10	diesel	220	100
	D205SB02	5 to 10	gasoline	290	100
	D205SB02	5 to 10	JP-5	170	100
UST(R)-11	123-0041	4 to 8	diesel	200	100
	123-0041	4 to 8	motor oil	200	100
	123-0043	4 to 8	diesel	240	100

Notes:
[a] sample ID used for EBS samples
[b] ESLs (RWQCB 2005)

Acronyms/Abbreviations:
AOC – area of concern
AST – aboveground storage tank
bgs – below ground surface
EBS – environmental baseline survey
ESL – environmental screening level
JP-5 – jet propellant grade 5
µg/L – micrograms per liter
SWMU – solid waste management unit
TPH – total petroleum hydrocarbons
UST – underground storage tank

Review Qualifier:
J – estimated value

Table 4-10
Semivolatile Organic Compounds in Groundwater
Exceeding Preliminary Screening Criteria

Study Area	Station ID[a]	Depth (feet bgs)	SVOC	Concentration (µg/L)	Preliminary Screening Criteria[b] (µg/L)
AOC 23	071M-013	7.5 to 8.5	benzo(a)pyrene	3 J	0.2

Notes:
[a] sample ID used for EBS samples
[b] MCL – the lower of either federal or California (U.S. EPA 2004b)

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
EBS – environmental baseline survey
µg/L – micrograms per liter
MCL – maximum contaminant level
SVOC – semivolatile organic compound

Review Qualifier:
J – estimated value

Table 4-11
Metals in Groundwater Exceeding Preliminary Screening Criteria

Study Area	Station ID[a]	Depth (feet bgs)	Metal	Concentration (µg/L)	Preliminary Screening Criteria[b] (µg/L)	Background (µg/L)
AOC 2[c]	A02SB01	7 to 12	arsenic	16.3	10	20.72
	A02SB02	7 to 12	arsenic	15.9	10	20.72
AOC 4	MBG-1[d]	5 to 15	arsenic	11.3	10	20.72
		5 to 15	mercury	0.14 J	2	—[e]
		5 to 15	zinc	113	81	36.39
AOC 5	A05SB01	2 to 12	arsenic	31.2/29.1[f]	10	20.72
AOC 11	A11SB02	5 to 10	arsenic	17.5	10	20.72
EBS 78–79	D79SB03	7 to 12	arsenic	14.7	10	20.72
	D79SB04	7 to 12	arsenic	21.3	10	20.72
AOC 17	185I-006	9 to 10	aluminum	14,100	1,000	1,070
		9 to 10	arsenic	10.7	10	20.72
		9 to 10	chromium	51.9	50	12.45
	185I-008	10 to 10	aluminum	45,800	1,000	1,070
		10 to 10	arsenic	15.9	10	20.72
		10 to 10	chromium	173	50	12.45
		10 to 10	nickel	208	100	—
AOC 20	A20SB01	5 to 10	arsenic	11	10	20.72
	A20SB02	5 to 10	arsenic	26.9	10	20.72
AOC 23	123-0042	4 to 8	arsenic	16	10	20.72
	123-0043	4 to 8	arsenic	13.9	10	20.72
	A23SB08	7 to 12	thallium	2.7 J	2	5.2
	A23SB09	6 to 11	arsenic	22.6	10	20.72
	A23SB12	8 to 13	thallium	3.2 J	2	5.2
	A23SB17	7 to 12	arsenic	10.5	10	20.72
	A23SB18	3 to 8	thallium	3.4 J	2	5.2
	A23SB22	4 to 9	arsenic	12.7	10	20.72
	A23SB25	5 to 10	arsenic	11.1	10	20.72
	A23SB30	4 to 9	arsenic	19.3	10	20.72
	A23SB31	3 to 8	arsenic	11.9	10	20.72
AOC 25	DHP-S03-03	17.5 to 21	cadmium	17.2 J	5	—
		17.5 to 21	thallium	51.8 J	2	5.2
	M03-11[d]	26 to 36	arsenic	21.7 J	10	20.72
	MBG-3[d]	5 to 15	arsenic	15.1 J	10	20.72
EBS 205	D205B02	5 to 10	arsenic	15.7	10	20.72
UST(R)-11	123-0043	4 to 8	arsenic	13.9	10	20.72

Table 4-11 (continued)

Notes:
[a] sample ID used for EBS samples
[b] MCL – the lower of either federal or California (U.S. EPA 2004b)
[c] gray shading indicates sample concentration does not exceed background concentration
[d] monitoring well; maximum values reported
[e] dash indicates no value available
[f] duplicate sample

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
EBS – environmental baseline survey
µg/L – micrograms per liter
MCL – maximum contaminant level
UST – underground storage tank

Review Qualifier:
J – estimated value

Table 4-12
Analytes Reported in Groundwater at Concentrations Above Surface Water Preliminary Screening Criteria

Study Area	Station ID[a]	Depth (feet bgs)	Analyte	Concentration (µg/L)	Background (95th Percentile) (µg/L)	Lower of NRWQC or CTR CCCs[b] (µg/L)	Lower of NRWQC or CTR HHCOs[b] (µg/L)	Marine ESLs for TPH[c] (µg/L)
AOC 2[d]	A02SB01	7 to 12	arsenic	16.3	20.72	36	0.014	—[e]
	A02SB02	7 to 12	arsenic	15.9	20.72	36	0.014	—
AOC 4	MBG-1	5 to 15	arsenic	11.3	20.72	36	0.014	—
	MBG-1	5 to 15	mercury	0.14 J	—	0.025	0.051	—
	MBG-1	5 to 15	zinc	113	36.39	81	26,000	—
AOC 20	A20SB01	5 to 10	arsenic	11	20.72	36	0.014	—
	A20SB02	5 to 10	arsenic	26.9	20.72	36	0.014	—
	A20SB02	5 to 10	diesel	3,200	—	—	—	640
	A20SB02	5 to 10	JP-5	2,600	—	—	—	640
AOC 23	A23SB22	4 to 9	arsenic	12.7	20.72	36	0.014	—
	A23SB36	7 to 12	arsenic	3.4 J	20.72	36	0.014	—
	126-0017	8 to 9	diesel	940 J	—	—	—	640
	S21-DGS-DP20	7 to 9	vinyl chloride	2.7	—	—	2.4	—
EBS 205	D205SB02	5 to 10	arsenic	15.7	20.72	36	0.014	—

Notes:
- [a] sample ID used for EBS samples
- [b] CCC and HHCO – the lower of either federal or California
- [c] San Francisco Bay Regional Water Quality Control Board ESLs
- [d] gray shading indicates sample concentration does not exceed background concentration
- [e] dash indicates no value available

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
CCC – criterion continuous concentration (for saltwater)
CTR – California Toxics Rule

Table 4-12 (continued)

Acronyms/Abbreviations: (continued)
EBS – environmental baseline survey
ESL – environmental screening level
HHCO – human-health consumption of organisms only
JP-5 – jet propellant grade 5
µg/L – micrograms per liter
NRWQC – National Recommended Water Quality Criteria
TPH – total petroleum hydrocarbons

Review Qualifier:
J – estimated value

Table 4-13
Dissolved Iron in Groundwater at Various Eh and pH Levels

Eh (mV)	pH	Iron (III) (Ferric) (mg/L)	Iron (II) (Ferrous) (mg/L)
-400	5	8.2E-15	100
-400	6	4.5E-13	100
-400	7	4.5E-11	100
-400	8	4.6E-09	100
-400	9	1.0E-07	6.7
-200	5	1.5E-11	100
-200	6	1.4E-09	100
-200	7	1.4E-07	100
-200	8	3.1E-07	1.8
-200	9	1.0E-07	2.0E-03
0	5	4.8E-08	100
0	6	4.5E-06	100
0	7	2.9E-06	5.5E-01
0	8	3.0E-07	5.5E-04
0	9	1.0E-07	6.4E-07
200	5	1.5E-04	100
200	6	2.9E-05	1.7E-01
200	7	2.9E-06	1.7E-04
200	8	3.0E-07	1.7E-07
200	9	1.0E-07	2.0E-10
400	5	3.1E-04	5.5E-02
400	6	2.9E-05	5.4E-05
400	7	2.9E-06	5.4E-08
400	8	3.0E-07	5.5E-07
400	9	1.0E-07	6.4E-14
600	5	3.1E-04	1.7E-05
600	6	2.9E-05	1.7E-08
600	7	2.9E-06	1.7E-11
600	8	3.0E-07	1.7E-14
600	9	1.0E-07	2.0E-17

Note:
estimations at 15 °C and total initial iron concentration of 100 mg/L using Visual MINTEQ 2.50

Acronyms/Abbreviations:
°C – degrees Celsius
Eh – electrical potential
mg/L – milligrams per liter
mV – millivolt

Table 4-14
Correlation Analysis[a] for Aluminum and Iron With Other Frequently Reported Metals

Metals	ALUMINUM CORRELATIONS		IRON CORRELATIONS	
	Data Points	r[b]	Data Points	r[b]
aluminum	257	1.00	257	**0.91**[c]
arsenic	257	0.57	257	**0.70**[c]
barium	257	0.45	257	0.59
chromium	257	0.66	257	0.64
cobalt[d]	256	**0.72**[c]	256	**0.76**[c]
copper	257	**0.72**[c]	257	**0.80**[c]
iron	257	**0.91**[c]	257	1.00
lead	195	0.39	217	0.36
manganese[d]	256	**0.70**[c]	256	**0.79**[c]
nickel	257	0.63	257	0.60
vanadium	257	**0.90**[c]	257	**0.92**[c]
zinc	257	0.65	257	0.69

Notes:
[a] correlation analysis was conducted using Statistica (version 7.0)
[b] r – Pearson's correlation coefficient (Zar 1999)
[c] bold font indicates correlation is considered statistically significant
[d] the maximum values for manganese (3,780 mg/kg) and cobalt (259 mg/kg) were not used in the aluminum correlation analysis; also, the maximum manganese value (3,780 mg/kg) was not used in the iron analysis; in all three cases, the maximums were greater than 2.5 times the next highest value in the data set

Acronym/Abbreviation:
mg/kg – milligrams per kilogram

Table 4-15
Typical Concentrations of Metals in Sediment, Rocks, and Soil
(milligrams per kilogram)

Analyte	IR Site 35[a]	Alameda Pink Background[a]	San Francisco Bay Sediment[a,b]	Bay Area Soil[a,c]	Common Rocks[d,e]	Granite[e]	Basalt[e]	Shale[e]	Sandstone[e]	Limestone[e]
Metals										
aluminum	5,330	5,230	31,400	NA	NA	Major	Major	Major	Major	4,200
antimony	0.75	2.60	NA	NA	0	0.2	0.1	1	0.4	0.3
arsenic[d]	2.2	1.70	8.9	4	2	2	2	13	1	1
barium	41.3	32.5	NA	120	455	600	330	580	NA	10
beryllium	0.14	0.38	NA	0.5	3	3	1	3	NA	NA
cadmium	0.3	0.16	NA	NA	0.17	0.13	0.2	0.3	NA	0.03
chromium	29.6	29.20	92.4	56	35	10	170	90	35	11
cobalt	4.95	4.70	NA	14	4	4	48	19	0.3	0.1
copper	10	6.91	39.8	31	20	20	87	45	2	4
iron	10,500	8,590	37,592	NA	NA	Major	Major	Major	Major	Major
lead	9.8	3.20	20.5	5.4	9	17	6	20	7	9
manganese	119	108	561	NA	850	450	1,500	850	50	1,100
mercury	0.05	0.10	NA	NA	0	0.03	0.01	0.4	0.03	0.04
molybdenum	0.55	3.10	NA	NA	1.0	1	1.5	2.6	0.2	0.4
nickel	28.5	24.3	82.9	57	20	10	130	68	2	20
selenium	0.25	0.42	NA	NA	0	0.05	0.05	0.6	0.05	0.9
silver	0.13	0.54	NA	NA	0	0.04	0.1	0.07	NA	NA
thallium	1	0.30	NA	NA	1	1.5	0.2	1.4	0.8	NA
vanadium	21	21	NA	46	50	50	250	130	20	20
zinc	29	20.60	110.5	61	50	50	105	95	16	20

Table 4-15 (continued)

Notes:
[a] median concentration
[b] San Francisco Estuary Institute, 2006 http://www.sfei.org/rmp/data.htm
[c] LBNL 2002 (arsenic concentration for other units besides Great Valley Group)
[d] average concentration
[e] Drever 1988

Acronyms/Abbreviations:
IR – Installation Restoration (Program)
LBNL – Lawrence Berkeley National Laboratory
NA – not applicable

Table 4-16
Metals Reported in Groundwater for Which No Alameda Point Background 95th Percentiles Were Calculated

Metal	Maximum Reported Concentration in IR Site 35 Data Set (µg/L)	Study Area at Which Maximum Was Reported	Soil Boring or Well With Maximum[a]
cadmium	17.2 J	AOC 25	DHP-S03-03[b]
calcium	417,000	AOC 2	A02SB01
cobalt	34.2	AOC 17	185I-008[b]
magnesium	903,000	AOC 23	A23SB04
mercury	0.14 J	AOC 4	MBG-1
molybdenum	10.5	AOC 23	123-0042
nickel	208	AOC 17	185I-008[b]
potassium	276,000	AOC 23	A23SB04
silver	0.61 J	AOC 23	123-0042
sodium	8,910,000	AOC 23	A23SB04

Notes:
[a] sample ID used for EBS sample
[b] sample had consistently high concentrations of metals and is believed to be unfiltered

Acronyms/Abbreviations:
AOC – area of concern
EBS – environmental baseline survey
IR – Installation Restoration (Program)
µg/L – micrograms per liter

Review Qualifier:
J – estimated value

Table 4-17
Metals Concentrations in Groundwater Compared to the Alameda Point Background Data Set

Metal	ALAMEDA POINT BACKGROUND DATA SET		IR SITE 35 DATA SET					
	Maximum Concentration (µg/L)	95th Percentile (µg/L)	Maximum Reported Concentration (µg/L)	Number of Samples	Number of Concentrations Above 95th Percentile/ Maximum	Study Area With Maximum	Soil Boring or Well With Maximum[a]	Maximum Reported Concentration (µg/L)/ Study Area / Soil Boring Without Samples 185I-008, 185I-006 and DHP-S03-03
aluminum	4,530	1,070	**45,800**[b]	90	2/2	AOC 17	185I-008[c]	888/ AOC 4/ MBG-1
arsenic	40.7	20.72	31.2	98	6/0	AOC 5	A05SB01	Same
antimony	4.2	37.5	0.23 J	98	0/0	AOC 25	M03-11	Same
barium	1,260	569.5	735	98	1/0	AOC 4	MBG-1	Same
beryllium	3	2.5	**3.1 J**[b]	98	1/1	AOC 23	A23SB04	Same
chromium	82.8	12.45	**173**[b]	98	8/1	AOC 17	185I-008[c]	42.2 J/ AOC 23/ A23SB04
copper	27.3	24.03	**72.5**[b]	98	1/1	AOC 17	185I-008[c]	4.7 J/ AOC 23/ 123-0040
iron	24,400	6,586	**64,900**[b]	90	16/4	AOC 17	185I-008[c]	38,100/ AOC 25/ A25SB02
lead	2.9	11.45	**15**[b]	101	1/2	AOC 17	185I-008[c]	1.2/ AOC 23/ 123-0040
manganese	2,480	1,741	**3,060**[b]	90	7/3	AOC 24	A24SB01	Same
selenium	2.5	8.58	**22.7 J**[b]	97	11/22	AOC 11/EBS 78–79	D78SB04	Same
thallium	5.2	16.15	**51.8 J**[b]	97	1/1	AOC 25	DHP-S03-03[c]	3.4 J/ AOC 23/ A23SB18
vanadium	50.8	26.27	**124**[b]	98	5/1	AOC 17	185I-008[c]	31.4 J/ AOC 23/ A23SB04
zinc	46,800[d]	36.39	677 J	98	5/NA	AOC 25	DHP-S03-03[c]	113/ AOC 4/ MBG-1[e]

Notes:
[a] sample ID used for EBS samples
[b] bold indicates that the maximum concentration at IR Site 35 exceeded the maximum results in the Alameda Point background data set
[c] these samples had consistently high concentrations of metals, are atypical, and believed to be unfiltered
[d] outlier in background data set
[e] of two samples collected from well MBG-1, reported zinc concentration in the other sample was 12 J µg/L; the next highest zinc concentration was 54.2 µg/L from sample 123-0041 collected at AOC 23

Table 4-17 (continued)

Acronyms/Abbreviations:
AOC – area of concern
EBS – environmental baseline survey
IR – Installation Restoration (Program)
µg/L – micrograms per liter
NA – not applicable

Review Qualifier:
J – estimated value

Table 4-18
Metals in Soil and Groundwater at AOC 2 at Concentrations Above Background

Metal	Frequency Above Background	Concentration Range Above Background	Alameda Point 95th Percentile Concentration[a]	PSC	Number Reported Above PSC and Background
Soil		**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	
calcium	1/14	27,000 J	16,800	NA	No PSC
cobalt	2/14	41 and 259	14.30	900	0
lead	1/17	38	37.66	150	0
magnesium	1/14	7,930 J	7,304	NA	No PSC
nickel	3/17	56.2 to 72	55.72	1,600	0
thallium	2/14	2.4 J and 2.6 J	0.50	5.2	0
zinc	1/17	76	67.48	23,000	0
Groundwater		**(µg/L)**	**(µg/L)**	**(µg/L)**	
manganese	1/2	2,950	1,741	NA	No PSC
selenium	2/2	17.8 and 19.1	2.5	50 (71)[b]	0

Notes:
[a] or maximum detected result in background data set if maximum is less than the 95th percentile
[b] surface water PSC

Acronyms/Abbreviations:
AOC – area of concern
µg/L – micrograms per liter
mg/kg – milligrams per kilogram
NA – not available
PSC – preliminary screening criterion

Review Qualifier:
J – estimated value

Table 4-19
Metals in Soil and Groundwater at AOC 4 at Concentrations Above Background

Metal	Frequency Above Background	Concentration Range Above Background	Alameda Point 95th Percentile Concentration[a]	PSC	Number Reported Above PSC and Background
Soil		**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	
aluminum	1/4	19,000	13,960	76,000	0
chromium	1/4	66.7	54.84	210	0
iron	1/4	27,900	22,280	23,000	1
magnesium	1/4	8,800	7,304	NA	No PSC
potassium	1/4	2,480	1,232	NA	No PSC
sodium	1/4	1,430	1,230	NA	No PSC
vanadium	1/4	51.1	47.34	78	0
Groundwater		**(µg/L)**	**(µg/L)**	**(µg/L)**	
barium	1/3	735	569.5	1,000	0
iron	1/3	7,070 J	6,586	NA	No PSC
manganese	1/3	1,970	1,741	NA	No PSC
zinc	1/3	113	36.39	NA (81)[b]	1

Notes:
[a] or maximum detected result in background data set if maximum is less than the 95th percentile
[b] surface water PSC

Acronyms/Abbreviations:
AOC – area of concern
µg/L – micrograms per liter
mg/kg – milligrams per kilogram
NA – not available
PSC – preliminary screening criterion

Review Qualifier:
J – estimated value

Table 4-20
Metals in Soil and Groundwater at AOC 5 at Concentrations Above Background

Metal	Frequency Above Background	Concentration Range Above Background	Alameda Point 95th Percentile Concentration[a]	PSC	Number Reported Above PSC and Background
Soil		**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	
barium	3/12	96.1 to 112	93.68	5,400	0
calcium	1/12	20,000 J	16,800	NA	No PSC
chromium	3/12	58 to 86.8	54.84	210	0
copper	1/12	126 J	39.14	3,100	0
iron	2/12	26,100 and 38,200 J	22,280	23,000	2
lead	1/12	40.9	37.66	150	0
magnesium	2/12	9,610 J and 10,800	7,304	NA	No PSC
manganese	2/12	805 J and 3,780	383.0	1,800	1
nickel	3/12	59.5 to 84.4	55.72	1,600	0
potassium	4/12	1,300 to 2,060	1,232	NA	No PSC
selenium	1/12	3.6	1.78	390	0
sodium	2/12	1,270 and 3,260	1,230	NA	No PSC
vanadium	1/12	69.1	47.34	78	0
zinc	4/12	71.8 to 78.6	67.48	23,000	0
Groundwater[b]		**(µg/L)**	**(µg/L)**	**(µg/L)**	
arsenic	2/3	29.1 and 31.2	20.72	10	2
iron	2/3	23,000 and 28,500	6,586	NA	No PSC
manganese	2/3	1,910 and 2,470	1,741	NA	No PSC
selenium	3/3	13.2 to 21.6	2.5	50	0

Notes:
[a] or maximum detected result in background data set if maximum is less than the 95th percentile
[b] table includes one duplicate groundwater sample

Acronyms/Abbreviations:
AOC – area of concern
µg/L – micrograms per liter
mg/kg – milligrams per kilogram
NA – not available
PSC – preliminary screening criterion

Review Qualifier:
J – estimated value

Table 4-21
Metals in Soil at AOC 10 at
Concentrations Above Background

Metal	Frequency Above Background[a]	Concentration Range Above Background	Alameda Point 95th Percentile Concentration	PSC	Number Reported Above PSC and Background
Soil		**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	
barium	15/43	98 J to 160	93.68	5,400	0
cadmium	18/43	1.8 to 3.6	1.72	37	0
chromium	2/43	61 and 65	54.84	210	0
copper	2/43	45 and 81 J	39.14	3,100	0
lead	66/107	38 to 819	37.66	199[b]	7
mercury	2/43	0.6 and 1	0.52	23	0
nickel	12/43	56 to 88 J	55.72	1,600	0
selenium	1/43	3 J	1.78	390	0
thallium	1/43	3.7	0.50	5.2	0
vanadium	1/43	55	47.34	78	0
zinc	28/43	68 to 150 J	67.48	23,000	0

Notes:
[a] includes field duplicates
[b] lead removal action objective

Acronyms/Abbreviations:
AOC – area of concern
mg/kg – milligrams per kilogram
PSC – preliminary screening criterion

Review Qualifier:
J – estimated value

Table 4-22
Metals in Soil and Groundwater at AOC 11/EBS Parcels 78–79 at Concentrations Above Background

Metal	Frequency Above Background[a]	Concentration Range Above Background	Alameda Point 95th Percentile Concentration	PSC	Number Reported Above PSC and Background
Soil		**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	
aluminum	4/35	15,000 to 33,000	13,960	76,000	0
barium	3/46	123 J to 386	93.68	5,400	0
cadmium[b]	2[c]/46	1.8 and 2	1.72	37	0
calcium	2/36	17,700 and 45,300	16,800	NA	No PSC
chromium	2/46	58.8 and 113	54.84	210	0
cobalt	1/46	18.5 J	14.30	900	0
copper	2/46	41.9 and 93.8	39.14	3,100	0
iron	6/35	23,100 to 49,500	22,280	23,000	6
lead	5/48	43 to 150	37.66	150	0
magnesium	3/35	8,890 to 14,900	7,304	NA	No PSC
manganese	5/35	616 J to 1,160 J	383.0	1,800	0
nickel	1/46	59	55.72	1,600	0
potassium	2/35	1,410 J and 2,130	1,232	NA	No PSC
vanadium	3/46	58.3 to 110	47.34	78	1
zinc	9/46	71.9 to 270	67.48	23,000	0
Groundwater		**(µg/L)**	**(µg/L)**	**(µg/L)**	
arsenic[b]	1/11	21.3	20.72	10	1
chromium	1/11	20 J	12.45	50	0
iron[b]	3/11	8,820 to 15,400	6,586	NA	No PSC
manganese[b]	1/11	2,410	1,741	NA	No PSC
selenium	4/11	6.5 to 22.7 J	2.5	50	0

Notes:
[a] includes field duplicates
[b] additional analysis, presented in Appendix H, indicates that concentrations of this metal in groundwater at AOC 11/EBS Parcels 78–79 are below background
[c] cadmium was reported at 2 mg/kg in the sample of backfill used to fill the NTCRA excavation at EBS Parcels 78–79

Acronyms/Abbreviations:
AOC – area of concern
EBS – environmental baseline survey
µg/L – micrograms per liter
mg/kg – milligrams per kilogram
NA – not available
NTCRA – non-time-critical removal action
PSC – preliminary screening criterion

Review Qualifier:
J – estimated value

Table 4-23
Metals in Soil at AOC 12 at
Concentrations Above Background

Metal	Frequency Above Background[a]	Concentration Range Above Background	Alameda Point 95th Percentile Concentration	PSC	Number Reported Above PSC and Background
Soil		**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	
aluminum	2/2	30,600 J and 32,000 J	13,960	76,000	0
arsenic	4/75	20 to 38	9.14	0.062	4
barium	6/75	98 to 150	93.68	5,400	0
cadmium	19/76	1.8 to 7.8	1.72	37	0
calcium	2/2	67,500 and 75,200	16,800	NA	No PSC
chromium	8/76	58 to 96.7 J	54.84	210	0
cobalt	2/75	27 and 27.6	14.30	900	0
copper	3/76	42 to 60.7	39.14	3,100	0
iron	2/2	34,300 and 35,000	22,280	23,000	2
lead	80/184	38 to 666	37.66	199[b]	12
magnesium	2/2	33,200 and 39,600	7,304	NA	No PSC
manganese	2/2	940 and 943	383.0	1,800	0
mercury	1/76	1.8	0.52	23	0
nickel	10/76	57 to 140	55.72	1,600	0
thallium	2/75	5.2 J and 5.8 J	0.50	5.2	1
vanadium	2/75	113 and 116	47.34	78	2
zinc	21/76	72 J to 270	67.48	23,000	0

Notes:
[a] includes field duplicates
[b] lead removal action objective

Acronyms/Abbreviations:
AOC – area of concern
mg/kg – milligrams per kilogram
NA – not available
PSC – preliminary screening criterion

Review Qualifier:
J – estimated value

Table 4-24
Metals in Soil and Groundwater at AOC 17 at Concentrations Above Background

Metal	Frequency Above Background	Concentration Range Above Background	Alameda Point 95th Percentile Concentration*	PSC	Number Reported Above PSC and Background
Soil		**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	
aluminum	2/18	14,000 and 14,500 J	13,960	76,000	0
iron	1/18	27,000	22,280	23,000	1
magnesium	1/18	7,990 J	7,304	NA	No PSC
manganese	2/18	421 J and 685 J	383.0	1,800	0
potassium	1/18	2,300	1,232	NA	No PSC
sodium	1/18	1,460	1,230	NA	No PSC
thallium	1/18	0.53	0.50	5.2	0
Groundwater		**(µg/L)**	**(µg/L)**	**(µg/L)**	
aluminum	2/6	14,100 and 45,800	1,070	1,000	2
chromium	2/6	51.9 and 173	12.45	50	2
copper	1/6	72.5	24.03	NA	No PSC
iron	2/6	19,000 and 64,900	6,586	NA	No PSC
lead	2/6	4 and 15	2.9	15	1
vanadium	2/6	38.6 and 124	26.27	NA	No PSC
zinc	1/6	115	36.39	NA	No PSC

Note:
* or maximum detected result in background data set if maximum is less than the 95th percentile

Acronyms/Abbreviations:
AOC – area of concern
µg/L – micrograms per liter
mg/kg – milligrams per kilogram
NA – not available
PSC – preliminary screening criterion

Review Qualifier:
J – estimated value

Table 4-25
Metals in Soil and Groundwater at AOC 20 at Concentrations Above Background

Metal	Frequency Above Background	Concentration Range Above Background	Alameda Point 95th Percentile Concentration[a]	PSC	Number Reported Above PSC and Background
Soil		(mg/kg)	(mg/kg)	(mg/kg)	
thallium	1/11	1.8	0.50	5.2	0
Groundwater		(µg/L)	(µg/L)	(µg/L)	
arsenic	1/2	26.9	20.72	10 (0.14)[b]	1 (1)[c]
vanadium	1/2	29.1	26.27	NA	No PSC

Notes:
[a] or maximum detected result in background data set if maximum is less than the 95th percentile
[b] surface water PSC
[c] number of concentrations above the surface water PSC and background

Acronyms/Abbreviations:
AOC – area of concern
µg/L – micrograms per liter
mg/kg – milligrams per kilogram
NA – not available
PSC – preliminary screening criterion

Table 4-26
Metals in Soil and Groundwater at AOC 23 at Concentrations Above Background

Metal	Frequency Above Background	Concentration Range Above Background	Alameda Point 95th Percentile Concentration[a]	PSC	Number Reported Above PSC and Background
Soil		**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	
aluminum[b]	21/123	14,100 to 30,300	13,960	76,000	0
antimony	1/161	9.9	8.6	31	0
arsenic[b]	10/160	9.2 to 14.3	9.14	0.062	10
barium	19/160	94.4 to 474	93.68	5,400	0
beryllium	6/172	1.27 to 3.4	1.27	150	0
calcium	1/123	24,900	16,800	NA	No PSC
chromium[b]	19/172	55.9 to 107 J	54.84	210	0
cobalt	14/160	14.3 J to 46.8	14.30	900	0
copper	20/172	39.2 to 185	39.14	3,100	0
iron	20/123	23,300 J to 49,000	22,280	23,000	20
lead	11/181	38.2 J to 135	37.66	150	0
magnesium	16/123	7,440 to 19,500	7,304	NA	No PSC
manganese[b]	17/123	397 J to 1,460	383.0	1,800	0
mercury	17/172	0.56 to 2.6	0.52	23	0
nickel	24/172	55.8 to 119	55.72	1,600	0
potassium	23/123	1,290 to 4,600	1,232	NA	No PSC
sodium	19/123	1,350 to 7,900	1,230	1,800	0
thallium	16/160	0.71 to 6.4 J	0.5	5.2	1
vanadium[b]	16/160	49.8 J to 127	47.34	78	3 (1 at PSC)
zinc	26/172	68.6 to 343	67.48	23,000	0
Groundwater		**(µg/L)**	**(µg/L)**	**(µg/L)**	
arsenic[b]	1/46	22.6	20.72	10 (0.014)[c]	1(1[d])
beryllium	1/46	3.1 J	2.50	4	0
chromium	3/46	14.5 J to 42.2 J	12.45	50	0
iron	1/42	6,900	6,586	NA	No PSC
manganese	1/42	2,550	1,741	NA	No PSC
selenium	8/46	3.2 J to 8.8	2.5	50 (71)[c]	0 (0[d])
vanadium	1/46	31.4 J	26.27	NA	No PSC
zinc	1/46	54.2	36.39	NA (81)[c]	0

Notes:
- [a] or maximum detected result in background data set if maximum is less than the 95th percentile
- [b] additional analysis presented in Appendix H indicates that this metal at AOC 23 is below background
- [c] number in parenthesis is the PSC for surface water
- [d] indicates number of concentrations above surface water PSC and background

Acronyms/Abbreviations:
- AOC – area of concern
- µg/L – micrograms per liter
- mg/kg – milligrams per kilogram
- NA – not available
- PSC – preliminary screening criterion

Review Qualifier:
- J – estimated value

Table 4-27
Metals in Soil and Groundwater at AOC 24 at
Concentrations Above Background

Metal	Frequency Above Background	Concentration Range Above Background	Alameda Point 95th Percentile Concentration*	PSC	Number Reported Above PSC and Background
Soil		**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	
aluminum	2/3	14,000 and 22,900	13,960	76,000	0
arsenic	1/4	11.2	9.14	0.062	1
barium	1/4	142	93.68	5,400	0
chromium	1/4	83.5	54.84	210	0
copper	1/4	62.2 J	39.14	3,100	0
iron	2/3	34,200 J and 34,500 J	22,280	23,000	2
lead	1/4	79 J	37.66	150	0
magnesium	1/3	9,310 J	7,304	NA	No PSC
manganese	1/3	439 J	383.0	1,800	0
mercury	1/4	1.3 J	0.52	23	0
nickel	1/4	93.1	55.72	1,600	0
potassium	1/3	3,120	1,232	NA	No PSC
sodium	1/3	1,460	1,230	NA	No PSC
vanadium	1/4	58.8	47.34	78	0
zinc	1/4	157 J	67.48	23,000	0
Groundwater		**(µg/L)**	**(µg/L)**	**(µg/L)**	
iron	1/1	36,700	6,586	NA	No PSC
manganese	1/1	3,060	1,741	NA	No PSC

Note:
* or maximum detected result in background data set if maximum is less than the 95th percentile

Acronyms/Abbreviations:
AOC – area of concern
µg/L – micrograms per liter
mg/kg – milligrams per kilogram
NA – not available
PSC – preliminary screening criterion

Review Qualifier:
J – estimated value

Table 4-28
Metals in Soil and Groundwater at AOC 25 at Concentrations Above Background

Metal	Frequency Above Background	Concentration Range Above Background	Alameda Point 95th Percentile Concentration[a]	PSC	Number Reported Above PSC and Background
Soil		(mg/kg)	(mg/kg)	(mg/kg)	
aluminum	2/15	15,900 and 22,500	13,960	76,000	0
arsenic	1/24	9.6	9.14	0.062	1
barium	7/24	97.5 to 155	93.68	5,400	0
cadmium	1/25	1.8	1.72	37	0
chromium	8/25	56.5 to 150	54.84	210	0
cobalt	1/24	16.4	14.30	900	0
copper	10/25	40.2 to 230	39.14	3,100	0
iron	4/15	22,300 to 35,900	22,280	23,000	3
lead	13/30	39 to 157	37.66	150	1
magnesium	1/15	9,080	7,304	NA	No PSC
mercury	3/25	1.3 to 4.7	0.52	23	0
nickel	8/25	60.7 to 120	55.72	1,600	0
potassium	6/15	1,660 to 3,350	1,232	NA	No PSC
sodium	1/15	1,470	1,230	NA	No PSC
thallium	2/24	1.8	0.5	5.2	0
vanadium	3/24	47.8 to 66.1	47.34	78	0
zinc	10/25	68.7 to 316	67.48	23,000	0
Groundwater		(µg/L)	(µg/L)	(µg/L)	
arsenic	1[b]/15	21.7 J	20.72	10	1[b]
chromium	2/15	15.4 J and 27.5	12.45	50	0
iron	6/15	10,600 to 38,100	6,586	NA	No PSC
manganese	1/15	1,820	1,741	NA	No PSC
selenium	4/15	5.4 to 16.6	2.5	50	0
thallium	1/14	51.8 J	5.2	2	1
vanadium	1/15	29.8	26.27	NA	No PSC
zinc	1/15	677 J	36.39	NA	No PSC

Notes:
[a] or maximum detected result in background data set if maximum is less than the 95th percentile
[b] sample collected from SWBZ; only 1 of 4 samples collected from well M03-11 had arsenic above Alameda Point background 95th percentile; field duplicate collected at same time had a reported concentration below background

Acronyms/Abbreviations:
AOC – area of concern
µg/L – micrograms per liter
mg/kg – milligrams per kilogram
NA – not available
PSC – preliminary screening criterion
SWBZ – second water-bearing zone

Review Qualifier:
J – estimated value

Table 4-29
Metals in Soil and Groundwater at SWMU UST(R)-11 at Concentrations Above Background

Metal	Frequency Above Background	Concentration Range Above Background	Alameda Point 95th Percentile Concentration*	PSC	Number Reported Above PSC and Background
Soil		**(mg/kg)**	**(mg/kg)**	**(mg/kg)**	
aluminum	2/6	16,200 and 18,300	13,960	76,000	0
barium	1/11	102	93.68	5,400	0
chromium	1/11	70.2	54.84	210	0
cobalt	1/11	14.3 J	14.30	900	0
iron	2/6	34,800 and 36,500	22,280	23,000	2
lead	1/11	59.4	37.66	150	0
manganese	2/6	600 J and 635 J	383.0	1,800	0
mercury	1/11	1.6	0.52	23	0
nickel	1/11	80.1	55.72	1,600	0
potassium	1/6	1,860	1,232	NA	No PSC
zinc	3/11	68.6 to 80.4	67.48	23,000	0
Groundwater		**(µg/L)**	**(µg/L)**	**(µg/L)**	
zinc	1/6	54.2	36.39	NA	No PSC

Note:
* or maximum detected result in background data set if maximum is less than the 95th percentile

Acronyms/Abbreviations:
µg/L – micrograms per liter
mg/kg – milligrams per kilogram
NA – not available
PSC – preliminary screening criterion
SWMU – solid waste management unit
UST – underground storage tank

Review Qualifier:
J – estimated value

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Table 5-1
Organic and Inorganic Chemicals Identified as Contaminants or Risk Drivers at IR Site 35

Study Area/Contaminant	Soil	Groundwater	Reason Identified as a Contaminant
AOC 1			
Volatile Organic Compounds			
naphthalene	—[a]	X[b]	risk
AOC 2			
PCBs			
Aroclor 1260	X	—	> PSC, risk
Metals			
manganese	—	n[c]	risk
AOC 3			
Pesticides			
alpha-chlordane	X	—	risk
dieldrin[d]	X	—	risk
heptachlor	X	—	> PSC, risk
AOC 4			
Metals			
iron	N[e]	—	> PSC
mercury	—	X	> aquatic PSC
zinc	—	X	> aquatic PSC
AOC 5			
Metals			
arsenic	—	n	> PSC, risk
iron	N	n	> PSC, risk
manganese	N	n	> PSC, risk
AOC 6			
PCBs			
Aroclor 1260	X	—	> PSC, risk
AOC 7			
PCBs			
Aroclor 1254	X	—	> PSC, risk
AOC 8			
PCBs			
Aroclor 1254	X	—	> PSC, risk
AOC 9 – no risk drivers and no concentrations > PSCs			
AOC 10			
Metals			
lead	X	—	> PSC

Table 5-1 (continued)

Study Area/Contaminant	Soil	Groundwater	Reason Identified as a Contaminant
AOC 11/EBS 78–79			
Volatile Organic Compounds			
trichloroethene	—	X	risk
Petroleum Hydrocarbons			
diesel	X	—	> PSC
Pesticides			
alpha-BHC	—	X	risk
gamma-chlordane	—	X	risk
4,4′-DDE	—	X	risk
4,4′-DDT	—	X	risk
dieldrin	—	X	risk
heptachlor	—	X	risk
heptachlor epoxide	—	X	risk
PCBs			
Aroclor 1260	—	X	risk
Metals			
arsenic	—	B[f]	> PSC, risk
cadmium	B	—	risk
iron	N	B	> PSC, risk
manganese	—	B	risk
vanadium	N	—	> PSC
AOC 12			
Metals			
arsenic	X	—	> PSC
iron	N	—	> PSC
lead	X	—	> PSC, risk
thallium	N	—	> PSC; < PSC in duplicate sample
vanadium	N	—	> PSC
AOC 13			
Pesticides			
4,4′-DDD	X	—	> PSC, risk
4,4′-DDT	X	—	> PSC, risk
dieldrin	X	—	> PSC, risk
AOC 17			
Petroleum Hydrocarbons			
diesel	X	—	> PSC
motor oil	X	—	> PSC

Table 5-1 (continued)

Study Area/Contaminant	Soil	Groundwater	Reason Identified as a Contaminant
AOC 17 (continued)			
Metals			
aluminum	—	T[g]	> PSC, risk
chromium	—	T	> PSC, risk
iron	N	T	> PSC
nickel	—	T	> PSC
vanadium	—	T	risk
AOC 18			
Volatile Organic Compounds			
naphthalene	—	X	risk
AOC 20			
Petroleum Hydrocarbons			
diesel	—	X	> aquatic PSC
JP-5	—	X	> aquatic PSC
Metals			
arsenic	—	B	> PSC, > aquatic PSC
AOC 21			
Petroleum Hydrocarbons			
diesel	X	X	> PSC
gasoline	X	X	> PSC
AOC 23 (including SWMU UST[R]-11)			
Volatile Organic Compounds			
1,2-dichloroethane	—	X	> PSC
benzene	X	X	> PSC, risk
naphthalene	—	X	risk
tetrachloroethene	—	X	risk
trichloroethene	—	X	risk
vinyl chloride	X	X	> PSC, risk, > aquatic PSC
Petroleum Hydrocarbons			
diesel	X	X	> PSC, > aquatic
gasoline	X	—	> PSC
motor oil	X	X	> PSC
Semivolatile Organic Compounds			
benz(a)anthracene	—	X	risk
benzo(b)fluoranthene	—	X	risk
benzo(a)pyrene	—	X	> PSC, risk
carbazole	X	—	risk
chrysene	—	X	risk
indeno(1,2,3-cd)pyrene	—	X	risk

Table 5-1 (continued)

Study Area/Contaminant	Soil	Groundwater	Reason Identified as a Contaminant
AOC 23 (including SWMU UST[R]-11) (continued)			
Polychlorinated Biphenyls			
Aroclor 1016	—	X	risk
Aroclor 1254	X	—	risk
Aroclor 1260	X	X	> PSC, risk
Metals			
arsenic	B	B	> PSC, risk
cadmium	—	X	risk
iron	N	—	> PSC, risk
manganese	—	n	risk
thallium	X	B	> PSC, risk
vanadium	B	—	> PSC
AOC 24			
Petroleum Hydrocarbons			
diesel	—	X	> PSC
Metals			
arsenic	N	—	> PSC, risk
iron	N	n	> PSC, risk
manganese	—	n	risk
vanadium	N	—	risk
AOC 25			
Metals			
arsenic	B	B	> PSC
cadmium	—	X(SWBZ), T	> PSC
iron	N	n	> PSC, risk
lead	X	—	> PSC
manganese	—	n	
thallium	—	X(SWBZ), T	> PSC, risk
vanadium	N	—	risk
Petroleum Hydrocarbons			
diesel	X	X	> PSC
motor oil	X	X	> PSC
EBS 205			
Volatile Organic Compounds			
cis-1,2-dichloroethene	—	X	> PSC
tetrachloroethene	—	X	risk
trichloroethene	—	X	risk
vinyl chloride	—	X	> PSC, risk

Table 5-1 (continued)

Study Area/Contaminant	Soil	Groundwater	Reason Identified as a Contaminant
EBS 205 (continued)			
Petroleum Hydrocarbons			
diesel	—	X	> PSC
gasoline	—	X	> PSC
JP-5	—	X	> PSC
SWMU OWS 17 – no risk drivers and no concentrations > PSCs			
SWMU AST 016 – no risk drivers and no concentrations > PSCs			
SWMU AST 039 – no risk drivers and no concentrations > PSCs			
SWMU AST 152			
Petroleum Hydrocarbons			
diesel	—	X	> PSC
SWMU AST 173A, B, C			
Petroleum Hydrocarbons			
diesel	—	X	> PSC
motor oil	X	X	> PSC
SWMU AST 392 – no risk drivers and no concentrations > PSCs			
PAH Areas			
PAHs	X	—	> PSC

Notes:

[a] dash indicates compound is not present in medium above PSC and has not been identified as a risk contributor

[b] X indicates compound has been identified above PSC and background or as a risk contributor

[c] n indicates concentration of metal is due to dissolution of naturally occurring metals in soil because of reducing conditions

[d] dieldrin was reported in one unvalidated soil sample above the PSC; however, it was not reported above detection levels in a validated reanalysis of the sample

[e] N indicates that these metals concentrations are naturally occurring per analysis in Section 4.3

[f] B indicates metal has been identified above PSC or is a major risk contributor, but concentrations are within the range of background at Alameda Point or are consistent with background based on statistical analysis in Appendix H

[g] T indicates concentration of the compound either above PSC or contributing to risk is likely to have resulted from a turbid grab sample as other groundwater samples have dissimilar results

Acronyms/Abbreviations:

AOC – area of concern
AST – aboveground storage tank
BHC – benzene hexachloride
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
IR – Installation Restoration (Program)
JP-5 – jet propellant grade 5
µg/L – micrograms per liter
OWS – oil/water separator
PAH – polynuclear aromatic hydrocarbon
PSC – preliminary screening criterion
SWBZ – second water-bearing zone
SWMU – solid waste management unit
UST – underground storage tank

Table 5-2
Physicochemical Properties and Retardation Factors of Selected Organic Compounds at IR Site 35

Analytes	Molecular Weight (g/mol)	Water Solubility (mg/L)	Vapor Pressure at 25°C (mm Hg)	Henry's Law Constant (atm-m^3/mole)	K_{oc} (L/kg)	Half-Life in Soil[a] (in years)	R[c] (unitless)
Volatile Organic Compounds							
benzene[1]	78.11	1.75E+03	95.19	5.55E-03	58.2	—[b]	5
benzo(g,h,i)perylene[1]	276.34	0.26E-03	1E-10	5.34E-08	3.86E+06	—	263,888
1,2-dichloroethane[1]	98.97	8.52E+03	61	9.79E-04	17.5	—	2
cis-1,2-dichloroethene[1]	96.94	3.5E+03	200	4.08E-03	35.6	—	3
naphthalene[1,2]	128.17	31	0.085	4.83E-04	2,010	0.71	138
tetrachloroethene[2]	165.82	150.3	18.49	1.49E-02	40	0.95	4
trichloroethene[2]	131.4	1,100	69	1.03E-02	82–150	0.98	7 – 11
vinyl chloride[1]	62.5	2.76E+03	2660	2.7E-02	18.5	0.5	2
Semivolatile Organic Compounds							
benz(a)anthracene[3]	228	1.40E-02	3.05E-08	4.50E-06	1.38E+06	1.86	94,344
benzo(b)fluoranthene[3]	252	1.40E-02	5E-07	1.19E-05	5.50E+05	1.67	37,602
benzo(a)pyrene[3]	252.3	3.80E-03	5.49E-09	1.80E-05	5.50E+06	1.45	376,006
carbozole[1]	167.21	7.48	—	1.53E-08	3,380	—	232
chrysene[3]	228.3	6.0E-03	6.23E-09	1.05E-05	2.0E+05	2.72	13,674
dibenz(a,h)anthracene[3]	278	2.50E-03	1.0E-10	7.33E-08	3.31E+06	2.57	226,288
indeno(1,2,3-cd)pyrene[3]	276	5.30E-04	1.0E-10	6.95E-08	1.58E+06	2.0	108,017
Pesticides							
alpha-BHC[1,4]	290.83	6.8	—	1.4E-05	1,080	1.1	75
chlordane[1,4]	409.78	0.06	9.98E-06	—	20,000	0.96	1,368
4,4'-DDD[1,4]	320.05	0.09	1.356E-06	4.0E-06	81,100	2.7	5,545
4,4'-DDE[1,4]	518.03	0.12	6.0E-06	2.1E-05	2.7E+05	2.7	18,459
4,4'-DDT[3]	354.49	3.10E-03	1.6E-07	2.80E-05	3.02E+05	15.6	20,647
dieldrin[3,4]	381	1.86E-01	5.89E-06	9.70E-06	1.2E+04	3	821
heptachlor [1,4,5]	373.4	0.18	4.0E-04	1.48E-03	5.24E+04	0.68	3,583
heptachlor epoxide[1,5]	389.32	0.20	1.95E-05	9.5E-06	5.26E+03	—	361

Table 5-2 (continued)

Analytes	Molecular Weight (g/mol)	Water Solubility (mg/L)	Vapor Pressure at 25°C (mm Hg)	Henry's Law Constant (atm-m^3/mole)	K_{oc} (L/kg)	Half-Life in Soil[a] (in years)	R[c] (unitless)
Polychlorinated Biphenyls							
Aroclor 1016[5]	257.55	0.27	4.0E-04	—	2.71E+04	—	1,854
Aroclor 1254[3]	372-375.7	0.003	—	—	3.47E+05	—	23,724
Aroclor 1260[3]	372–375.7	0.003	—	—	3.47E+05	—	23,724

References:
1. Michigan Department of Environmental Quality 2004
2. Howard et al. 1991
3. Mackay et al. 1992
4. Vogue et al. 1994
5. RAIS 2006

Notes:
a. the most conservative value is listed (the longest half-life indicated in the literature); half life listed is for microbially mediated degradation in soil
b. dash indicates not available
c. a value of 0.015 was used as the fraction of organic carbon to calculate R

Acronyms/Abbreviations
atm-m^3/mole – atmosphere cubic meter per mole
BHC – benzene hexachloride
°C – degrees Celsius
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
g/mol – grams per mole
K_{oc} – organic carbon partition coefficient
L/kg – liters per kilogram
mg/L – milligrams per liter
mm Hg – millimeters of mercury
R – retardation factor

Table 5-3
Physicochemical Properties and Retardation Factors of Selected Metals at IR Site 35

Metal	Atomic Weight (g/mole)	K_d (L/kg)	R (unitless)
aluminum	26.98	35,000*	159,518
arsenic	33	29	133
cadmium	112.4	75	343
chromium (III)	52	1,800,000	8,200,000
iron	55.85	25	88
lead	207.2	11,000	115
manganese	54.95	25.3*	50,135
mercury	200.59	52	116
nickel	58.69	65	238
thallium	204.38	71	297
vanadium	50.94	1000	325
zinc	67.41	62	4,559

Source:
RAIS 2006 unless noted otherwise

Note:
* Strenge and Peterson 1989, with 10 to 30 percent clay, pH = 6.8

Acronyms/Abbreviations:
g/mole – grams per mole
K_d – soil/water partition coefficient
L/kg – liters per kilogram
R – retardation factor

Table 5-4
Potential Transport Pathways at IR Site 35

Study Area	Vapor Migration	Particulate Migration in Air	Migration in Surface Water Runoff	Migration from Soil to Groundwater	Groundwater Migration	Migration of Groundwater to Surface Water
AOC 1	X	O	O	O	X	—[a]
AOC 2	P	—	—	O	O	NI
AOC 3	P	O	O	O	—	NI
AOC 4	P	O	O	O	O	O
AOC 5	P	O	O	O	O	—
AOC 6	P	O	O	O	—	—
AOC 7	—	O	O	O	—	—
AOC 8	P	X	X	O	—	—
AOC 9	P	—	—	O	—	—
AOC 10	—	X	X	O	—	—
AOC 11/ EBS Parcels 78–79	X	—	—	O	X	—
AOC 12[b]	—	X	X	—	—	—
AOC 13	P	O	O	O	—	—
AOC 17	P	—	—	O	O	—
AOC 18	P	—	—	O	O	—
AOC 20	P	—	—	O	X	X
AOC 21	P	—	—	O	X	X
AOC 23 / UST(R)-11	X	—	—	X	X	X
AOC 24	P	—	—	O	X	—
AOC 25	P	—	—	O	X	—
EBS Parcel 205	X	—	—	O	X	X
PAH Areas	P	X	X	O	O	NI

Notes:
[a] dash indicates that pathway is not applicable to study area
[b] additionally, sediment associated with AOC 12, present in a nearby storm sewer, could become suspended in stormwater and discharge to Seaplane Lagoon

Symbols Key:
NI – study area is close to surface water but groundwater is not impacted
O – pathway is possible but concentrations or properties of contaminants present in the study area make transport by this pathway unlikely
P – indicates a possible but insignificant pathway because concentrations of volatile chemicals in soil and/or groundwater are low
X – a potential pathway

Acronyms/Abbreviations:
AOC – area of concern
AST – aboveground storage tank
EBS – environmental baseline survey
OWS – oil/water separator
PAH – polynuclear aromatic hydrocarbon
UST – underground storage tank

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Table 6-1
Pre-TCRA Results for PAHs

PAH Area	Depth Interval (feet bgs)	U.S. EPA Cancer Risk	Cal/EPA Cancer Risk	Hazard Index
Decision Area 2	0–2	4E-06	4E-06	0.0009
	0–4	6E-06	7E-06	0.002
	0–8	7E-06	7E-06	0.002
Decision Area 3	0–2	3E-06	4E-06	0.001
	0–4	6E-06	6E-06	0.001
	0–8	8E-06	9E-06	0.002
Decision Area 4	0–2	6E-06	7E-06	0.001
	0–4	7E-06	8E-06	0.002
	0–8	1E-05	1E-05	0.003
Decision Area 5	0–2	2E-06	2E-06	0.0005
	0–4	3E-06	3E-06	0.003
	0–8	9E-06	9E-06	0.003
Decision Area 6	0–2	2E-05	2E-05	0.003
	0–4	2E-05	2E-05	0.004
	0–8	1E-05	1E-05	0.003
Decision Area 7	0–2	1E-05	1E-05	0.004
	0–4	1E-05	1E-05	0.004
	0–8	1E-05	1E-05	0.004
Decision Area 8	0–2	2E-05	2E-05	0.006
	0–4	2E-05	2E-05	0.006
	0–8	4E-05	4E-05	0.007
Decision Area 9	0–2	1E-05	1E-05	0.003
	0–4	1E-05	1E-05	0.003
	0–8	1E-05	1E-05	0.004
Decision Area 11	0–2	7E-06	8E-06	0.003
	0–4	7E-06	7E-06	0.002
	0–8	9E-06	1E-05	0.003
Decision Area 16	0–2	3E-06	3E-06	0.0007
	0–4	5E-06	5E-06	0.001
	0–8	8E-06	8E-06	0.002
Decision Area 17	0–2	5E-06	5E-06	0.0008
	0–4	5E-06	5E-06	0.003
	0–8	2E-05	2E-05	0.02
Decision Area 18	0–2	3E-06	3E-06	0.001
	0–4	2E-05	2E-05	0.005
	0–8	1E-05	1E-05	0.004

Acronyms/Abbreviations:
bgs – below ground surface
Cal/EPA – California Environmental Protection Agency
PAH – polynuclear aromatic hydrocarbon
TCRA – time-critical removal action
U.S. EPA – United States Environmental Protection Agency

Table 6-2
Post-TCRA Results for PAHs

PAH Area	Depth Interval (feet bgs)	Cancer Risk*	Hazard Index
Decision Area 1	0–2	7E-05	0.01
	0–4	7E-05	0.01
	0–8	7E-05	0.01
Decision Area 2	0–2	3E-06	0.0007
	0–4	6E-06	0.002
	0–8	7E-06	0.002
Decision Area 3	0–2	3E-06	0.0009
	0–4	4E-06	0.001
	0–8	9E-06	0.003
Decision Area 4	0–2	5E-06	0.001
	0–4	7E-06	0.002
	0–8	1E-05	0.003
Decision Area 5	0–2	2E-06	0.0005
	0–4	8E-06	0.003
	0–8	9E-06	0.003
Decision Area 6	0–2	4E-06	0.002
	0–4	9E-06	0.003
	0–8	9E-06	0.003
Decision Area 7	0–2	6E-06	0.003
	0–4	6E-06	0.003
	0–8	6E-06	0.003
Decision Area 8	0–2	4E-06	0.0008
	0–4	4E-06	0.001
	0–8	3E-05	0.004
Decision Area 9	0–2	1E-05	0.003
	0–4	1E-05	0.003
	0–8	1E-05	0.004
Decision Area 10	0–2	2E-06	0.0005
	0–4	2E-06	0.0005
	0–8	6E-06	0.001
Decision Area 11	0–2	5E-06	0.002
	0–4	5E-06	0.002
	0–8	8E-06	0.002
Decision Area 12	0–2	3E-06	0.001
	0–4	4E-06	0.001
	0–8	7E-06	0.002
Decision Area 13	0–2	2E-06	0.0004
	0–4	2E-06	0.0005
	0–8	2E-06	0.0008
Decision Area 14	0–2	3E-06	0.0005
	0–4	3E-06	0.001
	0–8	2E-06	0.001

Table 6-2
Post-TCRA Results for PAHs

PAH Area	Depth Interval (feet bgs)	Cancer Risk*	Hazard Index
Decision Area 15	0–2	2E-05	0.003
	0–4	2E-05	0.003
	0–8	2E-05	0.003
Decision Area 16	0–2	2E-06	0.0006
	0–4	5E-06	0.001
	0–8	8E-06	0.002
Decision Area 17	0–2	2E-06	0.0005
	0–4	3E-06	0.003
	0–8	2E-05	0.02
Decision Area 18	0–2	2E-06	0.0005
	0–4	2E-05	0.005
	0–8	2E-05	0.006

Note:
* California-modified cancer risk

Acronyms/Abbreviations:
bgs – below ground surface
PAH – polynuclear aromatic hydrocarbon
TCRA – time-critical removal action

Table 6-3
Tier 1 Evaluation Results by Exposure Group

Study Area	EXPOSURE GROUP 1[a,b] Total[e]	EXPOSURE GROUP 1[a,b] Without Metals Below Background	EXPOSURE GROUP 2[a,c] Total[e]	EXPOSURE GROUP 2[a,c] Without Metals Below Background	EXPOSURE GROUP 3[a,d] Total[e]	EXPOSURE GROUP 3[a,d] Without Metals Below Background
AOC 2						
Cancer Risk	2E-03	1E-05	2E-04	9E-06	2E-03	4E-08
Hazard Index	7	4	3	0.6	4	4
AOC 4						
Cancer Risk	2E-03	5E-07	9E-05	5E-07	2E-03	4E-09
Hazard Index	5	3	2	2	3	1
AOC 5						
Cancer Risk	5E-03	4E-03	1E-04	4E-07	4E-03	4E-03
Hazard Index	12	10	6	5	6	6
AOC 6						
Cancer Risk	NA	NM	5E-06	NM	NG	NG
Hazard Index	NA	NM	NC	NM	NG	NG
AOC 7						
Cancer Risk	NA	NG	9E-05	4E-06	NG	NG
Hazard Index	NA	NG	0.4	NC	NG	NG
AOC 8						
Cancer Risk	NA	NM	3E-06	NM	NG	NG
Hazard Index	NA	NM	NC	NM	NG	NG
AOC 9						
Cancer Risk	NA	NA	9E-05	NC	NG	NG
Hazard Index	NA	NA	0.001	0.001	NG	NG
AOC 13						
Cancer Risk	NA	NA	1E-04	6E-06	NG	NG
Hazard Index	NA	NA	0.0007	0.0007	NG	NG
AOC 17						
Cancer Risk	2E-03	2E-06	7E-05	5E-08	2E-03	2E-06
Hazard Index	16	13	3	2	13	11
AOC 18						
Cancer Risk	8E-05	4E-05	4E-05	NC	4E-05	4E-05
Hazard Index	1	0.04	0.9	0.0004	0.2	0.04

Table 6-3
Tier 1 Evaluation Results by Exposure Group

Study Area	EXPOSURE GROUP 1[a,b] Total[e]	EXPOSURE GROUP 1[a,b] Without Metals Below Background	EXPOSURE GROUP 2[a,c] Total[e]	EXPOSURE GROUP 2[a,c] Without Metals Below Background	EXPOSURE GROUP 3[a,d] Total[e]	EXPOSURE GROUP 3[a,d] Without Metals Below Background
AOC 20						
Cancer Risk	4E-03	4E-03	4E-05	3E-08	4E-03	4E-03
Hazard Index	2	1	1	0.4	0.8	0.8
AOC 21						
Cancer Risk	1E-06	NM	2E-08	NM	1E-06	NM
Hazard Index	0.07	NM	0.04	NM	0.03	NM
AOC 24						
Cancer Risk	9E-04	2E-04	2E-04	2E-04	7E-04	1E-09
Hazard Index	11	10	4	3	7	7
AOC 25						
Cancer Risk	3E-03	3E-03	2E-04	1E-06	3E-03	3E-03
Hazard Index	35	34	6	5	29	29

Notes:

[a] PAHs are not included

[b] includes all soil and groundwater exposure pathways

[c] includes exposure pathways for soil and vapors from VOCs in groundwater

[d] includes exposure pathways for residential use of groundwater

[e] includes all COPCs

Acronyms/Abbreviations:

AOC – area of concern

COPC – chemical of potential concern

NA – not applicable; without groundwater data, Exposure Group 2 is the only risk group

NC – not calculated because COPCs have not been assigned a slope factor or reference dose

NG – no groundwater data collected, in accordance with the Work Plan (BEI 2006)

NM – no metals data collected, in accordance with the Work Plan (BEI 2006)

PAH – polynuclear aromatic hydrocarbon

VOC – volatile organic compound

Table 6-4
Tier 1 Evaluation Results by Risk Driver

Study Area	Analyte Name	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND Hazard Quotient	WITHOUT BACKGROUND Cancer Risk
AOC 2					
Soil					
	Aroclor 1260	—*	8E-06	—	8E-06
	arsenic	—	1E-04	—	—
	iron	0.9	—	—	—
	lead	0.3	—	—	—
	manganese	0.2	—	—	—
	thallium	0.5	—	0.5	—
	vanadium	0.5	—	—	—
	Total for soil	**3**	**2E-04**	**0.6**	**9E-06**
Groundwater					
	arsenic	—	2E-03	—	—
	manganese	3	—	3	—
	Total for groundwater	**4**	**2E-03**	**4**	**4E-08**
	Total for soil and groundwater	**7**	**2E-03**	**4**	**1E-05**
AOC 4					
Soil					
	arsenic	—	9E-05	—	—
	iron	1	—	1	—
	vanadium	0.7	—	0.7	—
	Total for soil	**2**	**9E-05**	**2**	**5E-07**
Groundwater					
	arsenic	—	2E-03	—	—
	iron	0.6	—	0.6	—
	manganese	2	—	—	—
	Total for groundwater	**3**	**2E-03**	**1**	**4E-09**
	Total for soil and groundwater	**5**	**2E-03**	**3**	**5E-07**
AOC 5					
Soil					
	arsenic	—	1E-04	—	—
	cadmium	0.3	—	—	—
	iron	2	—	2	—
	lead	0.3	—	—	—
	manganese	2	—	2	—
	vanadium	0.9	—	0.9	—
	Total for soil	**6**	**1E-04**	**5**	**4E-07**
Groundwater					
	arsenic	—	4E-03	—	4E-03
	iron	3	—	3	—
	manganese	3	—	3	—
	vanadium	0.6	—	—	—
	Total for groundwater	**6**	**4E-03**	**6**	**4E-03**
	Total for soil and groundwater	**12**	**5E-03**	**10**	**4E-03**
AOC 6					
Soil					
	Aroclor 1260	—	5E-06	—	5E-06
	Total for soil	**NC**	**5E-06**	**NC**	**5E-06**

Table 6-4
Tier 1 Evaluation Results by Risk Driver

Study Area	Analyte Name	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND Hazard Quotient	WITHOUT BACKGROUND Cancer Risk
AOC 7					
Soil					
	arsenic	—	8E-05	—	—
	Aroclor 1254	—	4E-06	—	4E-06
	Total for soil	**0.4**	**9E-05**	**NC**	**4E-06**
AOC 8					
Soil					
	Aroclor 1254	—	3E-06	—	3E-06
	Total for soil	**NC**	**3E-06**	**NC**	**3E-06**
AOC 9					
Soil					
	arsenic	—	9E-05	—	—
	Total for soil	**0.001**	**9E-05**	**0.001**	**NC**
AOC 13					
Soil					
	arsenic	—	9E-05	—	—
	4,4′-DDD	—	2E-06	—	2E-06
	4,4′-DDT	—	2E-06	—	2E-06
	dieldrin	—	2E-06	—	2E-06
	Total for soil	**0.0007**	**1E-04**	**0.0007**	**6E-06**
AOC 17					
Soil					
	aluminum	0.2	—	0.2	—
	antimony	0.2	—	—	—
	arsenic	—	7E-05	—	—
	cadmium	0.2	—	—	—
	iron	1	—	1	—
	manganese	0.4	—	0.4	—
	vanadium	0.5	—	—	—
	Total for soil	**3**	**7E-05**	**2**	**5E-08**
Groundwater					
	aluminum	1	—	1	—
	arsenic	—	2E-03	—	—
	chromium	—	2E-06	—	2E-06
	iron	6	—	6	—
	manganese	2	—	—	—
	vanadium	3	—	3	—
	Total for groundwater	**13**	**2E-03**	**11**	**2E-06**
	Total for soil and groundwater	**16**	**2E-03**	**13**	**2E-06**
AOC 18					
Soil					
	arsenic	—	4E-05	—	—
	Total for soil	**0.9**	**4E-05**	**0.0004**	**NC**
Groundwater					
	naphthalene	—	4E-05	—	4E-05
	Total for groundwater	**0.2**	**4E-05**	**0.04**	**4E-05**
	Total for soil and groundwater	**1**	**8E-05**	**0.04**	**4E-05**

Table 6-4
Tier 1 Evaluation Results by Risk Driver

Study Area	Analyte Name	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND Hazard Quotient	WITHOUT BACKGROUND Cancer Risk
AOC 20					
Soil					
	arsenic	—	4E-05	—	—
	Total for soil	**1**	**4E-05**	**0.4**	**3E-08**
Groundwater					
	arsenic	—	4E-03	—	4E-03
	Total for groundwater	**0.8**	**4E-03**	**0.8**	**4E-03**
	Total for soil and groundwater	**2**	**4E-03**	**1**	**4E-03**
AOC 21					
Soil	**Total for soil**	**0.04**	**2E-08**	**0.04**	**2E-08**
Groundwater	**Total for groundwater**	**0.03**	**1E-06**	**0.03**	**1E-06**
	Total for soil and groundwater	**0.07**	**1E-06**	**0.07**	**1E-06**
AOC 24					
Soil					
	aluminum	0.3	—	0.3	—
	arsenic	—	2E-04	—	2E-04
	cadmium	0.2	—	—	—
	iron	1	—	1	—
	lead	0.5	—	—	—
	manganese	0.2	—	0.2	—
	vanadium	0.8	—	0.8	—
	Total for soil	**4**	**2E-04**	**3**	**2E-04**
Groundwater					
	arsenic	—	7E-04	—	—
	iron	3	—	3	—
	manganese	3	—	3	—
	Total for groundwater	**7**	**7E-04**	**7**	**1E-09**
	Total for soil and groundwater	**11**	**9E-04**	**10**	**2E-04**
AOC 25					
Soil					
	aluminum	0.3	—	0.3	—
	arsenic	—	2E-04	—	—
	cadmium	1	—	1	—
	iron	2	—	2	—
	lead	1	—	—	—
	mercury	0.3	—	0.3	—
	thallium	0.4	—	0.4	—
	vanadium	0.8	—	0.8	—
	Total for soil	**6**	**2E-04**	**5**	**1E-06**
Groundwater					
	arsenic	—	3E-03	—	3E-03
	barium	0.2	—	—	—
	cadmium	0.9	—	0.9	—
	iron	3	—	3	—
	manganese	2	—	2	—
	thallium	22	—	22	—
	vanadium	0.8	—	0.8	—
	Total for groundwater	**29**	**3E-03**	**29**	**3E-03**
	Total for soil and groundwater	**35**	**3E-03**	**34**	**3E-03**

Table 6-4
Tier 1 Evaluation Results by Risk Driver

Note:

* dash indicates that the health effect for this chemical did not contribute significantly to the risk

Acronyms/Abbreviations:

AOC – area of concern
DDD – dichlorodiphenyldichloroethane
DDT – dichlorodiphenyltrichloroethane
NC – not calculated because chemicals of potential concern have not been assigned a slope factor or reference dose

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Table 6-5
HHRA Results by Exposure Group

Exposure Group	AOC 1			AOC 3			AOC 11/EBS 78–79			AOC 23			EBS 205		
	CANCER RISK		Hazard	CANCER RISK		Hazard	CANCER RISK		Hazard	CANCER RISK		Hazard	CANCER RISK		Hazard
	U.S. EPA	Cal/EPA	Index	U.S. EPA	Cal/EPA	Index	U.S. EPA	Cal/EPA	Index	U.S. EPA	Cal/EPA	Index	U.S. EPA	Cal/EPA	Index
1. All soil and groundwater exposure pathways															
Total*	1E-06	4E-03	29	NA	NA	NA	3E-03	8E-03	233	2E-02	3E-02	408	4E-04	2E-03	6
Without metals below background	NM	NM	NM	NM	NM	NM	2E-03	5E-03	222	2E-02	3E-02	401	8E-05	6E-05	0.9
2. Exposure pathways for soil and vapors from VOCs in groundwater															
Total*	1E-06	5E-05	2	3E-03	3E-03	3	2E-05	8E-05	2	3E-05	2E-04	3	4E-05	1E-04	1
Without metals below background	NM	NM	NM	NM	NM	NM	5E-06	3E-06	2	2E-05	5E-05	2	2E-05	3E-05	0.07
Without metals below background and PAHs in soil	NC	5E-05	2	3E-03	3E-03	3	4E-06	1E-06	2	1E-05	3E-05	2	2E-05	3E-05	0.07
3. Exposure pathways for residential use of groundwater															
Total*	NC	4E-03	27	NG	NG	NG	3E-03	8E-03	231	2E-02	3E-02	405	3E-04	2E-03	4
Without metals below background	NC	NM	NM	NG	NG	NG	2E-03	5E-03	220	2E-02	3E-02	399	8E-05	6E-05	0.9

Note:
* includes all COPCs

Acronyms/Abbreviations:
AOC – area of concern
Cal/EPA – California Environmental Protection Agency
COPC – chemical of potential concern
EBS – environmental baseline survey
HHRA – human-health risk assessment
NA – not applicable; without groundwater data, Exposure Group 2 is the only risk group
NC – not calculated; no COPCs in this category
NG – no groundwater data
NM – no metals data; risk without metals below background is the same as total risk for the exposure pathway
PAH – polynuclear aromatic hydrocarbon
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Table 6-6
HHRA Results by Risk Driver

Study Area	Analyte Name	TOTAL Hazard Quotient	TOTAL U.S. EPA Cancer Risk	TOTAL Cal/EPA Cancer Risk	WITHOUT BACKGROUND Hazard Quotient	WITHOUT BACKGROUND U.S. EPA Cancer Risk	WITHOUT BACKGROUND Cal/EPA Cancer Risk
AOC 1							
Soil[a]							
	benzo(a)pyrene	—[b]	1E-06	2E-06	—	1E-06	2E-06
	Total for soil	**0.003**	**1E-06**	**2E-06**	**0.003**	**1E-06**	**2E-06**
Groundwater[c]							
	naphthalene	29	—	4E-03	29	—	4E-03
	Total for groundwater	**29**	**NC**	**4E-03**	**27**	**0E+00**	**4E-03**
	Total for soil and groundwater	**29**	**1E-06**	**4E-03**	**29**	**1E-06**	**4E-03**
AOC 3							
Soil[a]							
	benzo(a)pyrene	—	5E-06	1E-05	—	5E-06	1E-05
	alpha-chlordane	—	—	1E-06	—	—	1E-06
	dieldrin	—	1E-05	1E-05	—	1E-05	1E-05
	heptachlor	3	3E-03	3E-03	3	3E-03	3E-03
	Total for soil	**3**	**3E-03**	**3E-03**	**3**	**3E-03**	**3E-03**
AOC 11/EBS Parcels 78 and 79							
Soil[a]							
	benzo(a)pyrene	—	—	1E-06	—	—	1E-06
	arsenic	—	1E-05	7E-05	—	—	—
	cadmium	—	—	7E-06	—	—	—
	iron	1	—	—	1	—	—
	Total for soil	**2**	**1E-05**	**8E-05**	**2**	**2E-06**	**3E-06**
Groundwater[c]							
	trichloroethene	—	1E-05	—	—	1E-05	—
	Aroclor 1260	220	2E-03	5E-03	220	2E-03	5E-03
	alpha-BHC	—	1E-06	—	—	1E-06	—
	alpha-chlordane	—	—	3E-06	—	—	3E-06
	gamma-chlordane	—	3E-06	9E-06	—	3E-06	9E-06
	4,4'-DDE	—	2E-06	2E-06	—	2E-06	2E-06
	4,4'-DDT	—	4E-06	3E-06	—	4E-06	3E-06
	dieldrin	—	9E-06	1E-05	—	9E-06	1E-05
	heptachlor	—	1E-05	1E-05	—	1E-05	1E-05
	heptachlor epoxide	—	4E-06	2E-06	—	4E-06	2E-06
	arsenic	4	5E-04	3E-03	—	—	—
	iron	2	—	—	—	—	—
	manganese	3	—	—	—	—	—
	Total for groundwater	**231**	**3E-03**	**8E-03**	**220**	**2E-03**	**5E-03**
	Total for soil and groundwater	**233**	**3E-03**	**8E-03**	**222**	**2E-03**	**5E-03**
AOC 23							
Soil[a]							
	vinyl chloride	—	—	2E-06	—	—	2E-06
	benzo(a)anthracene	—	—	1E-06	—	—	1E-06
	benzo(b)fluoranthene	—	—	1E-06	—	—	1E-06
	benzo(k)fluoranthene	—	—	1E-06	—	—	1E-06
	benzo(a)pyrene	—	5E-06	1E-05	—	5E-06	1E-05
	carbazole	—	2E-06	—	—	2E-06	—
	dibenz(a,h)anthracene	—	1E-06	—	—	1E-06	—
	Aroclor 1254	0.3	6E-06	1E-05	0.3	6E-06	1E-05
	Aroclor 1260	0.3	4E-06	1E-05	0.3	4E-06	1E-05
	aluminum	0.1	—	—	—	—	—
	arsenic	0.2	2E-05	1E-04	—	—	—

Table 6-6
HHRA Results by Risk Driver

Study Area	Analyte Name	TOTAL Hazard Quotient	TOTAL U.S. EPA Cancer Risk	TOTAL Cal/EPA Cancer Risk	WITHOUT BACKGROUND Hazard Quotient	WITHOUT BACKGROUND U.S. EPA Cancer Risk	WITHOUT BACKGROUND Cal/EPA Cancer Risk
AOC 23 (continued)							
	cadmium	0.1	—	7E-06	—	—	—
	chromium	0.2	—	—	—	—	—
	iron	0.8	—	—	0.8	—	—
	manganese	0.2	—	—	—	—	—
	thallium	0.2	—	—	0.2	—	—
	vanadium	0.4	—	—	—	—	—
	Total for soil	**3**	**3E-05**	**2E-04**	**2**	**2E-05**	**4E-05**
Groundwater[c]							
	benzene	—	—	1E-06	—	—	1E-06
	benzo(g,h,i)perylene	0.3	—	—	0.3	—	—
	naphthalene	—	—	7E-06	—	—	7E-06
	tetrachloroethene	—	6E-06	6E-06	—	6E-06	6E-06
	trichloroethene	0.1	6E-06	—	0.1	6E-06	—
	vinylchloride	—	1E-05	1E-05	—	1E-05	1E-05
	benz(a)anthracene	—	6E-04	9E-04	—	6E-04	9E-04
	benzo(b)fluoranthene	—	6E-04	1E-03	—	6E-04	1E-03
	benzo(a)pyrene	0.2	1E-02	2E-02	0.2	1E-02	2E-02
	chrysene	—	6E-06	1E-04	—	6E-06	1E-04
	indeno(1,2,3-cd)pyrene	0.3	2E-03	3E-03	0.3	2E-03	3E-03
	Aroclor 1016	4	4E-06	3E-04	4	4E-06	3E-04
	Aroclor 1260	391	4E-03	9E-03	391	4E-03	9E-03
	arsenic	3	3E-04	2E-03	—	—	—
	cadmium	—	—	1E-06	—	—	1E-06
	chromium	0.2	—	—	0.2	—	—
	iron	0.5	—	—	0.5	—	—
	manganese	1	—	—	1	—	—
	molybdenum	0.1	—	—	0.1	—	—
	selenium	0.1	—	—	0.1	—	—
	thallium	3	—	—	—	—	—
	vanadium	0.4	—	—	0.4	—	—
	Total for groundwater	**405**	**2E-02**	**3E-02**	**399**	**2E-02**	**3E-02**
	Total for soil and groundwater	**408**	**2E-02**	**3E-02**	**401**	**2E-02**	**3E-02**
EBS Parcel 205							
Soil[a]							
	arsenic	0.3	2E-05	1E-04	—	—	—
	chromium	0.2	—	—	—	—	—
	iron	0.5	—	—	—	—	—
	manganese	0.1	—	—	—	—	—
	vanadium	0.3	—	—	—	—	—
	Total for soil	**1**	**2E-05**	**1E-04**	**0.0002**	**7E-08**	**1E-07**
Groundwater[c]							
	benzene	—	—	1E-06	—	—	1E-06
	tetrachloroethene	—	2E-05	2E-05	—	2E-05	2E-05
	trichloroethene	0.7	4E-05	1E-06	0.7	4E-05	1E-06
	vinyl chloride	—	2E-05	4E-05	—	2E-05	4E-05
	arsenic	3	3E-04	2E-03	—	—	—
	manganese	0.1	—	—	—	—	—
	vanadium	0.2	—	—	—	—	—
	Total for groundwater	**4**	**3E-04**	**2E-03**	**0.9**	**8E-05**	**6E-05**
	Total for soil and groundwater	**6**	**4E-04**	**2E-03**	**0.9**	**8E-05**	**6E-05**

Table 6-6
HHRA Results by Risk Driver

Notes:

[a] includes exposure pathways for ingestion, dermal contact, inhalation of particulates and vapors, and ingestion of homegrown produce

[b] dash indicates that the health effect for this chemical did not contribute significantly to the risk

[c] includes exposure pathways for residential use (ingestion, inhalation, and dermal contact while showering) and inhalation of vapors in indoor air

Acronyms/Abbreviations:

AOC – area of concern
BHC – benzene hexachloride
Cal/EPA – California Environmental Protection Agency
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EBS – environmental baseline survey
HHRA – human-health risk assessment
U.S. EPA – United States Environmental Protection Agency

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Table 9-1
Identification of Remedial Process Options for Soil

General Response Action	Remedial Technology	Process Option
No action	No action	**No action***
Institutional controls	Institutional controls	**Legal and administrative mechanisms***
Containment	Capping	**Asphalt cap***
		Soil cover*
		Engineered alternative cap*
In situ treatment	Physical/chemical treatment	Solidification/stabilization
	Biological treatment	Phytoremediation
Removal and disposal	Mechanical excavation	Excavation of soil for *ex situ* treatment
		Excavation of soil for off-site disposal*
Ex situ treatment	Physical/chemical treatment	Soil washing
		Solidification/stabilization

Note:
* bold type indicates process option was retained for further evaluation

Table 9-2
Identification of Remedial Process Options for Groundwater

General Response Action	Remedial Technology	Process Option
No action	None	**No action***
Institutional controls	Institutional controls	**Legal and administrative mechanisms***
Groundwater monitoring	Groundwater monitoring	**Groundwater monitoring***
MNA	Groundwater sampling and analysis, water-level measurements, modeling	**Natural attenuation***
Containment	Vertical subsurface barriers	Sheet piling
		Biobarrier
		Deep-soil mixing wall
		Slurry wall
	Hydraulic controls	Extraction/injection
Ex situ treatment	Physical/chemical treatment	**Adsorption/absorption***
		Advanced oxidation processes*
Source removal and disposal	Mechanical excavation	**Soil removal and off-site disposal (for AOC 1 only)***
In situ treatment	Biological treatment	Biosparging
		Enhanced *in situ* bioremediation*
	Thermal treatment	Electrical resistive heating
	Chemical treatment	**Chemical oxidation***
Disposal	Untreated groundwater disposal	**Off-site disposal facilities***
	Treated groundwater disposal	**Surface water discharge***
		Publicly owned treatment works*
		Reinjection

Note:
* bold type indicates process option was retained for further evaluation

Acronyms/Abbreviations:
AOC – area of concern
MNA – monitored natural attenuation

Table 9-3
Screening of Remedial Technologies and Process Options for Soil

General Response Action	Remedial Technology	Process Option	Description	Effectiveness	Implementability	Cost	Conclusion
No action	None	None	No further response actions for soil.	Does not prevent public access or exposure to site contaminants.	No action required.	No direct costs.	Retain as required by CERCLA.
ICs	ICs	Legal and administrative controls	ICs are restrictions placed on the use of land or activities that may take place at a given area.	Not effective to actively treat contamination. Effective to prevent or limit site access, and to prevent exposure to impacted soil.	Implementable. There is a precedent for the use of ICs at Alameda Point.	Costs for ICs are expected to be low compared to other process options.	Retain for use as a component of remedial alternatives.
Containment	Soil cover or cap	Single-layer cap, soil cover, engineered alternative cap	Containment involves isolating impacted soil from potential receptors. Cap types considered in this RI/FS Report include a layer of pavement (asphalt or concrete), soil cover, or low-permeability layer with protective soil cover (engineered alternative cap).	A single-layer cap would be effective for public health protection as long as periodic maintenance is performed. A soil cover of suitable thickness would be effective to prevent exposure to underlying impacted soil. If prevention of surface water infiltration is an objective of the remedy, the engineered alternative cap is the most effective process option considered, because it incorporates a low-permeability layer. ICs are needed with each containment option.	A single-layer cap or soil cover is moderately to readily implementable. An engineered alternative cap is rated low to moderate in implementability because of the possible need for sumps with electric sump pumps to facilitate drainage (depending on cap area), and the need for repairs if the liner is penetrated during future investigations or site development.	Containment is generally the least expensive way to manage risks associated with impacted soil in large areas. Costs are dependent on the local availability of soils suitable for construction and the requirements for monitoring, maintenance, and leachate collection (if required).	Single-layer cap, soil cover, and engineered alternative cap are all retained for consideration as components of remedial alternatives.
In situ treatment	Physical/ chemical, biological treatment	S/S, phytoremediation	S/S chemically binds and immobilizes or encapsulates chemicals in a matrix to prevent physical mobility. Phytoremediation is a plant-based technology that uses selected plants to remove, transfer, stabilize, and destroy contaminants in soil.	Creating a stabilized mass (with S/S) would effectively prevent inhalation and/or ingestion of impacted soil. *In situ* S/S treatment would not be effective in reducing the mass of impacted soil and would result in a substantial increase in overall volume. Phytoremediation is rated low in effectiveness because of the need for pilot-scale testing to confirm effectiveness in achieving cleanup goals, and uncertain treatment duration.	S/S is rated low in implementability due to heterogeneous nature of the fill material and limited volume of metals-impacted soil. Existing roads, site features, and underground utilities would have to be taken into consideration during implementation of *in situ* S/S. Phytoremediation is rated low in implementability because crop replanting would be required, and harvesting and replanting would be needed every few months for an as-yet-unknown duration.	S/S costs vary widely, and are expected to be significantly higher than other process options. Phytoremediation costs are expected to be lower than the cost of complete removal.	S/S is eliminated from further consideration based on implementability and cost. Phytoremediation is eliminated from further consideration based on low effectiveness and implementability.
Removal and disposal	Mechanical excavation	Excavation, off-site disposal	Soil excavation entails removing impacted soil. Disposal options include *ex situ* treatment (discussed below) and off-site disposal.	Excavation is effective and applicable. Excavation allows relocation of impacted soil to a safer location (e.g., an off-site disposal facility) where future contact or exposure would be prevented.	Excavation is rated moderate to readily implementable. During excavation, measures should be implemented to control fugitive dust. Excavations extending below the water table are less implementable than shallower excavations, due to added complexities of dewatering and water treatment.	Costs for disposal of excavated soil can be high, depending on volume. Capital and O&M costs for excavation are rated moderate and low, respectively.	Excavation and off-site disposal as a process option is retained.
Ex situ treatment	Physical treatment	Soil washing	Soil washing removes contaminants from soil by dissolving or suspending them in a surfactant solution or by other processes.	Effectiveness for lead-impacted soil is well documented. The ability of soil washing to address more hydrophobic organic compounds like PAHs would likely be limited. When a mixture of contaminants is involved and soil is heterogeneous, effectiveness must be assessed with pilot-scale testing.	Soil washing is rated low in implementability because of expected heterogeneity of excavated soil. Treated soil may contain hazardous levels of washing solvent and require additional treatment.	Soil washing can be cost-effective only if sufficient soil volume requires treatment.	Soil washing is eliminated from further consideration because sufficient volume is not expected to make this process option cost-effective compared to other process options.
		S/S	Contaminants are physically bound or enclosed in a stabilized mass, or chemically stabilized.	*Ex situ* S/S should be effective to prevent inhalation or ingestion and mobility of contaminants.	*Ex situ* S/S is rated moderate to low in implementability.	*Ex situ* S/S can be cost-effective if sufficient volume requires treatment.	*Ex situ* S/S is eliminated from further consideration because the anticipated volume of soil that would be treated by S/S is not sufficient to make this option cost-effective compared to other process options.

Acronyms/Abbreviations:
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
IC – institutional control
O&M – operation and maintenance
PAH – polynuclear aromatic hydrocarbon
RI/FS – remedial investigation/feasibility study
S/S – solidification/stabilization

Table 9-4
Screening of Remedial Technologies and Process Options for Groundwater

General Response Action	Remedial Technology	Process Option	Description	Effectiveness	Implementability	Cost	Conclusion
No action	None	No action	No further response actions for groundwater.	Does not prevent domestic use of groundwater or protect quality of groundwater migrating to surface waters.	No action required.	No direct costs.	Retain as required by CERCLA.
ICs	ICs	Legal and administrative mechanisms	ICs are nonengineering measures designed to prevent or limit exposure to hazardous substances left in place at a site or assure the effectiveness of a selected remedy.	Should be effective in preventing unacceptable exposure to impacted groundwater and indoor vapors from groundwater.	Implementable. There is a precedent for the use of ICs at Alameda Point.	Low capital cost. O&M costs are expected to be low compared to other process options.	Retain for use as a component of remedial alternatives.
Groundwater monitoring	Groundwater monitoring	Groundwater monitoring	Concentrations of contaminants in groundwater are evaluated over time to assess plume stability.	Not effective at reducing the mass, volume, or toxicity of groundwater contamination. The method is effective as a means of verifying conditions in groundwater and assessing remediation progress.	Readily implementable, as demonstrated by previous and current monitoring programs at Alameda Point.	Low capital cost. Moderate to high annual O&M cost, depending on the frequency and duration of the monitoring program.	Retain for use as a component of remedial alternatives.
MNA	Groundwater sampling and analysis, water-level measurements, modeling	Natural attenuation	Allows natural processes to reduce contamination over time. Monitoring is performed to verify that these processes reduce contaminant concentrations to acceptable levels.	Under suitable conditions MNA should be effective in reducing concentrations of organic chemicals in groundwater over the long term. Most effective when implemented with source control or source removal activities.	Readily implementable. Groundwater sampling and analytical methods are well proven at Alameda Point.	Low capital cost. Moderate annual O&M cost. Total cost is dependent on its effectiveness and duration.	Retain for use as a component of remedial alternatives.
Containment	Vertical subsurface barriers	Sheet piling, biobarrier, deep-soil mixing wall, slurry wall	Barriers minimize the horizontal movement of impacted groundwater or limit the flow of uncontaminated groundwater into a plume.	May be effective in limiting horizontal migration of groundwater contaminants.	Low in implementability. Utility lines would need to be removed in order to implement this process option.	Relatively high in capital cost. Low in annual O&M cost.	Eliminated from further consideration based on low implementability and high cost.
	Hydraulic controls	Extraction/ injection	Extraction and/or injection wells are used to modify the hydraulic gradient and prevent migration of contaminants.	May be effective in limiting horizontal and vertical migration of groundwater contaminants.	Moderately implementable. Discharge of treated water may pose administrative and technical challenges.	Moderate in capital cost, high in O&M cost relative to other technologies.	Eliminated from further consideration based on high overall costs.
Groundwater extraction and *ex situ* treatment	Physical/chemical treatment	Adsorption/ absorption and advanced oxidation	Adsorption involves the association of an adsorbate compound onto a surface (sorbent); absorption involves the redistribution of a compound from the aqueous phase into a volume of material. Sorption allows or retards the rate of migration of the contaminant relative to advective groundwater flow velocity. Advanced oxidation employs chemical reactions to destroy contaminants.	Although contaminant mass may be reduced, groundwater pumping has been shown to be inefficient and high-cost as the sole remedy for reducing contaminants to low levels.	Extraction of groundwater is moderately implementable. Extensive long-term groundwater extraction may induce settlement of fill soils.	Costs for pump-and-treat systems are difficult to predict, primarily due to the uncertain end point of the remedy. Therefore, the *ex situ* technologies are expected to have high O&M costs.	Groundwater extraction and *ex situ* treatment was eliminated from further consideration as a long-term remedy due to the high cost, long duration, and limited implementability associated with groundwater pump-and-treat systems. However, *ex situ* treatment is retained for further evaluation as a short-duration treatment option for groundwater.
Source removal and disposal	Mechanical excavation	Soil removal	Excavation of the source area entails removing impacted soil and any entrained NAPL.	Excavation of a source area as a groundwater process option is effective and potentially applicable for AOC 1. Excavation allows relocation of waste to a safer location where future contact with groundwater would be prevented. Additional soil and/or groundwater investigations would increase source removal effectiveness.	Excavation is rated moderate to readily implementable because of the suspected shallow depth of the source removal activities. During excavation, mitigation measures would be implemented to control fugitive dust. Excavations extending below the water table are less implementable than shallower excavations, due to added complexities of dewatering and water treatment.	Costs for disposal of excavated material can be high. Capital and O&M costs for excavation are rated moderate and low, respectively.	Soil removal as a groundwater process option is retained for further evaluation as a component of remedial alternatives to address naphthalene at AOC 1.

Table 9-4 (continued)

General Response Action	Remedial Technology	Process Option	Description	Effectiveness	Implementability	Cost	Conclusion
In situ treatment	Biological treatment	Biosparging	An enhanced form of air sparging in which oxygen and nutrients are added to the injected airstream to enhance growth of naturally occurring microbes and accelerate aerobic bioremediation.	Should be effective in treating fuel hydrocarbons. Not effective in treating nonoxidizable VOCs. Has the same physical limitations as air sparging. The time frame to reach RAOs is difficult to predict at IR Site 35.	Low implementability. Would require pilot-scale testing to verify effectiveness. Vapors typically are extracted and treated to mitigate vapor migration. Extracted vapors must be treated to meet BAAQMD requirements.	Moderate capital cost. Moderate O&M cost, assuming effectiveness in a reasonable time frame (i.e., approximately 5 years or less).	Eliminated from further consideration based on low likelihood of meeting RAOs within a reasonable time frame. Other more effective *in situ* oxidation processes are available.
		Enhanced *in situ* bioremediation	A compound is injected into the aquifer that produces a slow and sustained release of molecular oxygen (for aerobic ISB) or a carbon substrate (for anaerobic ISB) to stimulate *in situ* bioremediation.	May be effective in treating VOCs or fuel hydrocarbons. Time to reach RAOs depends on adequate distribution of injected compounds.	Moderately implementable. Bench- and/or pilot-scale testing may be needed to verify effectiveness.	Moderate capital cost. Low O&M cost assuming effectiveness in a reasonable time frame (i.e., approximately 5 years or less).	Retain for further evaluation as a component of remedial alternatives.
	Thermal treatment	Electrical resistive heating	An electrical technique to resistively heat soil and create an *in situ* source of steam to strip contaminants from the aquifer, which are then captured using SVE.	Should be effective in stripping volatile contaminants. Offers some potential to meet RAOs. Typically used for DNAPL areas or other high concentration source areas.	Low in implementability. Requires installation of electrodes and specialized above-grade equipment. Heating of formational materials could take an extended period. Vapors must be extracted and treated.	High in capital cost.	Eliminate from further consideration. Difficult to implement. Not cost-competitive for dissolved-phase contaminants at the levels encountered at IR Site 35.
	Chemical treatment	Chemical oxidation	Reagents are injected into the groundwater zone where VOCs and/or fuel hydrocarbons are present, producing hydroxyl radicals (oxidizing agents), which oxidize organic contaminants to water and carbon dioxide.	Shown to be effective at other Alameda Point sites to oxidize volatile contaminants.	Moderately implementable. May require bench- and/or pilot-scale testing to verify effectiveness. Handling reagents requires special engineering controls.	Moderately high in capital cost. No appreciable O&M cost unless periodic reinjection is employed.	Retain for further consideration as a component of remedial alternative(s).
Disposal	Untreated groundwater disposal	Off-site disposal	Untreated groundwater is placed in temporary storage facilities and transported to an off-site treatment or disposal facility.	Off-site treatment and disposal is an effective means of disposing of low volumes of untreated groundwater.	Easily implemented for small quantities of extracted groundwater. For larger quantities, implementability is moderate.	Costs could range from low to very high, depending upon the volume of extracted groundwater and its chemical characteristics.	Retain for further analysis as a disposal option for groundwater extracted during dewatering or groundwater sampling.
	Treated groundwater disposal	Surface water discharge	Treated groundwater is conveyed to a storm drain system for discharge to San Francisco Bay.	Discharge to a storm drain system is an effective means of disposing of treated groundwater.	Moderately implementable, depending on volume and duration. Would need to comply with substantive provisions of NPDES permit program.	Medium capital and O&M costs.	Retain for further analysis as a disposal option for groundwater extracted during dewatering.
		POTW	Treated groundwater is conveyed to a publicly owned treatment plant via sanitary sewer piping.	Discharge to a POTW is an effective means of disposing of treated groundwater.	Moderately implementable. Would need to comply with substantive provisions of industrial wastewater permitting requirements.	Medium capital and O&M costs.	Retain for further analysis as a disposal option for groundwater extracted during dewatering.
		Reinjection	Treated groundwater is reinjected into the aquifer from which it was extracted.	Reinjection is an effective means of disposing of treated groundwater.	Low implementability. Could have adverse impact on nearby groundwater plume.	Medium capital and O&M costs.	Eliminated from further consideration based on low implementability.

Acronyms/Abbreviations:
AOC – area of concern
BAAQMD – Bay Area Air Quality Management District
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
DNAPL – dense non-aqueous phase liquid
IC – institutional control
IR – Installation Restoration (Program)
ISB – *in situ* biodegradation
MNA – monitored natural attenuation
NAPL – nonaqueous-phase liquid
NPDES – National Pollutant Discharge Elimination System
O&M – operation and maintenance
POTW – publicly owned treatment works
RAO – remedial action objective
SVE – soil vapor extraction
VOC – volatile organic compound

Table 9-5
Oxidant Effectiveness for Chemicals of Concern in Groundwater

Oxidant	EASE OF TREATMENT USING ISCO*	
	Vinyl Chloride (AOC 23-4)	Naphthalene (AOC 1-5)
Fenton's reagent	Amenable	Reluctant
Modified Fenton's reagent	Amenable	Amenable
Ozone	Amenable	Reluctant
Ozone/H_2O_2	Amenable	Reluctant
Permanganate (K/Na)	Amenable	Amenable
Activated persulfate	Amenable	Reluctant

Note:
* references for Ease of Treatment information include ITRC 2005; Haskins, pers. com. 2006; and Regenesis n.d.

Acronyms/Abbreviations:
AOC – area of concern
H_2O_2 – hydrogen peroxide
ISCO – *in situ* chemical oxidation
K – potassium
Na – sodium

Table 9-6
Considerations for *In Situ* Treatment of Groundwater With ISCO

Parameters	Peroxide	Ozone	Permanganate	Persulfate
Formulation	H_2O_2 Fenton's ($H_2O_2 + Fe^{+2}$) Modified Fenton's ($H_2O_2 + Fe^{+2}$)	Ozonation (ozone gas O_3) Peroxone ($O_3 + H_2O_2$) (liquid)	$KMnO_4$ (solid) $NaMnO_4$ (liquid)	Persulfate ($S_2O_8^{2-}$) Activated persulfate (heated or Fe^{+2} catalyzed)
Potential detrimental effects	• Gas evolution • Heat generation • By-products • Mobilization of metals (for conventional Fenton's), less of a concern for Modified Fenton's because of neutral pH	• Gas evolution • By-products • Mobilization of metals	• By-products • Mobilization of metals	• By-products • Mobilization of metals
pH/alkalinity	Effective over a wide pH range, but carbonate alkalinity must be taken into consideration	Effective over a wide pH range, but carbonate alkalinity must be taken into consideration	Effective over a wide pH range; carbonate alkalinity not a concern	Effective over a wide pH range, but carbonate alkalinity must be taken into consideration
Persistence	Easily degraded in contact with soil/groundwater (hours to days) unless inhibitors are used	Easily degraded in contact with soil/groundwater (half-life 30 minutes)	The oxidant is very stable (months)	Oxidant is very stable (days to weeks)
Oxidant demand	Soil oxidant demand varies with soil type; contaminant oxidant demand is based on total mass and mass distribution (sorbed, dissolved and free phase)			
Soil permeability and heterogeneity	Low-permeable soils and subsurface heterogeneity offer a challenge for the distribution of injected or extracted fluids			
Other considerations	• Fenton's requires low pH • Peroxide and Fenton's may have uncontrolled reactions • Avoid flammable compounds • Aerobic biodegradation may result from O_2 release • Iron oxides may form and reduce aquifer permeability	• Cost (quantities needed) • Health and safety concerns • O_3 must be produced on-site • Requires air-sparging • Longer injection times required	• Not effective with TPH (benzene) or chlorinated ethanes • Potential dust hazard with $KMnO_4$ • $KMnO_4$ often impure (contains chromium) • MnO_2 reduces soil permeability and limits future injections	• Creates high sulfate conditions • Not well tested *in situ* • Difficult to control/catalyze • Requires elevated temperatures to remediate contaminants

Table 9-6 (continued)

	Peroxide	Ozone	Permanganate	Persulfate
Other considerations (continued)			• Reacts violently with H_2O_2, fuel • Addresses only dissolved phase (rebound)	

Source: ITRC 2005

Acronyms/Abbreviations:
Fe^{+2} – ferrous iron
H_2O_2 – hydrogen peroxide
ISCO – *in situ* chemical oxidation
$KMnO_4$ – potassium permanganate
MnO_2 – manganese dioxide
$NaMnO_4$ – sodium permanganate
O_2 – molecular oxygen
O_3 – ozone
$S_2O_8^{2-}$ – persulfate
TPH – total petroleum hydrocarbons

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Table 10-1
Identification of Remedial Alternatives for Soil

Alternative Name	AOC 3 Alternative Number	AOC 10/12 Alternative Number	PAH Alternative Number
no further action	AOC 3-1	AOC 10/12-1	PAH-1
cover and/or ICs	AOC 3-2	AOC 10/12-2	PAH-2
excavation and off-site disposal	AOC 3-3	AOC 10/12-3	PAH-3a* PAH-3b* PAH-4a* PAH-4b*

Note:
* descriptions of the four excavation and off-site disposal alternatives for PAHs are as follows:
  PAH-3a: excavation in unpaved areas to 2 feet bgs and ICs
  PAH-3b: excavation to 2 feet bgs and ICs
  PAH-4a: excavation in unpaved areas to 4 feet bgs and ICs
  PAH-4b: excavation to 4 feet bgs

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
IC – institutional control
PAH – polynuclear aromatic hydrocarbon

Table 10-2
Identification of Remedial Alternatives for Groundwater

Alternative Name	AOC 1 Alternative Number	AOC 23 Alternative Number
no action	AOC 1-1	AOC 23-1
MNA and ICs	AOC 1-2	AOC 23-2
source removal, enhanced aerobic ISB, and ICs	AOC 1-3	NA
enhanced aerobic or anaerobic ISB and ICs	AOC 1-4	AOC 23-3
ISCO	AOC 1-5	AOC 23-4

Acronyms/Abbreviations:
AOC – area of concern
IC – institutional control
ISB – *in situ* bioremediation
ISCO – *in situ* chemical oxidation
MNA – monitored natural attenuation
NA – not applicable to this AOC

Table 10-3
Screening Results for Soil Remedial Alternatives

Alternatives	Effectiveness	Implementability	Cost	Conclusion
AOC 3-1, AOC 10/12-1, and PAH-1 – no further action	Not evaluated.	Not evaluated.	Not evaluated.	Retained for DAA per the NCP.
AOC 3-2, AOC 10/12-2, and PAH-2 – cover/ICs	Should meet the threshold criteria for compliance with ARARs and overall protection of human health and the environment. Should be effective in meeting general response objectives. New cover or existing pavements should be effective in reducing risks of public exposure to underlying impacted soil. ICs would prohibit actions that could result in unacceptable exposure to impacted soil. ICs would include a soil management plan, describing possible subsurface hazards (such as impacted soil) that may be encountered during future excavation.	Implementable. A cover would limit future uses of the covered area. ICs have been implemented elsewhere at Alameda Point.	Moderate to high. Design, maintenance and O&M costs may be higher than removal for small areas.	Retained for DAA.
AOC 3-3, AOC 10/12-3, PAH-3a, PAH-3b, PAH-4a, and PAH-4b – excavation and off-site disposal	Should meet the threshold criteria for compliance with ARARs and overall protection of human health and the environment. Should be effective in meeting general response objectives. Removal of impacted soil would be more effective than a soil cover.	Implementable. Future site uses would not be restricted.	Moderate to high, depending on volume of excavated soil.	Retained for DAA.

Acronyms/Abbreviations:
AOC – area of concern
ARAR – applicable or relevant and appropriate requirement
DAA – detailed analysis of alternatives
IC – institutional control
NCP – National Oil and Hazardous Substances Pollution Contingency Plan
O&M – operation and maintenance
PAH – polynuclear aromatic hydrocarbon

Table 10-4
Screening Results for Groundwater Remedial Alternatives

Alternatives	Effectiveness	Implementability	Cost	Conclusion
AOC 1-1 and AOC 23-1 – no action	Not evaluated.	Not evaluated.	Not evaluated.	Retained for DAA per the NCP.
AOC 1-2 and AOC 23-2 – MNA and ICs	Conditions are assumed to be appropriate for MNA. Additional groundwater investigations are warranted in AOCs 1 and 23 to assess the likelihood of achieving RAOs without enhancements. MNA is assumed to be effective in achieving RAOs in groundwater over the long term. ICs would be effective in preventing or limiting access or exposure to impacted groundwater and to indoor vapors.	Readily implementable.	Low to moderate. Costs for MNA will depend on the time to reach RAOs.	Retained for DAA.
AOC 1-3 – source removal, enhanced aerobic ISB, and ICs	Should be effective in reducing contaminant mass in the plume area. Excavation, associated dewatering, and disposal would be effective in removing the source area and underlying impacted soil. Performance monitoring should be implemented in order to monitor the naphthalene concentration reductions in groundwater over the long term. ICs would be effective in preventing or limiting access or exposure to impacted groundwater and to indoor vapors from groundwater.	Implementable.	Moderate to high, depending on volumes of excavated material and extracted groundwater during dewatering processes.	Retained for DAA.
AOC 1-4 and AOC 23-3 – enhanced aerobic or anaerobic ISB and ICs	Aerobic and anaerobic ISB could be effective at treating the chemicals in the subsurface. Performance monitoring would be implemented to monitor the reductions of contaminant concentrations in groundwater over the long term. ICs would be effective in preventing or limiting access or exposure to impacted groundwater and to indoor vapors. The duration of ISB alternatives is expected to be considerably longer than ISCO alternatives.	Moderately implementable. Approximately 75 injection points would be utilized for AOC 1-4 and approximately 190 injection points would be utilized for AOC 23-3.	High, depending on number of injection points and amount of oxygen-releasing or electron donor compounds to be added to the subsurface. More injection points would be necessary for the ISB reagent injections than for the ISCO reagent injection. Costs for these alternatives would be higher than for Alternatives AOC 1-5 and AOC 23-4.	Eliminated, based on the longer duration and higher comparative costs than for Alternatives AOC 1-5 and AOC 23-4.

Table 10-4 (continued)

Alternatives	Effectiveness	Implementability	Cost	Conclusion
AOC 1-5 and AOC 23-4 – ISCO	ISCO would be effective at reducing contaminant concentrations in groundwater. Performance monitoring would be implemented in order to assess treatment effectiveness. ICs are assumed not to be needed based on the short time period to reach RAOs.	Implementable. Approximately 32 injection points would be utilized for AOC 1-5 and approximately 114 injection points would be utilized for AOC 23-4.	Moderate to high, depending on number of injection points and amount of chemical reagents to be added to the subsurface.	Retained for DAA.

Acronyms/Abbreviations:
AOC – area of concern
DAA – detailed analysis of alternatives
IC – institutional control
ISB – *in situ* bioremediation
ISCO – *in situ* chemical oxidation
MNA – monitored natural attenuation
NCP – National Oil and Hazardous Substances Pollution Contingency Plan
RAO – remedial action objective

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Table 11-1
Detailed and Comparative Analysis of Soil Remedial Alternatives at AOC 3 by Balancing Criteria

Alternative	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness	Implementability	Cost*
	Parameters considered: • residual risk at completion • long-term management of remaining contaminants • reliability of engineering controls and ICs • need to replace components • continuing repair/maintenance needs	Parameters considered: • treatment processes • amount of hazardous material • degree of reduction in toxicity, mobility, or volume through treatment • degree of irreversibility • treatment residuals	Parameters considered: • short-term risks to community • impacts on workers • environmental impacts • time until protection is achieved	Parameters considered: • technical feasibility • operational reliability • future alternative remedial options • ability to monitor effectiveness • ability to obtain governmental approvals • availability of services and materials	Parameters considered: • net present value • capital costs • O&M costs
AOC 3-2: soil cover and ICs	**Medium** A soil cover is expected to be effective in preventing exposure to impacted soil. Alternative AOC 3-2 would require ICs and long-term management of contaminants. Preventing infiltration is not an objective of this alternative, so a soil cover is appropriate. The simplicity of the cover design minimizes the need to replace components; therefore, continuing repair/maintenance needs should be minimal. Should the cover be damaged, it should be easy to repair.	**Low** The mobility of heptachlor-impacted soil would be reduced with a soil cover, but no treatment would occur. There are no active treatment processes that would reduce the toxicity or volume of heptachlor in impacted soil.	**Medium** Under Alternative AOC 3-2, the cover would provide protection by preventing exposure to impacted soil. This alternative would not take a significant amount of time to implement. ICs would be implemented indefinitely; therefore, time to achieve protection would be longer for this alternative. Long-term cover maintenance, monitoring and reporting would be required. This alternative would involve transporting up to 15–20 truckloads of clean fill soil through the community. This alternative has the potential to create dust, which would need to be minimized using proper dust-control techniques.	**Medium** Alternative AOC 3-2 would be implementable, but excavations and other actions that could damage the cover would be restricted. Clean cover soil is readily available from sources in the San Francisco Bay Area. The soil cover would be relatively easy to design and construct. Shallow excavation does not present dewatering and shoring challenges. ICs would need to be implemented for a longer period of time.	**Medium** The present-value cost associated with this alternative is estimated to be $365,000, which is comparable to Alternative AOC 3-3. A summary of the cost estimate is provided in Table 11-2.
AOC 3-3: excavation and off-site disposal	**High** Under Alternative AOC 3-3, all impacted soil exceeding the preliminary RG would be removed. This alternative is considered to be the most effective and permanent over the long term, achieving complete removal.	**Medium** Alternative AOC 3-3 would require that all excavated soil be transported to an appropriate waste disposal facility. Any required treatment to meet land-disposal restrictions would be performed at the disposal facility prior to land disposal. This treatment would reduce the toxicity and mobility of chemicals in hazardous soil prior to disposal. Excavated soil not requiring treatment to meet land-disposal restrictions would not be treated; thus, some soil would not realize a reduction in toxicity, mobility, or volume.	**High** Alternative AOC 3-3 would involve excavation and off-site disposal of impacted soil and backfilling of the excavation. This alternative would not take a significant amount of time to implement. The excavation activities are expected to be completed in one day. Once the excavation is completed, this alternative would eliminate exposure to impacted soil. No ICs or long-term management would be required. This alternative has the potential to create significant fugitive dust and to track impacted soil off-site. These hazards can be minimized using proper planning and engineering controls such as dust-control and equipment-decontamination techniques. Additional truck trips would be required through the community, with up to 30–40 truck trips required for transporting excavated soil to the off-site disposal facility and clean fill soil to the excavation area.	**High** Alternative AOC 3-3 would be readily implemented. Excavation, transportation, and off-site disposal of impacted soil have been performed in the past at Alameda Point. Because it involves excavation at shallow depths above the groundwater table, this alternative would not present challenges related to dewatering, excavation stability, and compaction of backfill. Both hazardous and nonhazardous landfills have available capacity for treatment and disposal of the soil that would be excavated under this alternative.	**Medium** The present-value cost associated with this alternative is estimated to be $401,000, which is comparable to Alternative AOC 3-2. A summary of the cost estimate is provided in Table 11-3.

Note:
* based on net present value

Acronyms/Abbreviations:
AOC – area of concern
IC – institutional control
O&M – operation and maintenance
RG – remediation goal

Table 11-2
Cost Estimate Summary for Alternative AOC 3-2: Soil Cover and ICs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$100,000			$100,000
Initial investigation/predesign sampling	$14,000			$14,000
Preconstruction survey	$8,000			$8,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs With Markups[a]				**$124,000**
Capital Costs				
Removal of existing sod (3,500 square feet)	$6,000			$6,000
Soil cover (260 cubic yards)	$17,000			$17,000
Landscape sod (3,500 square feet)	$15,000			$15,000
Subtotal Capital Costs With Markups[a]				**$38,000**
O&M Costs				
ICs and reporting (30 years)		$3,000		$90,000
5-year reviews			$24,000	$144,000
Subtotal O&M Costs With Markups[a]				**$234,000**
Subtotal With Markups[a]				**$396,000**
Contingency (20%)				$79,000
TOTAL COST				**$475,000**
Present Value of Alternative AOC 3-2 (based on 2006 dollars)[b]				**$365,000**

Notes:

[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit

[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:

AOC – area of concern
IC – institutional control
O&M – operation and maintenance
USA – Underground Service Alert

Table 11-3
Cost Estimate Summary for Alternative AOC 3-3: Excavation and Off-Site Disposal

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$100,000			$100,000
Initial investigation/predesign sampling	$14,000			$14,000
Preconstruction survey	$8,000			$8,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs With Markups[a]				**$124,000**
Capital Costs				
Removal of existing sod (3,500 square feet)	$6,000			$6,000
Excavation and backfill (260 cubic yards)	$16,000			$16,000
Off-site disposal	$139,000			$139,000
Waste profile sampling	$10,000			$10,000
Confirmation sampling	$6,000			$6,000
Landscape sod (3,500 square feet)	$15,000			$15,000
Subtotal Capital Costs With Markups[a]				**$192,000**
O&M Costs				
Closeout report				$28,000
Subtotal O&M Costs With Markups[a]				**$28,000**
Subtotal With Markups[a]				**$344,000**
Contingency (20%)				$69,000
TOTAL COST				**$413,000**
Present Value of Alternative AOC 3-3 (based on 2006 dollars)[b]				**$401,000**

Notes:

[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit

[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:

AOC – area of concern
IC – institutional control
O&M – operation and maintenance
USA – Underground Service Alert

Table 11-4
Detailed and Comparative Analysis of Soil Remedial Alternatives at AOCs 10 and 12 by Balancing Criteria

Alternative	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness	Implementability	Cost*
	Parameters considered: • residual risk at completion • long-term management of remaining contaminants • reliability of engineering controls and ICs • need to replace components • continuing repair/maintenance needs	Parameters considered: • treatment processes • amount of hazardous material • degree of reduction in toxicity, mobility, or volume through treatment • degree of irreversibility • treatment residuals	Parameters considered: • short-term risks to community • impacts on workers • environmental impacts • time until protection is achieved	Parameters considered: • technical feasibility • operational reliability • future alternative remedial options • ability to monitor effectiveness • ability to obtain governmental approvals • availability of services and materials	Parameters considered: • net present value • capital costs • O&M costs
AOC 10/12-1: no further action	**Low** Long-term effectiveness and permanence are evaluated on the basis of risk remaining after the remedial activities have been completed. When average lead concentrations across AOCs 10 and 12 are considered, EPCs for both areas are currently below the preliminary RG for lead. However, if risk does exist in localized areas with higher concentrations, this alternative provides no ICs or removal to reduce risk associated with lead-impacted soil.	**Low** There are no active treatment processes that would reduce the mobility or toxicity of the contaminants in affected soils.	**Low** There are no short-term risks to the community and no impacts to workers associated with remedial actions for this alternative. Although AOC-wide average lead concentrations are below the preliminary RG, no action would be taken to mitigate risk for areas with higher concentrations.	**High** Alternative AOC 10/12-1 would be readily implementable because it would not involve any remedial activities.	**High** There would be no costs associated with Alternative AOC 10/12-1.
AOC 10/12-2: limited excavation, cover, and ICs	**Medium** All impacted soil in unpaved areas in AOC 10 and impacted sediments in one storm drain near AOC 12 would be removed. Existing pavement in AOCs 10 and 12 is expected to effectively prevent exposure to underlying lead-impacted soil. Alternative AOC 10/12-2 would require ICs and pavement maintenance to reduce risk associated with remaining lead-impacted soil. However, continuing repair/maintenance needs should be minimal. Should the pavement become damaged, it should be easy to repair.	**Medium** A small volume of impacted soil and sediments would be removed under this alternative. Any required treatment to meet land-disposal restrictions would be performed at the disposal facility prior to land disposal. This treatment would reduce the toxicity and mobility of chemicals in hazardous soil and sediments prior to disposal. Excavated soil and sediments not requiring treatment to meet land-disposal restrictions would not be treated; thus, these soil and sediments would not realize a reduction in toxicity, mobility, or volume. Pavement would reduce the mobility of the contaminants in affected soils beneath the pavement, but would not provide treatment.	**Medium** Alternative AOC 10/12-2 would involve limited removal and off-site disposal of impacted soil in unpaved areas and storm drain sediments and backfilling of the soil excavation areas. Under this alternative, the existing pavement would provide protection by preventing exposure to remaining impacted soil. This alternative would not take a significant amount of time to implement. This alternative has the potential to create fugitive dust and to track impacted soil off-site. These hazards can be minimized using proper planning and engineering controls such as dust-control and equipment-decontamination techniques. It is estimated that less than 10 truck trips would be required through the community for transporting removed soil and sediments to the off-site disposal facility.	**Medium** Alternative AOC 10/12-2 would be readily implemented with no significant difficulties regarding technical feasibility or reliability. Excavation, transportation, and off-site disposal of impacted soil and sediments have been performed in the past at Alameda Point. Because it involves excavation at shallow depths above the groundwater table, this alternative would not present challenges related to dewatering, excavation stability, and compaction of backfill. Both hazardous and nonhazardous landfills have available capacity for treatment and disposal of the soil and sediments that would be removed under this alternative. Asphalt cover materials are already in place, and materials for maintenance and repair are expected to be readily available from sources in the San Francisco Bay Area. The pavement would be relatively easy to maintain. Excavation and other actions that could damage the cover would be restricted. Long-term ICs would be implemented for the project life.	**Low** The present-value cost associated with this alternative is estimated to be $610,000, which is higher than Alternative AOC 10/12-3. Estimated costs for AOCs 10 and 12 for this alternative are $358,000 and $252,000 respectively. A summary of the cost estimate is provided in Table 11-5.

Table 11-4 (continued)

Alternative	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness	Implementability	Cost*
AOC 10/12-3: excavation and off-site disposal	**High** Under Alternative AOC 10/12-3, all impacted soil and sediments would be removed. This alternative is considered to be the most effective and permanent over the long term, achieving complete removal.	**Medium** Alternative AOC 10/12-3 would require that soil and sediments exceeding the preliminary RG be removed and transported to an appropriate waste disposal facility. Any required treatment to meet land-disposal restrictions would be performed at the disposal facility prior to land disposal. This treatment would reduce the toxicity and mobility of chemicals in hazardous soil and sediments prior to disposal. Excavated soil and sediments not requiring treatment to meet land-disposal restrictions would not be treated; thus, some soil and sediments would not realize a reduction in toxicity, mobility, or volume.	**High** Alternative AOC 10/12-3 would involve removal and off-site disposal of impacted soil and storm drain sediments and backfilling of the soil excavation areas. This alternative would not take a significant amount of time to implement. The excavation activities are expected to be completed in 1 day. Once the excavation activities are completed, this alternative would eliminate exposure to impacted soil and sediments. No ICs or long-term management would be required. This alternative has the potential to create some fugitive dust and to track impacted soil off-site, but excavation volumes would not be significant. Hazards associated with fugitive dust can be minimized using proper planning and engineering controls such as dust-control and equipment-decontamination techniques. Up to 40–50 truck trips would be required through the community to transport impacted soil and sediments to the off-site disposal facility and to import clean fill soil to the excavation areas.	**High** Alternative AOC 10/12-3 would be readily implemented with no significant difficulties regarding technical feasibility or reliability. Excavation, transportation, and off-site disposal of impacted soil and sediments have been performed in the past at Alameda Point. Because it involves excavation at shallow depths above the groundwater table, this alternative would not present challenges related to dewatering, excavation stability, and compaction of backfill. Both hazardous and nonhazardous landfills have available capacity for treatment and disposal of the soil and sediments that would be removed under this alternative. Clean soil backfill materials are readily available from sources in the San Francisco Bay Area.	**Medium** The present-value cost associated with this alternative is estimated to be $547,000, which is lower than Alternative AOC 10/12-2. Estimated costs for AOCs 10 and 12 for this alternative are $242,000 and $305,000, respectively. A summary of the cost estimate is provided in Table 11-6.

Note:

* based on net present value

Acronyms/Abbreviations:

AOC – area of concern
EPC – exposure point concentration
IC – institutional control
O&M – operation and maintenance
RG – remediation goal

Table 11-5
Cost Estimate Summary for Alternative AOC 10/12-2:
Limited Excavation, Cover, and ICs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Costs for AOC 10-2				
Remedial Design Costs				
Remedial design	$100,000			$100,000
Initial investigation/predesign sampling	$10,000			$10,000
Preconstruction survey	$8,000			$8,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs With Markups[a]				**$120,000**
Capital Costs				
Removal of existing sod (1,085 square feet)	$3,000			$3,000
Excavation and backfill (40 cubic yards)	$2,000			$2,000
Off-site disposal	$8,000			$8,000
Waste profile sampling	$5,000			$5,000
Confirmation sampling	$6,000			$6,000
Landscape sod (1,085 square feet)	$12,000			$12,000
Subtotal Capital Costs With Markups[a]				**$36,000**
O&M Costs				
ICs and reporting (30 years)		$3,000		$90,000
5-year reviews			$24,000	$144,000
Subtotal O&M Costs With Markups[a]				**$234,000**
Subtotal With Markups[a]				**$390,000**
Contingency (20%)				$78,000
TOTAL COST				**$468,000**
Present Value of Alternative AOC 10-2 (based on 2006 dollars)[b]				**$358,000**

Table 11-5 (continued)

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Costs for AOC 12-2				
Remedial Design Costs				
Remedial design	$50,000			$50,000
Initial investigation/predesign sampling	$4,000			$4,000
Subtotal Remedial Design Costs with Markups[a]				**$54,000**
Capital Costs				
Removal of sediments (10 cubic yards)	$5,000			$5,000
Off-site disposal	$2,000			$2,000
Waste profile sampling	$4,000			$4,000
Subtotal Capital Costs With Markups[a]				**$11,000**
O&M Costs				
ICs and reporting (30 years)		$3,000		$90,000
5-year reviews			$24,000	$144,000
Subtotal O&M Costs With Markups[a]				**$234,000**
Subtotal With Markups[a]				**$299,000**
Contingency (20%)				$60,000
TOTAL COST				**$359,000**
Present Value of Alternative AOC 12-2 (based on 2006 dollars)[b]				**$252,000**
TOTAL COST FOR ALTERNATIVE AOC 10/12-2				**$827,000**
Present Value of Alternative AOC 10/12-2 (based on 2006 dollars)[b]				**$610,000**

Notes:

[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit

[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:

AOC – area of concern
IC – institutional control
O&M – operation and maintenance
USA – Underground Service Alert

Table 11-6
Cost Estimate Summary for Alternative AOC 10/12-3:
Excavation and Off-Site Disposal

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Costs for AOC 10-3				
Remedial Design Costs				
Remedial design	$100,000			$100,000
Initial investigation/predesign sampling	$10,000			$10,000
Preconstruction survey	$8,000			$8,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs With Markups[a]				**$120,000**
Capital Costs				
Removal of existing sod (1,085 square feet)	$3,000			$3,000
Excavation and backfill (85 cubic yards)	$6,000			$6,000
Off-site disposal	$18,000			$18,000
Waste profile sampling	$10,000			$10,000
Confirmation sampling	$6,000			$6,000
Landscape sod (1,085 square feet)	$10,000			$10,000
Asphalt/concrete cover (1,140 square feet)	$5,000			$5,000
Subtotal Capital Costs With Markups[a]				**$58,000**
O&M Costs				
Closeout report				$28,000
Subtotal O&M Costs With Markups[a]				**$28,000**
Subtotal With Markups[a]				**$206,000**
Contingency (20%)				$41,000
TOTAL COST				**$247,000**
Present Value of Alternative AOC 10-3 (based on 2006 dollars)[b]				**$242,000**

Table 11-6 (continued)

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Costs for AOC 12-3				
Remedial Design Costs				
Remedial design	$100,000			$100,000
Initial investigation/predesign sampling	$11,000			$11,000
Preconstruction survey	$8,000			$8,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs with Markups[a]				**$121,000**
Capital Costs				
Removal of sediments (10 cubic yards)	$5,000			$5,000
Removal of existing asphalt/concrete pavement (performed by others)				
Excavation and backfill (252 cubic yards)	$16,000			$16,000
Off-site disposal	$55,000			$55,000
Waste profile sampling	$11,000			$11,000
Confirmation sampling	$6,000			$6,000
Asphalt/concrete cover (5,525 square feet)	$20,000			$20,000
Subtotal Capital Costs With Markups[a]				**$113,000**
O&M Costs				
Closeout report				$28,000
Subtotal O&M Costs With Markups[a]				**$28,000**
Subtotal With Markups[a]				**$262,000**
Contingency (20%)				$52,000
TOTAL COST				**$314,000**
Present Value of Alternative AOC 12-3 (based on 2006 dollars)[b]				**$305,000**
TOTAL COST FOR ALTERNATIVE AOC 10/12-3				**$561,000**
Present Value of Alternative AOC 10/12-3 (based on 2006 dollars)[b]				**$547,000**

Notes:

[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit

[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:

AOC – area of concern
IC – institutional control
O&M – operation and maintenance
USA – Underground Service Alert

Table 11-7
Detailed and Comparative Analysis of Soil Remedial Alternatives for PAH Areas by Balancing Criteria

Alternative	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness	Implementability	Cost*
	Parameters considered: • residual risk at completion • long-term management of remaining contaminants • reliability of engineering controls and ICs • need to replace components • continuing repair/maintenance needs	Parameters considered: • treatment processes • amount of hazardous material • degree of reduction in toxicity, mobility, or volume through treatment • degree of irreversibility • treatment residuals	Parameters considered: • short-term risks to community • impacts on workers • environmental impacts • time until protection is achieved	Parameters considered: • technical feasibility • operational reliability • future alternative remedial options • ability to monitor effectiveness • ability to obtain governmental approvals • availability of services and materials	Parameters considered: • net present value • capital costs • O&M costs
PAH-1: no further action	**Low** Long-term effectiveness and permanence are evaluated on the basis of risk remaining after the remedial activities have been completed. Shallow soils in the upper 2 feet that exceed the preliminary RG for PAHs were either excavated in the previous PAH TCRA or located in an area identified previously as either nonresidential area or under hardscapes. Soils that exceed the preliminary RG for PAHs in the depth interval of 2 to 4 feet typically have adequate separation from exposure to the environment (at least 2 feet of soil). However, if an unacceptable risk does exist in localized areas with high B(a)P equivalent concentrations, this alternative provides no measures to reduce or manage risk. Risk associated with PAHs in each decision area and depth interval is within the NCP risk management range.	**Low** There are no active treatment processes that would reduce the mobility or toxicity of PAHs in affected soils under this alternative.	**Low** There are no short-term risks to the community and no impacts to workers associated with remedial actions for this alternative. Most shallow (0 to 2 feet bgs) soils sitewide meet the preliminary RG for PAHs.	**High** Alternative PAH-1 would be readily implementable because it would not involve any remedial activities.	**High** There would be no costs associated with Alternative PAH-1.
PAH-2: ICs	**Medium** Alternative PAH-2 would include ICs to assure that risk from soil beneath hardscape is acceptable if hardscape is removed. Previous TCRA activities have reduced the mass of PAHs in shallow soil from unpaved areas, and risks are within the NCP risk management range.	**Low** Identified soils with B(a)P equivalent concentrations above the preliminary RG would remain in place for this alternative. ICs do not reduce the toxicity, mobility, or volume of contaminants or provide treatment, but are intended to minimize the possibility of public exposure to residual concentrations.	**Medium** ICs would not pose a short-term risk to workers or the community and can be put in place quickly. Soils with PAH concentrations above preliminary RGs would remain in place under this alternative.	**High** Alternative PAH-2 would be readily implemented with no significant difficulties regarding technical feasibility or reliability.	**Medium** The present-value cost associated with this alternative is estimated to be $235,000, which is comparable to Alternatives PAH-3a and PAH-3b, and lower than Alternatives PAH-4a and PAH-4b. A summary of the cost estimate is provided in Table 11-8.
PAH-3a: excavation in unpaved areas to 2 feet bgs and ICs	**Medium** Under Alternative PAH-3a, approximately 310 bcy of soil with PAHs above the preliminary RG in the 0- to 2-foot depth interval in the unpaved areas would be excavated and disposed of off-site for the purpose of additional mass removal of PAHs. Remaining PAHs above the preliminary RG in soil under hardscape, if any, would not be excavated, but ICs would be put in place to prohibit removal of hardscapes without a soil management plan. The soil management plan would assure that risk from soil beneath hardscape is acceptable if hardscape is removed. Alternative PAH-3a would accomplish at least 2 feet of separation from PAH-impacted soil not already under hardscape.	**Low** A portion of the soils with PAHs at concentrations above the preliminary RG in the 0- to 2-foot depth interval would be removed under this alternative and transported off-site for Class II disposal. No treatment would occur, and these soils would be placed in a secure landfill.	**Medium** Alternative PAH-3a would involve removal and off-site disposal of a limited volume (approximately 310 bcy) of PAH-impacted soil, followed by backfilling of the soil excavation areas. This alternative has the potential to create fugitive dust and for the excavated soil to be tracked off-site. These hazards can be minimized using proper planning and engineering controls such as dust-control and equipment-decontamination techniques. Approximately 42 truck trips would be required to transport excavated soil off-site through the community and clean fill soil and backfill materials to the excavation areas.	**Medium** Alternative PAH-3a would be readily implemented with no significant difficulties regarding technical feasibility or reliability. Excavation, transportation, and off-site disposal of impacted soil have been performed in the past at Alameda Point. The identified Class II landfills have available capacity for treatment and disposal of the soil that would be removed under this alternative. Clean soil backfill materials are readily available from sources in the San Francisco Bay Area. ICs are included.	**Medium** The present-value cost associated with this alternative is estimated to be $391,000, which is comparable to Alternatives PAH-2 and PAH-3b, and lower than Alternatives PAH-4a and PAH-4b. A summary of the cost estimate is provided in Table 11-9.

Table 11-7 (continued)

Alternative	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness	Implementability	Cost*
PAH-3b: excavation to 2 feet bgs and ICs	**Medium** Under Alternative PAH-3b, all identified soil from paved and unpaved areas in the 0- to 2-foot depth interval (approximately 1,100 bcy) with PAHs above the preliminary RG would be excavated and disposed of off-site. Clean imported fill would be used to backfill excavated areas. This alternative would include ICs to assure that risk from soil beneath hardscape is acceptable if hardscape is removed.	**Low** Alternative PAH-3b would involve excavation of all identified soil with PAHs above the preliminary RG in the 0- to 2-foot depth interval for off-site Class II disposal. These soils would not be treated prior to disposal, but would be placed in a secure landfill. No treatment would occur.	**Medium** Alternative PAH-3b would involve removal and off-site disposal of a limited volume (1,100 bcy) of soil, followed by backfilling of the soil excavation areas. This alternative, like other excavation alternatives, has the potential to create fugitive dust and to track excavated soil off-site. Approximately 150 truck trips would be required through the community to transport PAH-impacted soil off-site and clean fill to the excavation areas.	**Medium** Alternative PAH-3b would be readily implemented with no significant difficulties regarding technical feasibility or reliability. Excavation, transportation, and off-site disposal of soil have been performed in the past at Alameda Point. The identified Class II landfills have available capacity for disposal of the soil that would be removed under this alternative. Clean soil backfill is readily available from sources in the San Francisco Bay Area. ICs are included.	**Medium** The present-value cost associated with this alternative is estimated to be $553,000, which is comparable to Alternatives PAH-2 and PAH-3a, and lower than Alternatives PAH-4a and PAH-4b. A summary of the cost estimate is provided in Table 11-10.
PAH-4a: excavation in unpaved areas to 4 feet bgs and ICs	**High** Under Alternative PAH-4a, approximately 6,750 bcy of soil with PAHs above the preliminary RG in the 0- to 4-foot depth interval in the unpaved areas would be excavated and disposed of off-site. For several locations where PAH exceedances were found in the 0 to 2-foot interval, excavation deeper than 2 feet is not required. Remaining soil with PAHs above preliminary RGs under hardscape, if any, would not be excavated. ICs would be put in place to prohibit removal of hardscapes without a soil management plan. The soil management plan would assure that risk from soil beneath hardscape is acceptable if hardscape is removed. Clean imported fill and clean excavated soil from on-site would be used to backfill excavated areas, and Alternative PAH-4a would accomplish 4 feet of separation from deeper concentrations	**Low** Most of the PAH-impacted soils in the 0- to 4-foot depth interval would be removed and transported off-site for Class II disposal. These soils would be placed in a secure landfill. No treatment of contaminated soil would occur.	**Medium** Alternative PAH-4a would involve removal and off-site disposal of approximately 6,750 bcy of soil, followed by backfilling of the soil excavation areas. This alternative, like other excavation alternatives, has the potential to create fugitive dust and to track excavated soil off-site. Approximately 900 truck trips would be required through the community to transport PAH-impacted soil to the off-site disposal facility and clean fill soil to the excavation areas.	**Medium** Alternative PAH-4a would be readily implemented with no significant difficulties regarding technical feasibility or reliability. Excavation, transportation, and off-site disposal of soil have been performed in the past at Alameda Point. The identified Class II landfills have available capacity for treatment and disposal of the soil that would be removed under this alternative. Clean soil backfill is readily available from sources in the San Francisco Bay Area. ICs are included.	**Low** The present-value cost associated with this alternative is estimated to be $1,988,000, which is much higher than Alternatives PAH-2, PAH-3a and PAH-3b, and comparable to Alternative PAH-4b. A summary of the cost estimate is provided in Table 11-11.
PAH-4b: excavation to 4 feet bgs	**High** Under Alternative PAH-4b, all identified soil in paved and unpaved areas in the 0- to 4-foot depth interval with PAHs above the preliminary RG would be excavated and disposed of off-site. For several locations where PAH exceedances were found in the 0- to 2-foot interval, excavation deeper than 2 feet is not required. Clean imported fill and clean excavated soil from on-site would be used to backfill excavated areas. This alternative is considered to be the most effective and permanent over the long term, achieving the highest PAH mass removal of the alternatives considered. However, overall risk reduction is not expected to be appreciable.	**Low** Alternative PAH-4b would involve excavation of all identified soil with PAHs above the preliminary RG in the 0- to 4-foot depth interval for off-site disposal. These soils would not be treated prior to disposal, but would be placed in a secure landfill. No treatment of contaminated soil would occur.	**Low** Alternative PAH-4b would involve removal and off-site disposal of an estimated 9,022 bcy of soil, followed by backfilling of the soil excavation areas. This alternative involves significantly more soil excavation and handling than the other PAH alternatives. This alternative, like other excavation alternatives, has the potential to create fugitive dust and to track excavated soil off-site. Approximately 1,203 truck trips would be required through the community to transport excavated soil off-site and clean fill soil to the excavation areas.	**Medium** Alternative PAH-4b would be readily implemented with no significant difficulties regarding technical feasibility or reliability. Excavation, transportation, and off-site disposal of soil have been performed in the past at Alameda Point. The identified Class II landfills have available capacity for disposal of the soil that would be removed under this alternative. Clean soil backfill is readily available from sources in the San Francisco Bay Area. This alternative is assumed for FS purposes not to require ICs.	**Low** The present-value cost associated with this alternative is estimated to be $2,450,000, which is higher than Alternatives PAH-2, PAH-3a and PAH-3b, and comparable to Alternative PAH-4a. A summary of the cost estimate is provided in Table 11-12.

Note:
* based on net present value

Acronyms/Abbreviations
B(a)P – benzo(a)pyrene
bcy – bank cubic yard
bgs – below ground surface
IC – institutional control
NCP – National Oil and Hazardous Substances Pollution Contingency Plan
O&M – operation and maintenance
PAH – polynuclear aromatic hydrocarbon
RG – remediation goal
TCRA – time-critical removal action

Table 11-8
Cost Estimate Summary for Alternative PAH-2: ICs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$50,000			$50,000
Subtotal Remedial Design Costs With Markups[a]				**$50,000**
O&M Costs				
ICs and reporting (30 years)		$3,000		$90,000
5-year reviews			$24,000	$144,000
Subtotal O&M Costs With Markups[a]				**$234,000**
Subtotal With Markups[a]				**$284,000**
Contingency (20%)				$57,000
TOTAL COST				**$341,000**
Present Value of Alternative PAH-2 (based on 2006 dollars)[b]				**$235,000**

Notes:

[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit

[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:

IC – institutional control
O&M – operation and maintenance
PAH – polynuclear aromatic hydrocarbon
USA – Underground Service Alert

Table 11-9
Cost Estimate Summary for Alternative PAH-3a: Excavation in Unpaved Areas to 2 Feet bgs and ICs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$100,000			$100,000
Preconstruction survey	$8,000			$8,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs With Markups[a]				**$110,000**
Capital Costs				
Removal of existing sod (4,200 square feet)	$4,000			$4,000
Excavation / backfill (311 bcy)	$19,000			$19,000
Disposal off-site (311 cubic yards)	$30,000			$30,000
Waste profile soil sampling	$6,000			$6,000
Landscape sod (4,200 square feet)	$16,000			$16,000
Subtotal Capital Costs With Markups[a]				**$75,000**
O&M Costs				
ICs and reporting (30 years)		$3,000		$90,000
5-year reviews			$24,000	$144,000
Subtotal O&M Costs With Markups[a]				**$234,000**
Subtotal With Markups[a]				**$419,000**
Contingency (20%)				$84,000
TOTAL COST				**$503,000**
Present Value of Alternative PAH-3a (based on 2006 dollars)[b]				**$391,000**

Notes:

[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit

[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:

bcy – bank cubic yard
bgs – below ground surface
IC – institutional control
O&M – operation and maintenance
PAH – polynuclear aromatic hydrocarbon
USA – Underground Service Alert

Table 11-10
Cost Estimate Summary for Alternative PAH-3b: Excavation to 2 Feet bgs and ICs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$100,000			$100,000
Preconstruction survey	$8,000			$8,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs With Markups[a]				**$110,000**
Capital Costs				
Removal of existing sod (4,200 square feet)	$4,000			$4,000
Excavation and backfill (1,105 cubic yards)	$58,000			$58,000
Off-site disposal (1,105 cubic yards)	$104,000			$104,000
Waste profile sampling	$10,000			$10,000
Landscape sod (14,915 square feet)	$38,000			$38,000
Subtotal Capital Costs With Markups[a]				**$214,000**
O&M Costs				
ICs and reporting (30 years)		$3,000		$90,000
5-year reviews			$24,000	$144,000
Subtotal O&M Costs With Markups[a]				**$234,000**
Subtotal With Markups[a]				**$558,000**
Contingency (20%)				$111,000
TOTAL COST				**$669,000**
Present Value of Alternative PAH-3b (based on 2006 dollars)[b]				**$553,000**

Notes:

[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit

[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:

bgs – below ground surface
IC – institutional control
O&M – operation and maintenance
PAH – polynuclear aromatic hydrocarbon
USA – Underground Service Alert

Table 11-11
Cost Estimate Summary for Alternative PAH-4a: Excavation in Unpaved Areas to 4 Feet bgs and ICs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$100,000			$100,000
Preconstruction survey	$8,000			$8,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs With Markups[a]				**$110,000**
Capital Costs				
Removal of existing sod (91,111 square feet)	$45,000			$45,000
Excavation /backfill (13,187 cubic yards)	$533,000			$534,000
Disposal off-site (6,749 cubic yards)	$621,000			$621,000
Waste profile soil sampling	$49,000			$49,000
Landscape sod (91,111 square feet)	$196,000			$196,000
Subtotal Capital Costs With Markups[a]				**$1,445,000**
O&M Costs				
ICs and reporting (30 years)		$3,000		$90,000
5-year reviews			$24,000	$144,000
Subtotal O&M Costs With Markups[a]				**$234,000**
Subtotal With Markups[a]				**$1,789,000**
Contingency (20%)				$358,000
TOTAL COST				**$2,147,000**
Present Value of Alternative PAH-4a (based on 2006 dollars)[b]				**$1,988,000**

Notes:

[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit

[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:

bgs – below ground surface
IC – institutional control
O&M – operation and maintenance
PAH – polynuclear aromatic hydrocarbon
USA – Underground Service Alert

Table 11-12
Cost Estimate Summary for Alternative PAH-4b: Excavation to 4 Feet bgs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$100,000			$100,000
Preconstruction survey	$8,000			$8,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs With Markups[a]				**$110,000**
Capital Costs				
Removal of existing sod (91,111 square feet)	$45,000			$45,000
Removal of existing asphalt/concrete pavement (performed by others, 30,684 square feet)				
Excavation and backfill (16,939 cubic yards)	$738,000			$738,000
Off-site disposal (9,022 cubic yards)	$830,000			$830,000
Waste profile sampling	$61,000			$61,000
Landscape sod (121,796 square feet)	$273,000			$273,000
Subtotal Capital Costs With Markups[a]				**$1,947,000**
O&M Costs				
Project Closeout Report	$50,0900			$50,000
Subtotal O&M Costs With Markups[a]				**$50,000**
Subtotal With Markups[a]				**$2,105,000**
Contingency (20%)				$421,000
TOTAL COST				**$2,526,000**
Present Value of Alternative PAH-4b (based on 2006 dollars)[b]				**$2,450,000**

Notes:

[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit

[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:

bgs – below ground surface
IC – institutional control
O&M – operation and maintenance
PAH – polynuclear aromatic hydrocarbon
USA – Underground Service Alert

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Table 11-13
Detailed and Comparative Analysis of Groundwater Remedial Alternatives at AOC 1 by Balancing Criteria

Alternative	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness	Implementability	Cost*
	Parameters considered: • residual risk at completion • long-term management of remaining contaminants • reliability of engineering controls and ICs • need to replace components • continuing repair/maintenance needs	Parameters considered: • treatment processes • amount of hazardous material • degree of reduction in toxicity, mobility, or volume through treatment • degree of irreversibility • treatment residuals	Parameters considered: • short-term risks to community • impacts on workers • environmental impacts • time until protection is achieved	Parameters considered: • technical feasibility • operational reliability • future alternative remedial options • ability to monitor effectiveness • ability to obtain governmental approvals • availability of services and materials	Parameters considered: • net present value • capital costs • O&M costs
AOC 1-1: No Action	**Low** The cancer risk associated with nondomestic use of groundwater at AOC 1 is within the NCP risk management range. This alternative would rely on natural processes to remediate residual contamination to below preliminary RGs. However, there are no means to verify that such processes would continue to occur. Under this alternative, there would be no method of assessing long-term effectiveness and permanence.	**Low** No treatment or monitoring would be performed. Some reduction of naphthalene concentrations is likely to occur through natural attenuation processes. The absence of monitoring does not allow for evaluation of reduction in contaminant concentrations.	**Medium** There would be no short-term risks to the community or potential impacts to workers under this alternative. No action would be taken, so there would be no short-term environmental impacts. The overall time to reach preliminary RGs in the source area is expected to be longer for this alternative than for the other alternatives, however absence of monitoring would not allow for evaluation of reduction in contaminant concentrations.	**High** Easy to implement; however, no ability to monitor effectiveness.	**High** There would be no costs associated with Alternative AOC 1-1.
AOC 1-2: MNA and ICs	**Medium** The cancer risk associated with nondomestic use of groundwater at AOC 1 is within the NCP risk management range. The source area will not be removed under this alternative. Natural attenuation processes would be expected to continue reducing contaminant concentrations at the site. Additional groundwater investigations are warranted in AOC 1 to assess the likelihood of achieving preliminary RGs without enhancements. ICs, if needed, would be effective in managing risk.	**Medium** No active treatment would be performed. The naphthalene concentrations would continue to decrease through natural attenuation processes. Monitoring would be used to evaluate the reduction in naphthalene concentrations.	**Medium** MNA and IC implementation would pose a minimal risk to workers, community and environment. The overall time to reach preliminary RGs in the source area is expected to be longer for this alternative than for the other active alternatives.	**High** MNA should be easily implementable.	**Medium** The present-value cost of this alternative is $439,000, which is comparable to Alternative AOC 1-5 and less than Alternative AOC 1-3. Refer to Table 11-14 for a cost summary breakdown of Alternative AOC 1-2.
AOC 1-3: Source Removal, Enhanced Aerobic ISB and ICs	**High** Removal of the suspected source area should be effective to reduce naphthalene concentrations in groundwater in the source area. ISB treatment would further reduce residual naphthalene concentrations in the groundwater.	**High** Dewatering and subsequent treatment during excavation and ISB treatment would reduce the volume of contaminated groundwater. The excavated material would be transported to an appropriate waste disposal facility. No treatment to meet land-disposal restrictions is assumed to be required at the disposal facility prior to land disposal as all material to be disposed is assumed to be nonhazardous. The remaining naphthalene contamination would continue to be degraded through ISB treatment and natural attenuation processes.	**Medium** Soil excavation would pose a minimal risk to workers. Transportation and off-site disposal would pose a slight risk to the community. The ISB process would result in rapid mass destruction of remaining naphthalene. ISB reagents must be transported through the community. Efforts would be made to minimize disturbance to the environment during excavation.	**Medium** Excavation of the source area would provide some challenges because the source area is expected to be located in saturated soil, and several utilities are located in the excavation area. Dewatering and the associated treatment and permitting for disposal of the water can be accomplished but may prove difficult. The follow-on treatment of ISB should be easily implementable.	**Low** The present-value cost of this alternative is $884,000, which is higher than Alternatives AOC 1-2 and AOC 1-5. Refer to Table 11-15 for a cost summary breakdown of Alternative AOC 1-3.

Table 11-13 (continued)

Alternative	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness	Implementability	Cost*
AOC 1-5: ISCO	**High**	**High**	**Medium**	**Medium**	**Medium**
	Source area *in situ* treatment should reduce the need for long-term management of naphthalene. ICs are assumed not to be needed based on the short time period to reach preliminary RGs.	The ISCO process should permanently destroy a significant mass of naphthalene within weeks under favorable conditions, resulting in harmless end products. ISCO may increase concentration of dissolved metals in treatment area.	The ISCO process would result in rapid mass destruction of naphthalene; however, it poses some risk to site workers. Hazardous reagents must be transported through the community. The environmental impact would be minimal during the ISCO reagent injection process. The preliminary RGs at AOC 1 are expected to be achieved the quickest for this alternative than for the others.	This alternative involves the design and implementation of a chemical oxidation remediation process. Equipment for injection of ISCO (direct-push drilling equipment) is readily available. Achieving a uniform distribution of injection material is a potential concern; however, during the design phase the soil types will be reviewed and the appropriate spacing and frequency of injection points will be developed. ISCO has already been implemented successfully at numerous Alameda Point sites.	The present-value cost of this alternative is $504,000, which is comparable to Alternative AOC 1-2. Refer to Table 11-16 for a cost summary breakdown of Alternative AOC 1-5.

Note:
* based on net present value

Acronyms/Abbreviations:
AOC – area of concern
IC – institutional control
ISB – *in situ* bioremediation
ISCO – *in situ* chemical oxidation
MNA – monitored natural attenuation
NCP – national oil and hazardous substances pollution contingency plan
O&M – operation and maintenance
RG – remediation goal

Table 11-14
Cost Estimate Summary for Alternative AOC 1-2: MNA and ICs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$50,000			$50,000
Initial investigation/predesign sampling (15 borings)	$33,000			$33,000
Preconstruction survey	$5,000			$5,000
USA notification and utility locating	$2,000			$2,000
Subtotal Remedial Design Costs With Markups[a]				**$90,000**
Capital Costs				
Install monitoring wells (3 wells)	$29,000			$29,000
Subtotal Capital Costs With Markups[a]				**$29,000**
O&M Costs				
Long-term groundwater monitoring (average cost for 10 years)		$11,200		$112,000
ICs and reporting (10 years)		$3,000		$30,000
Annual groundwater monitoring report		$10,000		$100,000
5-year reviews			$24,000	$48,000
Subtotal O&M Costs With Markups[a]				**$290,000**
Subtotal With Markups[a]				**$409,000**
Contingency (20%)				$82,000
TOTAL COST				**$491,000**
Present Value of Alternative AOC 1-2 (based on 2006 dollars)[b]				**$439,000**

Notes:

[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit

[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:

AOC – area of concern
IC – institutional control
MNA – monitored natural attenuation
O&M – operation and maintenance
USA – Underground Service Alert

Table 11-15
Cost Estimate Summary for Alternative AOC 1-3:
Source Removal, Enhanced Aerobic ISB, and ICs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$50,000			$50,000
Initial investigation/predesign sampling (15 borings)	$33,000			$33,000
Preconstruction survey	$5,000			$5,000
USA notification and utility locating	$2,000			$2,000
Subtotal Remedial Design Costs With Markups[a]				**$90,000**
Capital Costs				
Install monitoring wells (3 wells)	$29,000			$29,000
Excavation/dewatering	$33,000			$33,000
Off-site waste disposal (830 bcy)	$84,000			$84,000
Waste profile soil sampling	$7,000			$7,000
GAC treatment of dewatering water	$38,000			$38,000
Treatment system (influent/effluent) sampling	$16,000			$16,000
Clean fill soil, backfilling, enhanced aerobic ISB (ORC)	$213,000			$213,000
Confirmation sampling	$12,000			$12,000
Subtotal Capital Costs With Markups[a]				**$432,000**
O&M Costs				
Long-term groundwater monitoring (average cost for 10 years)		$8,900		$89,000
ICs and reporting (10 years)		$3,000		$30,000
Annual groundwater monitoring report		$10,000		$100,000
5-year reviews			$24,000	$48,000
Subtotal O&M Costs With Markups[a]				**$267,000**
Subtotal With Markups[a]				**$789,000**
Contingency (20%)				$158,000
TOTAL COST				**$947,000**
Present Value of Alternative AOC 1-3 (based on 2006 dollars)[b]				**$884,000**

Notes:
[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit
[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Table 11-15 (continued)

Acronyms/Abbreviations:
AC – asphaltic concrete
AOC – area of concern
bcy – bank (in place) cubic yard
GAC – granular activated carbon
IC – institutional control
ISB – *in situ* bioremediation
MNA – monitored natural attenuation
O&M – operation and maintenance
ORC – oxygen release compound
USA – Underground Service Alert

Table 11-16
Cost Estimate Summary for Alternative AOC 1-5: ISCO

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$70,000			$70,000
Initial investigation/predesign sampling (15 borings)	$33,000			$33,000
Preconstruction survey	$5,000			$5,000
USA notification and utility locating	$2,000			$2,000
Subtotal Remedial Design Costs With Markups[a]				**$110,000**
Capital Costs				
Install monitoring wells (3 wells)	$29,000			$29,000
ISCO source treatment (7,500 square feet)	$100,000			$100,000
Field oversight, project management, markup	$73,000			73,000
Monitor ISCO treatment (6 months)	$28,000			$28,000
Subtotal Capital Costs With Markups[a]				**$230,000**
O&M Costs				
Long-term groundwater monitoring (2 years)		$23,000		$46,000
Annual groundwater monitoring report		$10,000		$20,000
Closeout report				$28,000
Subtotal O&M Costs With Markups[a]				**$94,000**
Subtotal With Markups[a]				**$434,000**
Contingency (20%)				$86,000
TOTAL COST				**$520,000**
Present Value of Alternative AOC 1-5 (based on 2006 dollars)[b]				**$504,000**

Notes:

[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit

[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.5 percent (OMB 2006) was used

Acronyms/Abbreviations:

AOC – area of concern
ISCO – *in situ* chemical oxidation
MNA – monitored natural attenuation
O&M – operation and maintenance
USA – Underground Service Alert

Table 11-17
Detailed and Comparative Analysis of Groundwater Remedial Alternatives at AOC 23 by Balancing Criteria

Alternative	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume Through Treatment	Short-Term Effectiveness	Implementability	Cost*
	Parameters considered: • residual risk at completion • long-term management of remaining contaminants • reliability of engineering controls and ICs • need to replace components • continuing repair/maintenance needs	Parameters considered: • treatment processes • amount of hazardous material • degree of reduction in toxicity, mobility, or volume through treatment • degree of irreversibility • treatment residuals	Parameters considered: • short-term risks to community • impacts on workers • environmental impacts • time until protection is achieved	Parameters considered: • technical feasibility • operational reliability • future alternative remedial options • ability to monitor effectiveness • ability to obtain governmental approvals • availability of services and materials	Parameters considered: • net present value • capital costs • O&M costs
AOC 23-1: No Action	**Low** Grab groundwater samples contained vinyl chloride above MCLs. Vinyl chloride concentrations in co-located monitoring well samples would likely be below MCLs. No well installation or sampling would be performed for the no action alternative. This alternative would not prohibit domestic use of groundwater. It would rely on natural attenuation processes to reduce vinyl chloride concentrations, but no means would be used to verify that such processes would occur.	**Low** No treatment or monitoring would be performed. Some reduction of vinyl chloride concentrations is likely to occur through natural attenuation processes. The absence of monitoring does not allow for evaluation of reduction in contaminant concentrations.	**Low** There would be no short-term risks to the community or potential impacts to workers under this alternative. No action would be taken, so there would be no short-term environmental impacts. However the alternative does not include methods to monitor environmental impacts of taking no action (vinyl chloride is a toxic contaminant). The overall time to reach preliminary RGs in the affected areas is expected to be longer for this alternative than for Alternative AOC 23-4; however absence of monitoring does not allow for evaluation of reduction in contaminant concentrations.	**High** Easy to implement; however, no ability to monitor effectiveness.	**High** There would be no costs associated with Alternative AOC 23-1.
AOC 23-2: MNA and ICs	**Medium** For this alternative, natural attenuation processes would be expected to reduce vinyl chloride concentrations at the site. The cancer risk associated with vinyl chloride in groundwater currently is within the risk management range. Additional groundwater investigation and sampling is warranted in AOC 23 to assess the timeframe for achieving preliminary RGs without enhancements. MNA is assumed to be effective in achieving preliminary RGs in groundwater within a reasonable timeframe. ICs would be effective in preventing or limiting access or exposure to impacted groundwater.	**Medium** No active treatment would be performed. The vinyl chloride concentrations would continue to decrease through natural attenuation processes. Monitoring would help to evaluate the reduction in vinyl chloride concentrations.	**Medium** MNA and IC implementation would pose a minimal risk to workers, community and environment. The overall time to reach preliminary RGs in the affected areas is expected to be longer for this alternative than for Alternative AOC 23-4. ICs would achieve short term protection.	**High** MNA would be easily implementable.	**Medium** The present-value cost of this alternative is $497,000, which is lower than Alternative AOC 23-4. Refer to Table 11-18 for a cost summary breakdown of Alternative AOC 23-2.
AOC 23-4: ISCO	**High** *In situ* treatment in the affected areas should reduce the need for long-term management of vinyl chloride. ICs are assumed not to be needed based on the short time period to reach preliminary RGs.	**High** The ISCO process would permanently destroy a significant mass of vinyl chloride within weeks, resulting in harmless end products. ISCO may increase concentrations of dissolved metals in treatment areas.	**Medium** The ISCO process would result in rapid mass destruction of vinyl chloride; however, it poses some risk to site workers. Hazardous reagents must be transported through the community. The environmental impact would be minimal during the ISCO reagent injection process. The preliminary RGs in the affected areas at AOC 23 are expected to be achieved the quickest for this alternative than for the others.	**Medium** This alternative involves the design and implementation of a chemical oxidation remediation process. Equipment for injection of ISCO (direct-push drilling equipment) is readily available. Achieving a uniform distribution of injection material is a potential concern; however, during the design phase the soil types will be reviewed and the appropriate spacing and frequency of injection points will be developed. ISCO has already been implemented successfully at numerous Alameda Point sites.	**Low** The present-value cost of this alternative is $849,000, which is higher than Alternative AOC 23-2. Refer to Table 11-19 for a cost summary breakdown of Alternative AOC 23-4.

Note:
* based on net present value

Acronyms/Abbreviations:
AOC – area of concern
IC – institutional control
ISCO – *in situ* chemical oxidation
MCL – maximum contaminant level
MNA – monitored natural attenuation
O&M – operation and maintenance
RG – remediation goal

Table 11-18
Cost Estimate Summary for Alternative AOC 23-2: MNA and ICs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$50,000			$50,000
Initial investigation/predesign sampling (20 borings)	$43,000			$43,000
Preconstruction survey	$5,000			$5,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs With Markups[a]				**$100,000**
Capital Costs				
Install monitoring wells (5 wells)	$44,000			$44,000
Subtotal Capital Costs With Markups[a]				**$44,000**
O&M Costs				
Long-term groundwater monitoring (average cost for 10 years)		$14,000		$140,000
ICs and reporting (10 years)		$3,000		$30,000
Annual groundwater monitoring report		$10,000		$100,000
5-year reviews			$24,000	$48,000
Subtotal O&M Costs With Markups[a]				**$318,000**
Subtotal With Markups[a]				**$462,000**
Contingency (20%)				$92,000
TOTAL COST				**$554,000**
Present Value of Alternative AOC 23-2 (based on 2006 dollars)[b]				**$497,000**

Notes:

[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit

[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:

AOC – area of concern
IC – institutional control
MNA – monitored natural attenuation
O&M – operation and maintenance
USA – Underground Service Alert

Table 11-19
Cost Estimate Summary for Alternative AOC 23-4: ISCO

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$70,000			$70,000
Initial investigation/predesign sampling (20 borings)	$43,000			$43,000
Preconstruction survey	$5,000			$5,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs With Markups[a]				**$120,000**
Capital Costs				
Install monitoring wells (5 wells)	$44,000			$44,000
ISCO source treatment (75,000 sf and 5,000 sf)	$250,000			$250,000
Field oversight, project management, markup	$178,000			$178,000
Monitor ISCO treatment (6 months)	$32,000			$32,000
Subtotal Capital Costs With Markups[a]				**$504,000**
O&M Costs				
Long-term groundwater monitoring (2 years)		$27,500		$55,000
Annual groundwater report		$10,000		$20,000
Closeout report				$28,000
Subtotal O&M Costs With Markups[a]				**$103,000**
Subtotal With Markups[a]				**$727,000**
Contingency (20%)				$145,000
TOTAL COST				**$872,000**
Present Value of Alternative AOC 23-4 (based on 2006 dollars)[b]				**$849,000**

Notes:

[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit

[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.5 percent (OMB 2006) was used

Acronyms/Abbreviations:

AOC – area of concern
ISCO – *in situ* chemical oxidation
MNA – monitored natural attenuation
O&M – operation and maintenance
sf – square feet
USA – Underground Service Alert

Bechtel Environmental, Inc.

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ALAMEDA POINT
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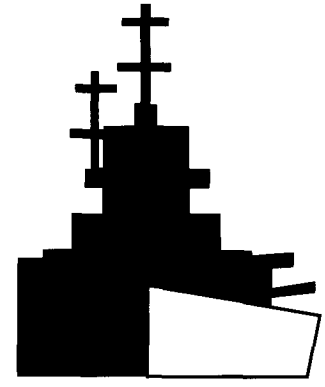
PROGRAM



FINAL
REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT IR SITE 35, AREAS OF CONCERN IN TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105-1
April 2007

Volume II of V

Submitted to:

Department of the Navy
Base Realignment and Closure
Program Management Office West

1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

FINAL
REMEDIAL INVESTIGATION/ FEASIBILITY STUDY REPORT IR SITE 35, AREAS OF CONCERN IN TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105-1
April 2007
Volume II of V

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K4 Letter of June 23, 2006, from DTSC to Navy

K5 1999 Memorandum of Agreement Between the Navy, California State Historic Preservation Officer, and Advisory Council on Alameda Historic District

L COST DEVELOPMENT SUMMARIES

M RESPONSES TO COMMENTS ON DRAFT RI/FS REPORT

N MEMORANDUM OF AGREEMENT BETWEEN THE DEPARTMENT OF THE NAVY AND THE CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY DEPARTMENT OF TOXIC SUBSTANCES CONTROL (on CD)

O PRINCIPLES AND PROCEDURES FOR SPECIFYING, MONITORING AND ENFORCEMENT OF LAND-USE CONTROLS AND OTHER POST-ROD ACTIONS (on CD)

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A-10 IR Site 35 Aerial View, 1985

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A-12 IR Site 35 Aerial View, 1993

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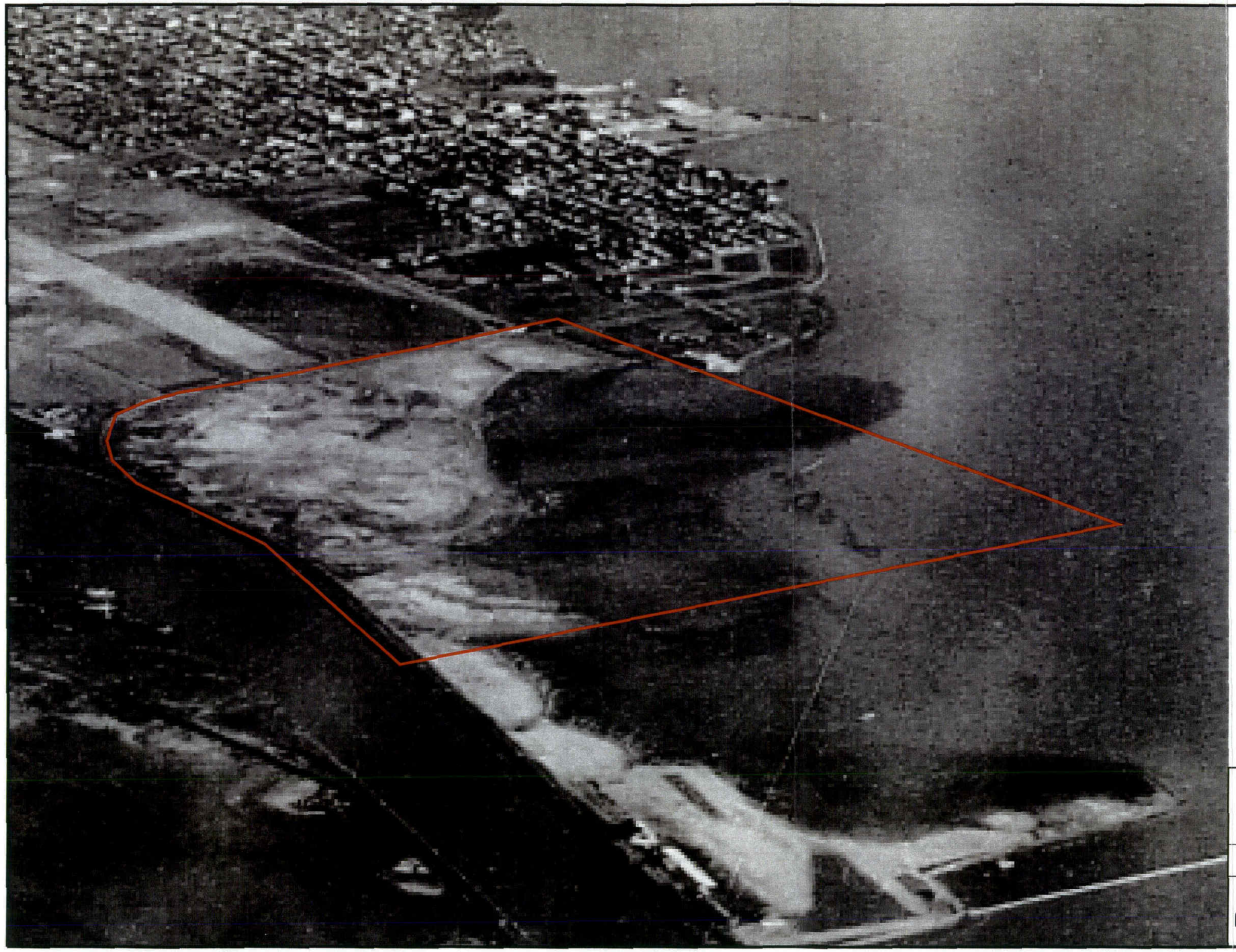


LEGEND

APPROXIMATE EXTENT OF IR SITE 35

SOURCE: PACIFIC AERIAL SURVEYS. 1930 NOT TO SCALE.

N

RI/FS Report for IR Site 35

Figure A-1

IR Site 35 Aerial View, 1930

Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 6/28/06
File No.:077E14381
Job No.: 23818-077
Rev No.: B

LEGEND

IR SITE 35 AOCs AND DATA GAP AREAS

SOURCE: UNITED STATES NAVAL RESERVE. 1937. PROPOSED NAVAL AIR STATION AND SUPPLY DEPOT SITE, SOUTH WESTERN HARBOR AREA, ALAMEDA AND OAKLAND. SCALE 1:12000. SEPTEMBER.

500 0 500 Feet

N

RI/FS Report for IR Site 35

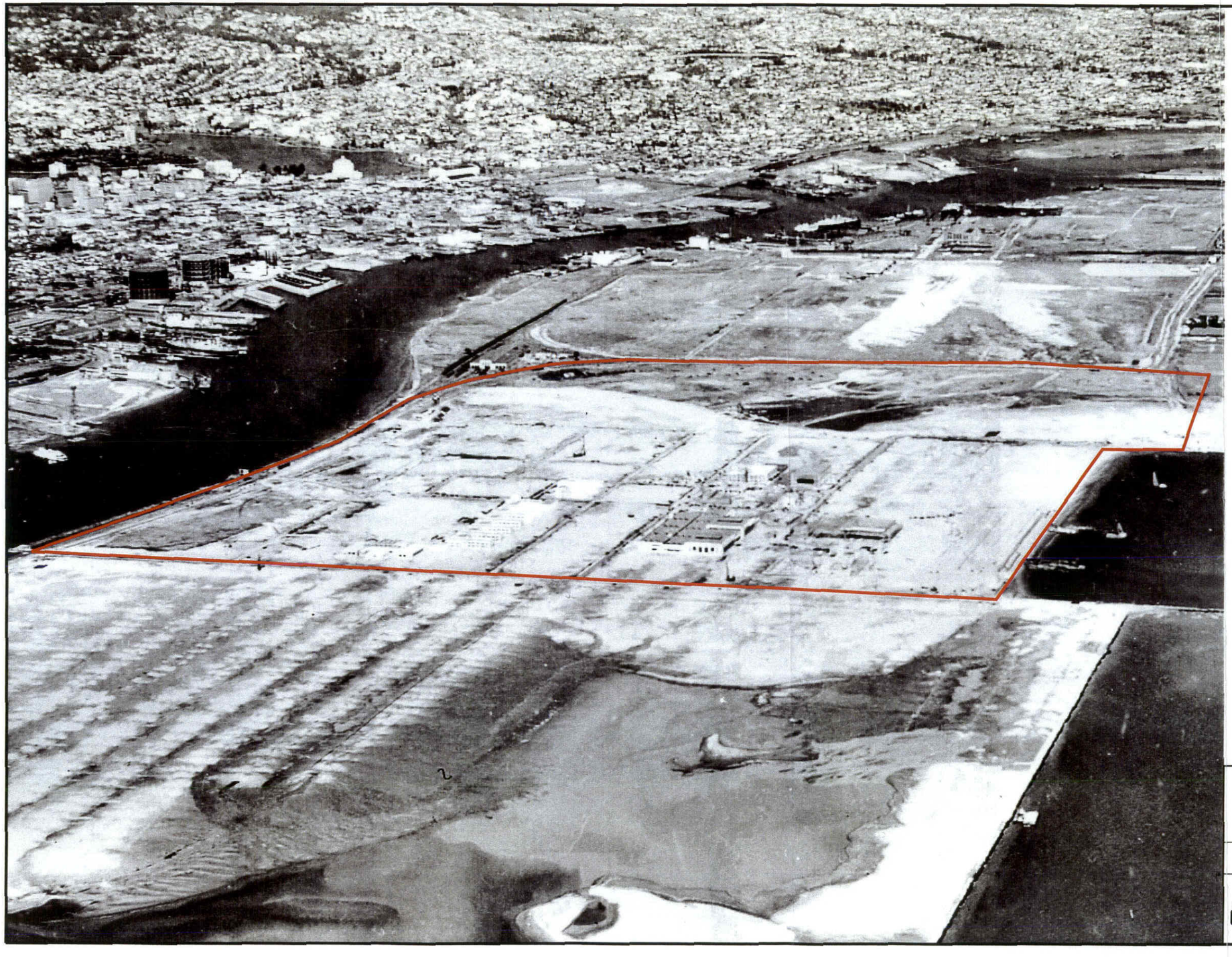
Figure A-2

IR Site 35 Aerial View, 1937

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 077E14382
Job No.: 23818-077
Rev No.: C



LEGEND

APPROXIMATE EXTENT OF IR SITE 35

SOURCE: PACIFIC AERIAL SURVEYS. 1940 NOT TO SCALE.

N

RI/FS Report for IR Site 35

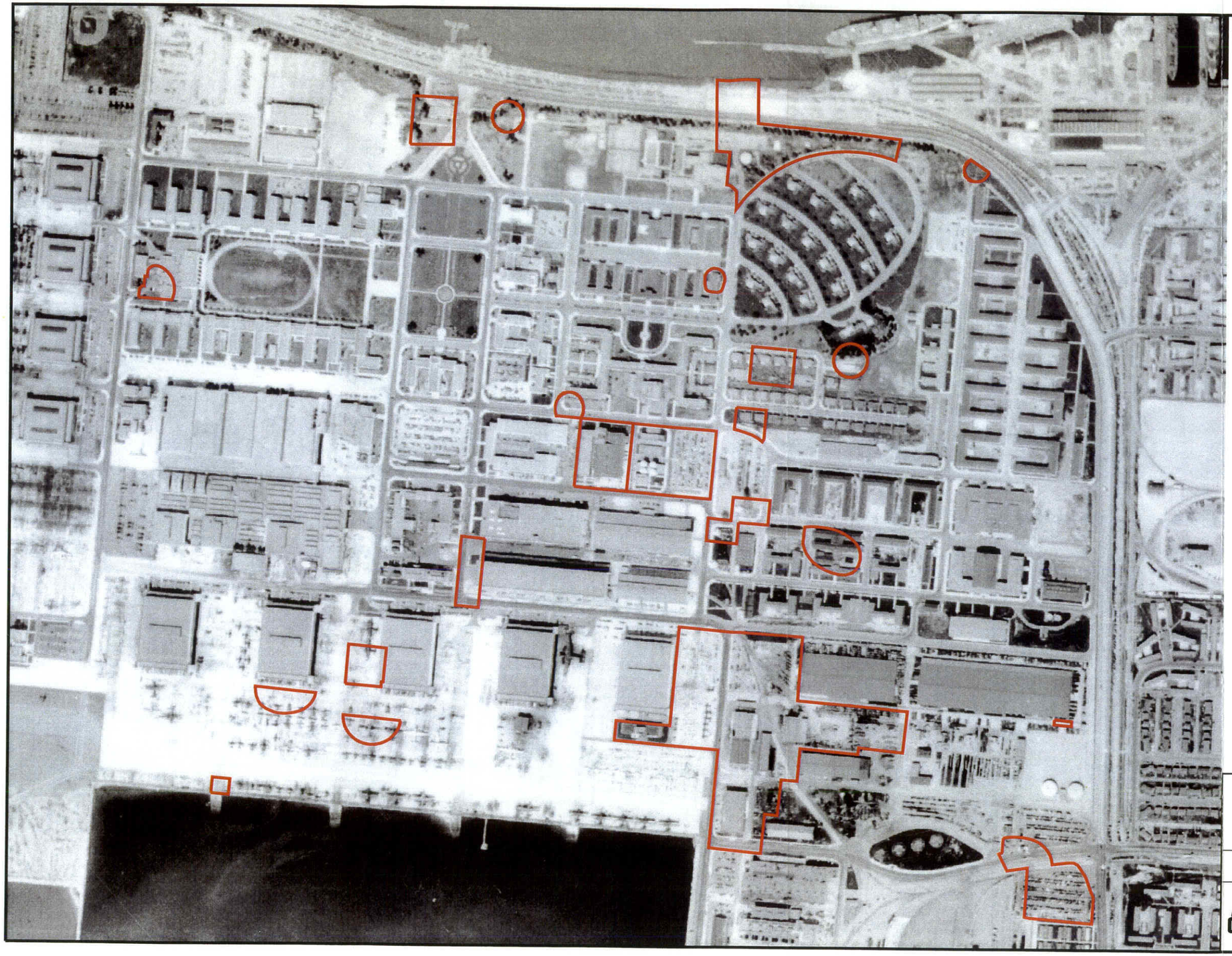
Figure A-3

IR Site 35 Aerial View, 1940

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/28/06
File No.:077E14383
Job No.: 23818-077
Rev No.: B



LEGEND

IR SITE 35 AOCs AND DATA GAP AREAS

SOURCE: PACIFIC AERIAL SURVEYS. 1947. SCALE 1:6000..

500 0 500 Feet

N

RI/FS Report for IR Site 35

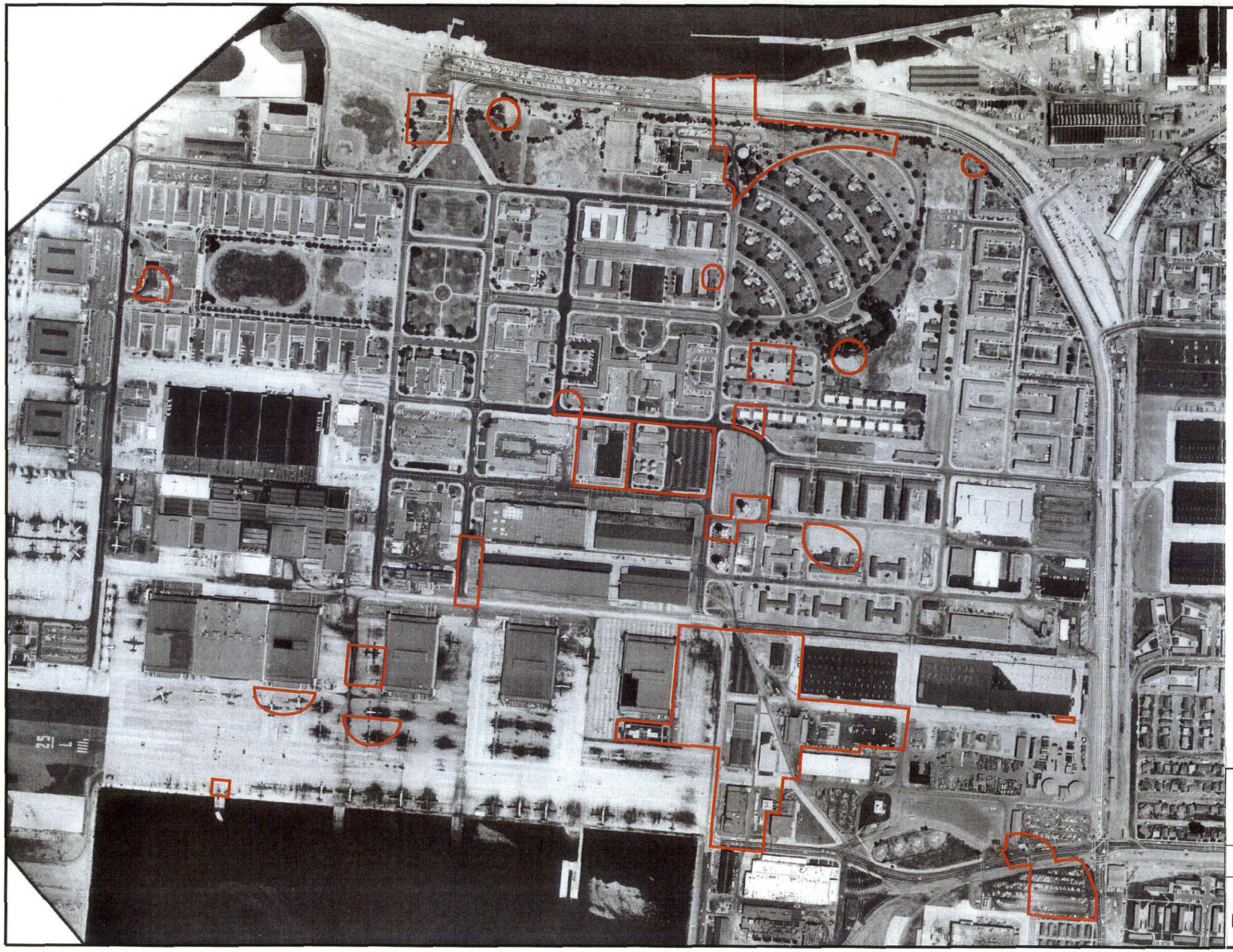
Figure A-4

IR Site 35 Aerial View, 1947

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 077E14384
Job No.: 23818-077
Rev No.: C



LEGEND

IR SITE 35 AOCs AND DATA GAP AREAS

SOURCE: PACIFIC AERIAL SURVEYS. 1959. SCALE 1:20000.

500 0 500 Feet

N

RI/FS Report for IR Site 35

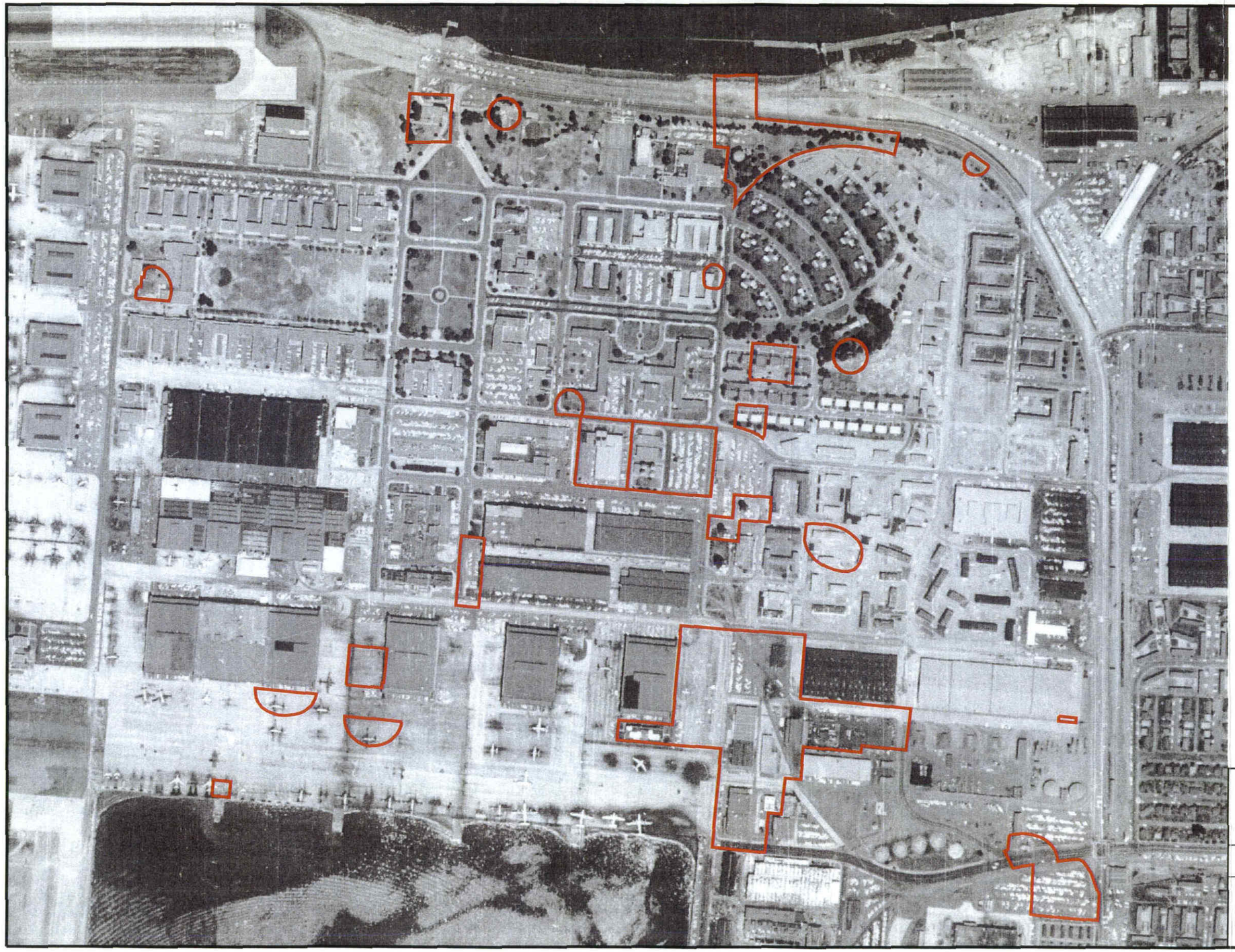
Figure A-5

IR Site 35 Aerial View, 1959

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 077E14385
Job No.: 23818-077
Rev No.: C



LEGEND

IR SITE 35 AOCs AND DATA GAP AREAS

SOURCE: PACIFIC AERIAL SURVEYS. 1963. SCALE 1:20000.

500 0 500 Feet

N

RI/FS Report for IR Site 35

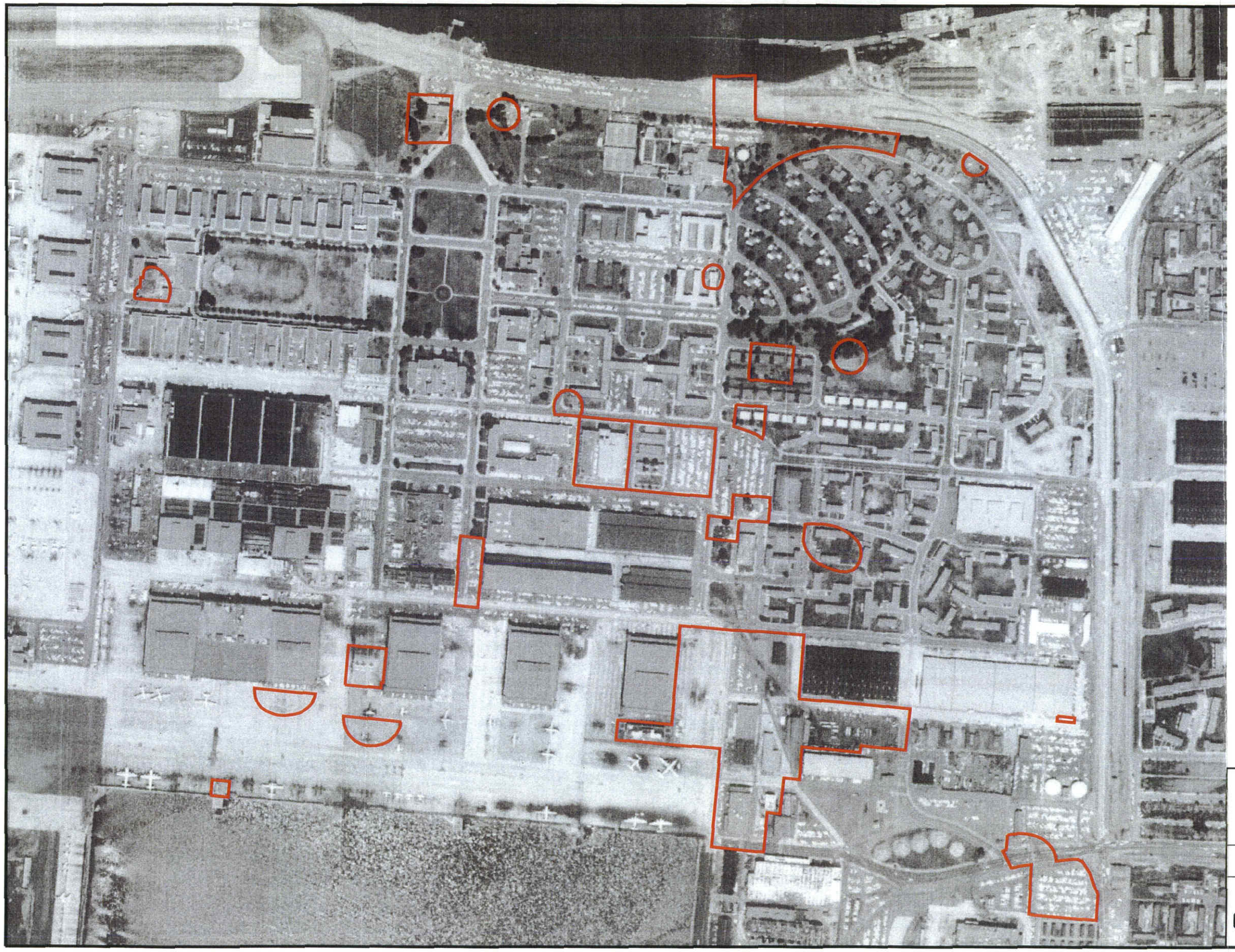
Figure A-6

IR Site 35 Aerial View, 1963

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 077E14386
Job No.: 23818-077
Rev No.: C



LEGEND

IR SITE 35 AOCs AND DATA GAP AREAS

SOURCE: PACIFIC AERIAL SURVEYS. 1966. SCALE 1:20000.

500 0 500 Feet

N

RI/FS Report for IR Site 35

Figure A-7

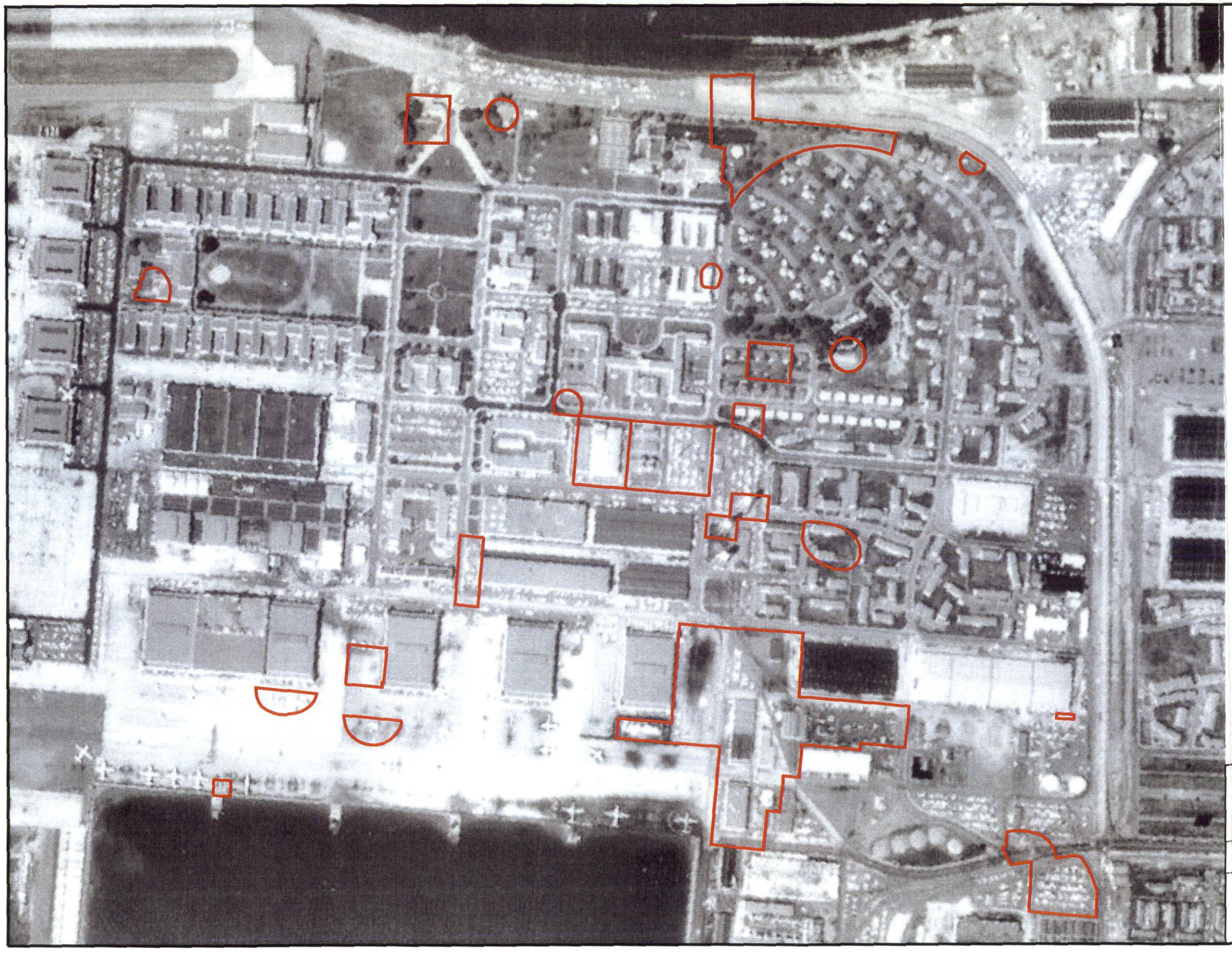
IR Site 35 Aerial View, 1966

Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 2/16/07
File No.: 077E14387
Job No.: 23818-077
Rev No.: C



LEGEND

IR SITE 35 AOCs AND DATA GAP AREAS

SOURCE: UNITED STATES GEOLOGICAL SURVEY. 1968. SCALE 1:3000.

500 0 500 Feet

N

RI/FS Report for IR Site 35

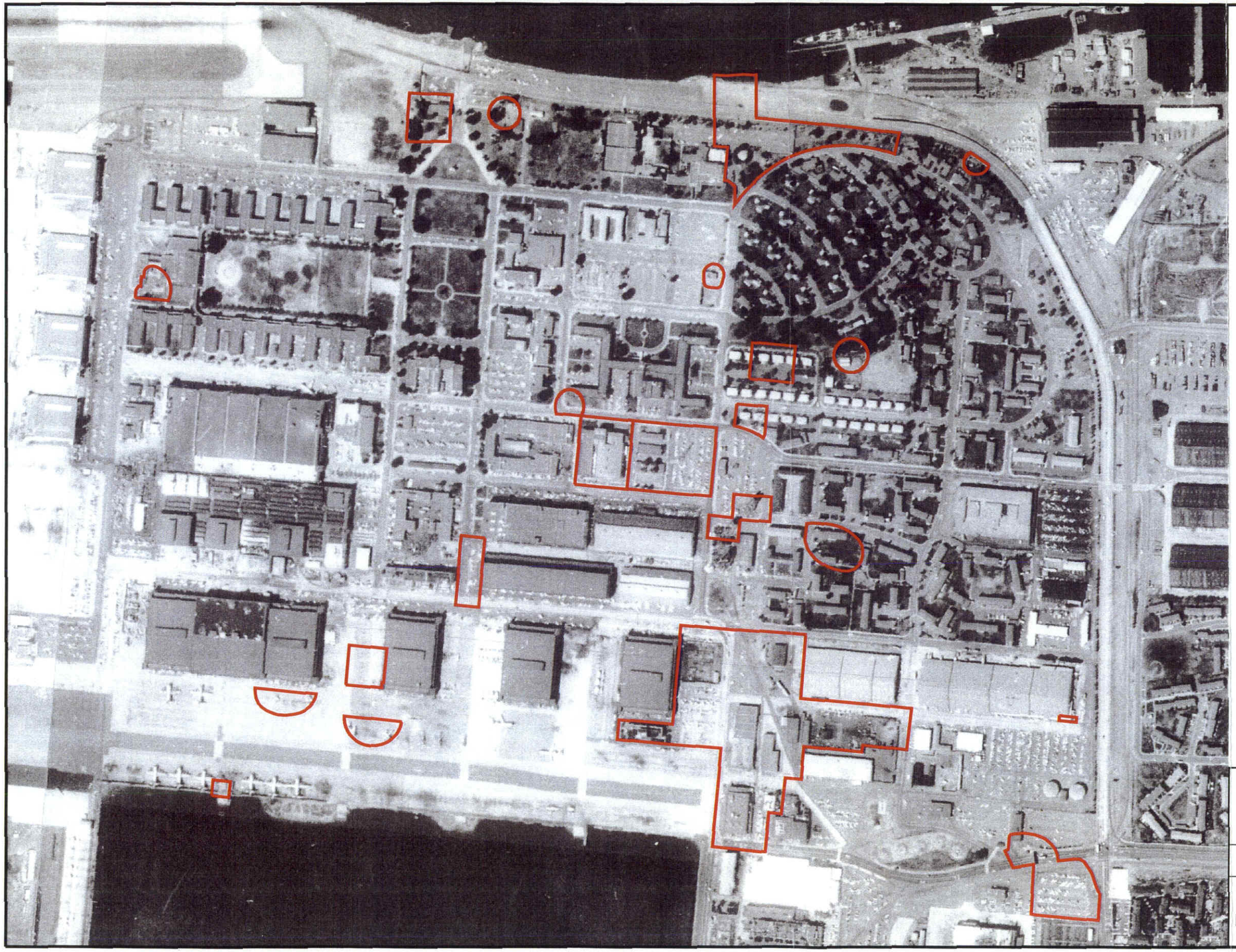
Figure A-8

IR Site 35 Aerial View, 1968

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 077E14388
Job No.: 23818-077
Rev No.: C



LEGEND

IR SITE 35 AOCs AND DATA GAP AREAS

SOURCE: PACIFIC AERIAL SURVEYS. 1975. SCALE 1:6000.

500 0 500 Feet

N

RI/FS Report for IR Site 35

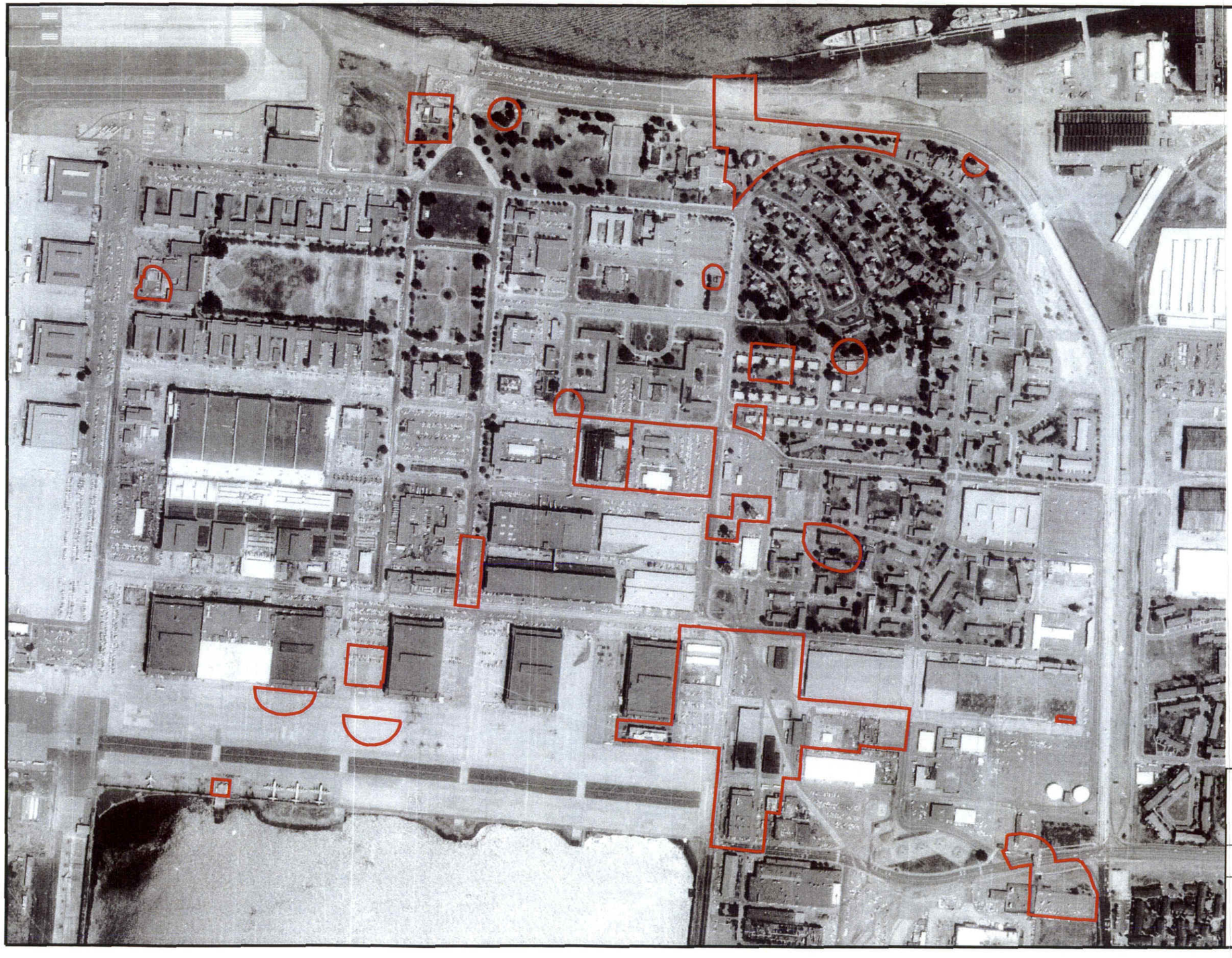
Figure A-9

IR Site 35 Aerial View, 1975

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 077E14389
Job No.: 23818-077
Rev No.: C



LEGEND

IR SITE 35 AOCs AND DATA GAP AREAS

SOURCE: PACIFIC AERIAL SURVEYS. 1985. SCALE 1:6000.

500 0 500 Feet

N

RI/FS Report for IR Site 35

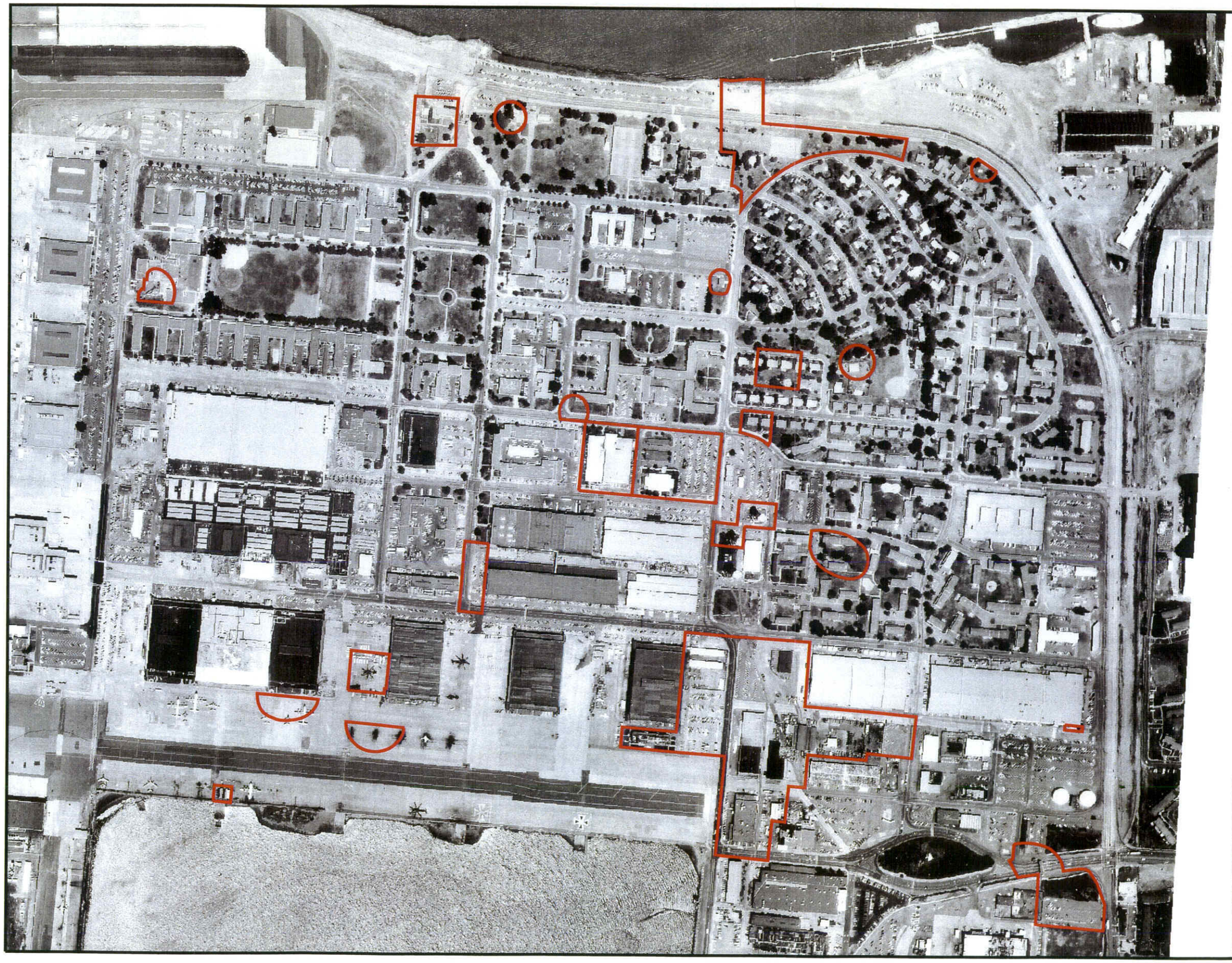
Figure A-10

IR Site 35 Aerial View, 1985

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 077E14390
Job No.: 23818-077
Rev No.: C



LEGEND

IR SITE 35 AOCs AND DATA GAP AREAS

SOURCE: PACIFIC AERIAL SURVEYS. 1990. SCALE 1:6000.

500 0 500 Feet

N

RI/FS Report for IR Site 35

Figure A-11

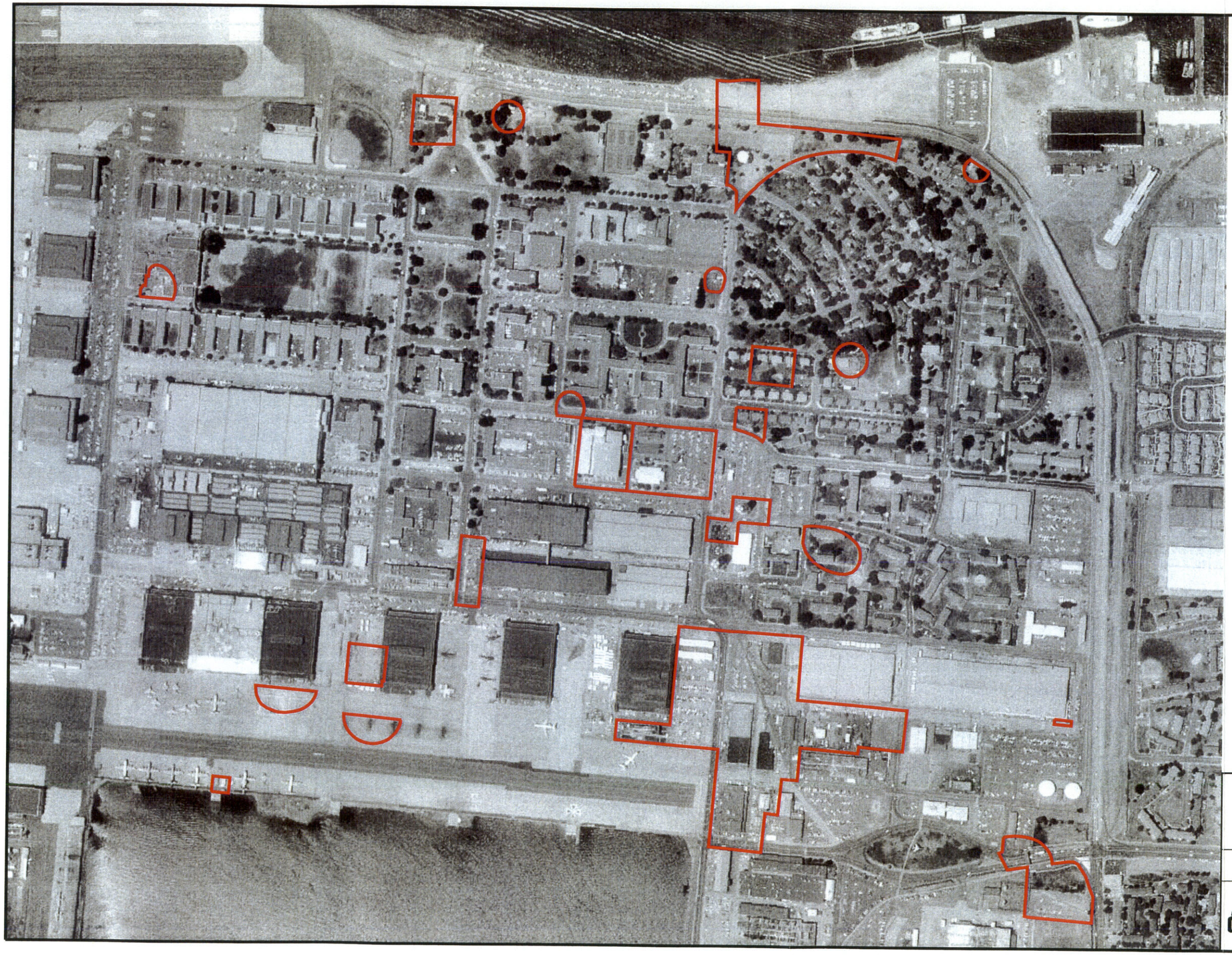
IR Site 35 Aerial View, 1990

Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 2/16/07
File No.: 077E14391
Job No.: 23818-077
Rev No.: C



LEGEND

IR SITE 35 AOCs AND DATA GAP AREAS

SOURCE: TOWILL, INC. 1993. SCALE 1:6000.

500 0 500 Feet

N

RI/FS Report for IR Site 35

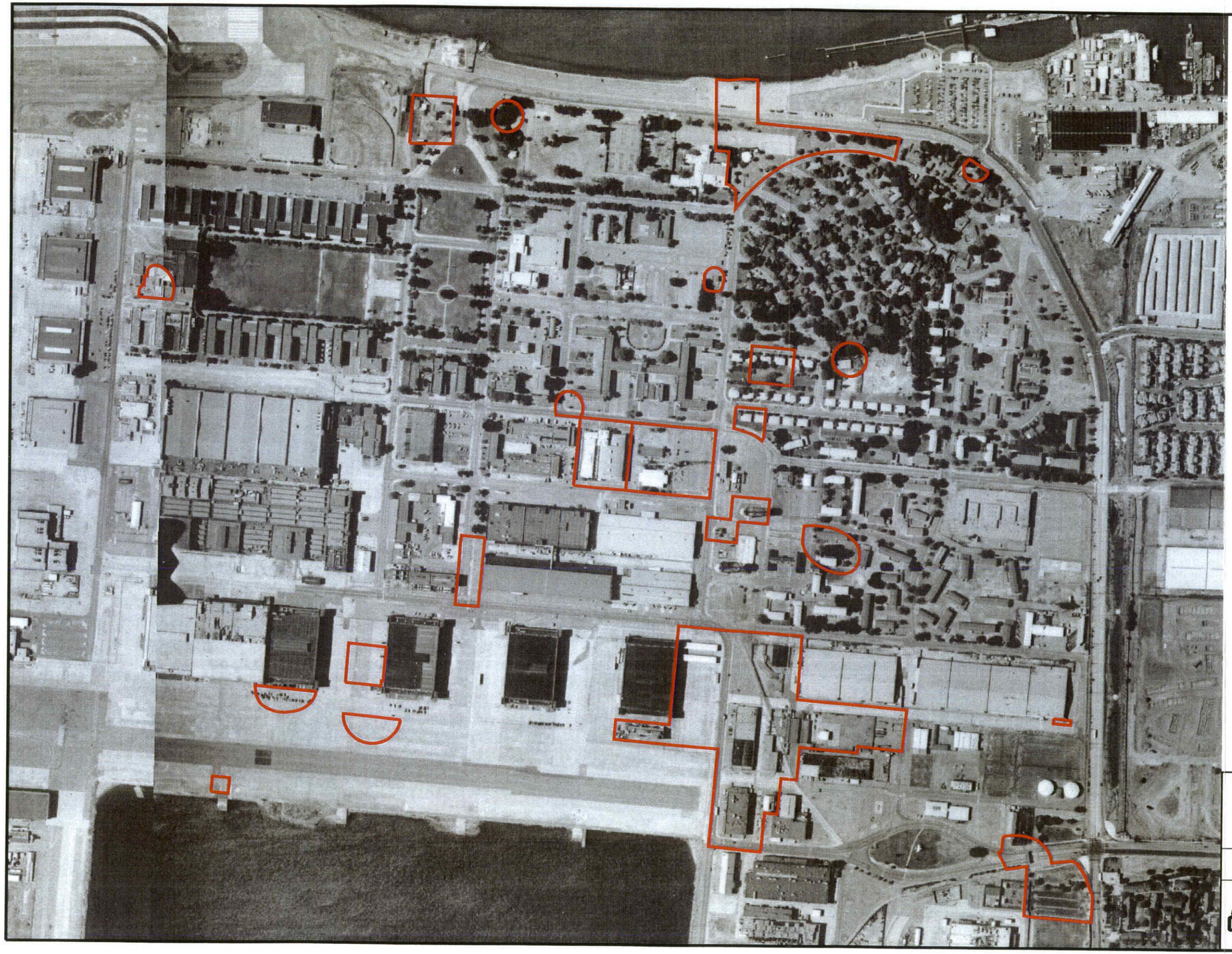
Figure A-12

IR Site 35 Aerial View, 1993

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 077E14392
Job No.: 23818-077
Rev No.: C



LEGEND

IR SITE 35 AOCs AND DATA GAP AREAS

SOURCE: PACIFIC AERIAL SURVEYS. 2002 SCALE 1:6000.

500 0 500 Feet

N

RI/FS Report for IR Site 35

Figure A-13

IR Site 35 Aerial View, 2002

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 077E14393
Job No.: 23818-077
Rev No.: C

APPENDIX B

ANALYTICAL DATA TABLES FROM PREVIOUS INVESTIGATIONS

N00236.002712
ALAMEDA POINT
SSIC NO. 5090.3

APPENDIX B – ANALYTICAL DATA TABLES FROM PREVIOUS INVESTIGATIONS

THIS APPENDIX IS CONTAINED IN ELECTRONIC FORMAT ONLY

TO VIEW THE DATA, CONTACT:

DIANE C. SILVA
RECORDS MANAGEMENT SPECIALIST
NAVAL FACILITIES ENGINEERING COMMAND SOUTHWEST
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132

TELEPHONE: (619) 532-3676

APPENDIX C

FIELD METHODOLOGY

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ACRONYMS/ABBREVIATIONS

AOC	area of concern
APPL	Agriculture and Priority Pollutants Laboratories, Inc.
ASTM	American Society for Testing and Materials
BEI	Bechtel Environmental, Inc.
bgs	below ground surface
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	chain-of-custody
FID	flame ionization detector
FS	feasibility study
FWBZ	first water-bearing zone
IDW	investigation-derived waste
IR	Installation Restoration (Program)
MSL	mean sea level
NRC	NRC Environmental Services
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PPE	personal protective equipment
PVC	polyvinyl chloride
redox	oxidation-reduction
RI	remedial investigation
SAP	sampling and analysis plan
SIM	selected ion monitoring
SOP	standard operating procedure
SVOC	semivolatile organic compound
TAL	target analyte list
TDS	total dissolved solids
TPH	total petroleum hydrocarbons
U.S. EPA	United States Environmental Protection Agency
VOC	volatile organic compound

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Appendix C
FIELD METHODOLOGY

This appendix presents the procedures and protocols followed by Bechtel Environmental, Inc. (BEI), and its subcontractors during remedial investigation (RI) field activities at Installation Restoration (IR) Program Site 35, Alameda Point.

C1 SCOPE OF FIELD ACTIVITIES

Field activities for the RI were conducted from November 21, 2005, through February 2, 2006. All field activities were performed in accordance with the Work Plan (BEI 2006), which included separate attachments for the Sampling and Analysis Plan (SAP) (includes Field Sampling Plan and Quality Assurance Project Plan), Data Management Plan, Investigation-Derived Waste (IDW) Management Plan, Site-Specific Safety and Health Plan Supplement, and Human-Health Risk Assessment Work Plan. Various RI activities were conducted at IR Site 35 to investigate soil and groundwater and collect samples, as shown in Table C-1.

The following RI activities conducted at IR Site 35 are discussed in subsequent sections of this appendix:

- use of standard operating procedures (SOPs)
- planning and notification
- land survey
- utility clearance and geophysical survey
- field instrumentation and calibration
- direct-push drilling
- soil sampling
- discrete groundwater sampling
- monitoring well sampling
- sediment sampling
- equipment decontamination
- borehole abandonment
- field documentation
- IDW management and disposal
- demobilization

Table C-1
Remedial Investigation Activities and Rationales for IR Site 35

Medium Investigated	RI Activity	Rationale (and number of borings/wells/locations)
Soil	Direct-push and hand-auger sampling	Characterize VOCs, TPH, SVOCs, PAHs, pesticides, PCBs, and metals in soil (127 borings)
	Direct-push sampling	Characterize geotechnical properties in soil (9 borings)
Groundwater	Direct-push sampling	Characterize VOCs, TPH, SVOCs, PAHs, pesticides, PCBs, and/or metals in the FWBZ (79 borings)
	Direct-push sampling	Characterize groundwater chemistry (total dissolved solids) in the FWBZ (76 borings)
	Groundwater sampling from monitoring well	Characterize VOCs, metals, and groundwater chemistry in the FWBZ (one existing well)
Sediment	Hand-auger sampling	Characterize lead in storm sewer manhole sediments (two locations)

Acronyms/Abbreviations:
FWBZ – first water-bearing zone
IR – Installation Restoration (Program)
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
RI – remedial investigation
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

C2 STANDARD OPERATING PROCEDURES

Field activities were conducted in accordance with the following Comprehensive Long-Term Environmental Action Navy (CLEAN) Program SOPs (BNI 2004):

- SOP 2, Drilling Method Evaluation
- SOP 3, Borehole Logging
- SOP 4, Soil Sampling
- SOP 6, Instrument Calibration and Use
- SOP 7, Water and Free Product Level Measurement in Wells
- SOP 8, Groundwater Sampling
- SOP 9, Sample Containers, Preservation, and Handling
- SOP 10, Sample Custody, Transfer, and Shipment
- SOP 11, Decontamination of Equipment
- SOP 13, Destruction of Boreholes and Wells
- SOP 16, gINT System: Borehole and Well Log Data Entry

- SOP 17, Logbook Protocols
- SOP 19, Shallow Freshwater Sediment Sampling
- SOP 22, IDW Management
- SOP 33, Activity Hazard Analysis

The CLEAN Program Quality Manager has provided controlled copies of all CLEAN Program SOPs to the Navy, the California Environmental Protection Agency Department of Toxic Substances Control, the San Francisco Bay Regional Water Quality Control Board, and the United States Environmental Protection Agency (U.S. EPA) Region 9. Copies of the SOPs can be made available to other document reviewers upon request through the Navy Remedial Project Manager. Field personnel were required to acknowledge receipt of SOPs, and copies of all applicable SOPs were available on-site. In addition, technical staff members were required to review procedures prior to the RI fieldwork.

C3 PLANNING AND NOTIFICATION

Planning and agency notification were key steps in preparing for field activities. The RI process for IR Site 35 was developed in meetings and telephone conference calls with the regulatory agencies, the Restoration Advisory Board, and the Navy. Additionally, the Alameda County Public Works Agency Water Resources Section and the Underground Service Alert of northern California were notified before intrusive activities were initiated at the site.

Orientation meetings were conducted with subcontractors before beginning fieldwork. These meetings included visual inspections of subcontractor tools and equipment to verify that they were in good working order. Visual inspections were conducted to assure that no equipment leaked oil, grease, or hydraulic fluid, and that the requisite health and safety equipment was present.

C4 LAND SURVEY

From November 21 through 23, 2005, the BEI land survey subcontractor (Kier & Wright Civil Engineers and Surveyors, Inc., of Pleasanton, California) located, marked, and surveyed soil boring locations using survey coordinates provided by BEI. Since most of the soil boring locations were moved from their original positions, a final survey of the soil boring locations was conducted by the subcontractor on December 29, 2005, except for one location that was inaccessible. The location and elevation of soil boring A23SB39 (inside the southern half of Building 66) was measured by BEI relative to the location and elevation of the nearest boring (A23SB36, outside Building 66) on January 9, 2006.

The locations surveyed by Kier & Wright Civil Engineers and Surveyors, Inc., were surveyed to the California State Plane Coordinate System North American Datum of 1983 for horizontal control, and to the National Geodetic Vertical Datum of 1988 for vertical control relative to mean sea level (MSL). The horizontal accuracy for location of

all points is ± 0.1 foot. The vertical accuracy for ground surface elevation is ± 0.01 foot. The survey data is presented in Attachment C1.

C5 UTILITY CLEARANCE AND GEOPHYSICAL SURVEY

To assure that proposed borings were not located on top of subsurface obstructions or buried utilities, Underground Service Alert of northern California was consulted in conjunction with the BEI geophysical subcontractor (Advanced Geological Services of San Anselmo, California). The geophysical subcontractor used ground-penetrating radar and electromagnetic line-locating methods to evaluate the 137 soil boring locations. The geophysical clearance at IR Site 35 was conducted between November 21 and December 7, 2005, before initiating subsurface investigation activities.

To clear an area within a 5-foot radius of each subsurface sampling location, the following steps were taken.

- Underground Service Alert was notified and meetings were scheduled with interested utility companies that were potentially affected by planned drilling activities.
- Available Navy, Alameda Point, and City of Alameda utility maps were reviewed by the geophysical subcontractor.
- Both the utility companies and the geophysical subcontractor marked the subsurface utility lines in the immediate vicinity of each proposed sampling location with color-coded survey paint. When a potential obstruction was detected, a new borehole location was marked by the geophysical subcontractor and the old location was abandoned.
- After pavement was cored (if applicable), a hand auger was advanced to approximately 4 to 5 feet below ground surface (bgs) to confirm underground utility clearance. No utilities were encountered during these hand-auguring activities.

C6 FIELD INSTRUMENTATION AND CALIBRATION

Both health-and-safety and groundwater instruments were used during field activities. Each instrument type required calibration.

C6.1 Safety and Health Instruments

For safety and health purposes, the borehole (or auger collar) and the worker's breathing zone were monitored during intrusive activities using a flame ionization detector (FID). Additionally, the breathing zone was monitored immediately after the protective cover and/or well casing cap was opened during groundwater sampling. As an additional safety and health precaution during field activities, the borehole (or auger collar) and worker's breathing zone were monitored using a combustible gas indicator with an oxygen sensor during intrusive activities.

The safety and health instrumentation was calibrated in accordance with CLEAN Program Procedure SH 4.4.2, FID Instrument Operation (BNI 2004), and Navy CLEAN Program SOP 6, Attachment C, Field Screening Instruments.

C6.2 Groundwater Instruments

During the groundwater sampling of an existing monitoring well, field readings for pH, conductivity, turbidity, water temperature, oxidation-reduction (redox) potential, and dissolved oxygen were monitored during the well purge to be sure that representative formation water was sampled. The groundwater monitoring and sampling instruments were calibrated by the equipment supplier (Equipco Services of Concord, California).

C7 SOIL SAMPLING

In November and December 2005, 137 soil borings were advanced at IR Site 35. Soil samples were collected from 126 of the 137 soil borings. The BEI drilling subcontractor (ResonantSonic International of Woodland, California) advanced 137 borings using direct-push technology. All direct-push drilling activities were performed under the direction of a California Professional Geologist. The direct-push sampling method used a hydraulic hammer and the weight of the sampling vehicle to advance the sampling tool into the soil. The 2.5-inch-outside-diameter sampler was advanced to the desired depth, and soil samples were collected in 4-foot-long acetate liners supplied by the drilling subcontractor. A retractable piston inside the split-barrel sampler prevented soil from filling the liners until the desired sampling depth was reached. Sampler liners from the sampling depths designated for laboratory analysis were removed and the ends were covered with Teflon sheets, capped with plastic end caps, and labeled.

Since Area of Concern (AOC) 8 was not accessible by the direct-push drill rig and only the collection of shallow soil samples (maximum depth of 4 feet bgs) for polychlorinated biphenyl (PCB) analysis was planned for this area, the five borings in AOC 8 were manually advanced using hand augers. Soil samples were transferred from the hand augers to laboratory-supplied glass jars, and the glass jars were capped and labeled. Locations of the soil borings are shown on Figure 3-1 in the main RI/Feasibility Study (FS) Report.

Soil samples were collected at various intervals between ground surface and 12 feet bgs (depending on area-specific investigation objectives). Soil samples were submitted to an off-site analytical laboratory (Agriculture and Priority Pollutants Laboratories, Inc. [APPL] of Fresno, California) for chemical analyses, which included the following:

- volatile organic compounds (VOCs), using U.S. EPA Methods 5035A and 8260B
- purgeable-range total petroleum hydrocarbons (TPH) (as gasoline), using U.S. EPA Methods 5035A and 8015-M
- extractable-range TPH (fuel fingerprint), using U.S. EPA Method 8015B-M with silica gel cleanup

- semivolatile organic compounds (SVOCs) (non-polynuclear aromatic hydrocarbons [PAHs]), using U.S. EPA Method 8270C
- PAHs, using U.S. EPA Method 8270C with selected ion monitoring (SIM)
- pesticides, using U.S. EPA Method 8081A
- PCBs, using U.S. EPA Method 8082
- target analyte list (TAL) metals, using U.S. EPA Method 6010B/7000 Series
- hexavalent chromium, using U.S. EPA Method 7196A
- mercury, using U.S. EPA Method 7471A

Additional analyses were performed on select soil samples by a geotechnical laboratory (Environmental Geotechnology Lab of Arcadia, California), including the following:

- air permeability, using American Petroleum Institute Recommended Practice 40
- density and moisture, using American Society for Testing and Materials (ASTM) D2937 and D2216
- effective porosity, using the State Water Resources Control Board method
- grain-size distribution, using ASTM C136-96 and D422-63
- liquid limits, using ASTM D4318-00
- hydraulic conductivity, using ASTM D5084-90
- total organic carbon, using the Walkley-Black method

Samples for VOC and TPH-as-gasoline analyses were first collected from the open end of the acetate liners using the En Core sampling device, in accordance with the U.S. EPA Method 5035A. All samples for chemical analysis were placed in an ice-filled cooler for transport to the laboratory following chain-of-custody (COC) protocol. Samples for characterization of geotechnical properties were placed in a cooler for transport to a laboratory. The boreholes were backfilled completely with a neat cement grout, an approved sealing material, as outlined in SOP 13.

C8 DISCRETE GROUNDWATER SAMPLING

Discrete groundwater samples were collected from 82 temporary wellpoint locations in the first water-bearing zone (FWBZ) (Figure 3-1 in the RI/FS Report). The 1-inch-diameter polyvinyl chloride (PVC) temporary wellpoints were installed in the borings by the BEI drilling subcontractor and sampled by CLEAN 3 personnel. Depth to groundwater was generally measured before the collection of the discrete groundwater samples using an electronic water-level meter, in accordance with SOP 7.

Attempts were made to collect two discrete groundwater samples using a microbladder pump inside the temporary well and new disposable, flexible tubing that ran from the desired sampling depth to the ground surface. However, turbidity in the temporary wells resulted in the microbladder pump's filter screen becoming clogged repeatedly with silt

or other particles. As described in the SAP, Attachment A to the Work Plan (BEI 2006), the alternative method of using a peristaltic pump was utilized to collect the discrete groundwater samples. Samples were collected directly into precleaned laboratory-supplied sample containers at a low flow rate to minimize agitation of the sample and volatilization of potential analytes.

All samples for analysis were placed in an ice-filled cooler for transport to off-site laboratories following COC protocol. Discrete groundwater samples were submitted for chemical and water quality parameter analyses, which included the following:

- VOCs, using U.S. EPA Method 8260B
- purgeable-range TPH (as gasoline), using U.S. EPA Method 8015-M
- extractable-range TPH (fuel fingerprint), using U.S. EPA Method 8015B-M with silica gel cleanup
- SVOCs (non-PAHs), using U.S. EPA Method 8270C
- PAHs, using U.S. EPA Method 8270C with SIM
- pesticides, using U.S. EPA Method 8081A
- PCBs, using U.S. EPA Method 8082
- TAL metals, using U.S. EPA Method 6010B/7000 Series
- hexavalent chromium, using U.S. EPA Method 7196A
- mercury, using U.S. EPA Method 1631 (low-level detection limits for groundwater samples collected within 500 feet of the shoreline)
- total dissolved solids (TDS), using U.S. EPA Method 160.1

Groundwater samples for metals analyses were filtered in the field using disposable 0.45-micron filters prior to shipment to the laboratories. Mercury analysis was conducted by Brooks Rand, LLC, of Seattle, Washington, while the remaining analyses were performed by APPL.

C9 MONITORING WELL SAMPLING

A groundwater sample was collected from an existing well (398-MW1) located in AOC 23 (Figure 3-1 in the R/FS Report). Prior to sampling, the well was inspected for damage and evidence of tampering and gauged for depth to groundwater and total depth. Depth to groundwater was measured using an electronic water-level meter, in accordance with SOP 7.

In accordance with guidelines in SOP 8, the monitoring well was purged and sampled using a low-flow submersible bladder pump equipped with a check valve with new, disposable, flexible tubing that ran from the desired sampling depth to the ground surface. The discharge tubing used to convey water from the pump outlet to the discharge point at ground surface was new, clean, polyethylene tubing. During purging, field monitoring parameters (pH, conductivity, turbidity, water temperature, redox

potential, and dissolved oxygen) were measured and recorded. Purging was considered complete when the field parameters had stabilized and a minimum of three well volumes of groundwater had been removed.

The sample was collected directly into precleaned, laboratory-supplied sample containers at a low flow rate to minimize volatilization of potential analytes. The sample was placed in an ice-filled cooler for transport to the Brooks Rand, LLC, and APPL laboratories following COC protocol. The sample was analyzed for the following:

- VOCs, using U.S. EPA Method 8260B
- TAL metals, using U.S. EPA Method 6010B/7000 Series
- mercury, using U.S. EPA Method 1631 (low-level detection limits for groundwater samples collected within 500 feet of the shoreline)
- TDS, using U.S. EPA Method 160.1

The groundwater sample for metals analysis was filtered in the field using a disposable 0.45-micron filter prior to shipment to the laboratories.

C10 SEDIMENT SAMPLING

Grab samples of sediment were collected from two storm sewer manholes using hand augers. Sediment samples were collected in accordance with SOP 19, and were placed into laboratory-supplied, wide-mouth glass jars. Samples were analyzed for lead by APPL using U.S. EPA Method 6010B with inductively coupled argon plasma.

C11 EQUIPMENT DECONTAMINATION

Decontamination of nondisposable sampling equipment was performed according to SOP 11. Sampling equipment was cleaned and decontaminated as follows.

- Large equipment pieces were decontaminated using a high-pressure hot water washer capable of delivering water at a minimum temperature of 180 degrees Fahrenheit.
- Smaller equipment pieces were decontaminated as follows:
  - Equipment was washed in low- or nonphosphate detergent (e.g., Liqui-Nox solutions made as directed by the manufacturer).
  - Equipment was rinsed twice with distilled water.

Equipment that was not used immediately following decontamination was wrapped in new plastic bags. Disposable sampling equipment was placed with used personal protective equipment (PPE) for disposal.

C12 BOREHOLE ABANDONMENT

All direct-push borings were abandoned after sample collection and removal of the PVC temporary wells. The boreholes were backfilled completely with a neat cement grout, an approved sealing material, as outlined in SOP 13.

C13 FIELD DOCUMENTATION

This section describes the use of paperwork, including field logbooks, photographs, COC records, sample labels, and custody seals, following procedures presented in SOPs 10 and 17.

C13.1 Field Logbooks and Records

Field activities were documented in controlled, permanently bound and prepaginated field logbooks. The logbooks contain various forms for this purpose, including daily field reports, sampling records, rinsate/trip blank logs, and photographic documentation.

Logbook entries were written in indelible ink. Corrections consisted of line-out deletions that were initialed and dated by the person making the correction. The remaining space on each page was crossed out. Completed field logbooks were delivered to the CLEAN Program Document Control Center in San Diego. Other forms used to record field safety-and-health-related data were not bound into field logbooks but were instead maintained in project files, folders, and binders. Logbook procedures are described in SOP 17.

C13.2 Photographs

Photographs were taken of selected sampling locations to show the surrounding area, site features, objects used to locate the site, sampling equipment, and unusual conditions. The photographs provide backup documentation for sampling procedures. Photographs were described in the field logbook. The photographs are reproduced in Attachments A through W to the main RI/FS Report.

C13.3 Sample Labeling

Labels were attached to each sample container at the time of sampling. The self-adhesive labels were made of waterproof paper or plastic and were completed with indelible ink. Errors made on the sample label were corrected by drawing a single line through the error (initialed) and entering the correct information. Sample labels clearly indicated the company name, project name and number, sampling location identifier, ten-character sample number (container identification number), sampling date and time (using 24-hour notation), analysis to be performed, sample preservation method, and the field sampler's name and initials (not preprinted) as described in the SAP and in SOPs 9 and 10.

All environmental samples collected to support this project were identified by a unique ten-character sample numbering system as described in the Data Management Plan

(Attachment B to the Work Plan) (BEI 2006), and CLEAN Program Procedures T 2.2, Sample Information Management System (BNI 2004).

C13.4 Chain-of-Custody Records

COC protocols defined in SOP 10 were followed during the sampling program. COC forms were completed by the sampler and accompanied the samples from the field to the analytical laboratory. The records were maintained from the time of sample collection to the time of submittal to delivery courier.

The custody records were completed using indelible ink. All corrections were made by drawing a line through, initialing, and then entering the correct information. The error remained legible after correction. All applicable information on the COC record was filled out completely and legibly. Unused spaces (rows) for sample/analysis information were crossed out and initialed. For samples delivered to the laboratory by an overnight air carrier (i.e., FedEx), the airbill numbers were recorded, and the COC records were placed in a zip-lock bag and taped to the lid inside the sample cooler prior to sealing. Signed custody seals were then attached over the lid/cooler seal to prevent tampering with samples during overnight shipment to the laboratory. For samples picked up by the analytical laboratory (i.e., APPL) courier at the end of the work day, the COC records were placed in a zip-lock bag and taped to the lid outside the sample cooler for the courier's review. The courier signed and dated the COC records before taking possession of the samples. COC documentation is presented in Attachment C2.

C13.5 Custody Seals

After samples were collected, custody seals were placed on the sample containers. Custody seals were used to detect tampering between sample collection and analysis. The seal was placed so that it would have to be broken in order to open the sample container. Two or more custody seals were placed on the outside of the shipping container or cooler prior to shipment by an overnight air carrier. Each custody seal affixed to sample containers and sample coolers was signed and dated by the field sampler. Custody seals are described in SOP 10.

C13.6 Sample Storage and Transport

Sample containers were selected in accordance with U.S. EPA SW-846, Test Methods for Evaluating Solid Wastes Physical/Chemical Methods (U.S. EPA 2005) and with SOP 9. Field and quality control samples were maintained at approximately 4 degrees Celsius until shipment to the laboratory. Samples were prepared for shipment according to the procedures specified in the applicable SOPs. Samples were packed for shipment using the following procedure.

- A sample label was attached to each container and covered with clear tape to prevent moisture damage.
- A custody seal was placed over the container lid/jar seal to prevent tampering before sample analysis.

- All glass containers were wrapped in bubble wrap and sealed in zip-lock bags.
- Coolers were packed with samples, and ice was used to fill all possible empty space. All contents were double-bagged to prevent leakage during shipment.
- The completed COC forms were placed inside a sealed zip-lock bag and taped to the inside or outside of each cooler lid.
- For coolers delivered to the laboratory by an overnight air carrier, each cooler seal was covered with two custody seals (one front, one back). The custody seals were then covered with clear packing tape to prevent accidental breaks. The closed cooler was secured with filament-type strapping tape to assure that contents did not spill during sample shipment by the overnight air carrier to the analytical laboratory.

C14 DEMOBILIZATION

Demobilization consisted of BEI and the subcontractors cleaning up work areas after completion of field activities. The work areas were left in a condition similar to that existing before the boring and sampling activities occurred.

C15 INVESTIGATION-DERIVED WASTE MANAGEMENT AND DISPOSAL

All IDW materials were managed and disposed by CLEAN personnel according to contract requirements and methods described in SOP 22 and the IDW Management Plan (Attachment C to the Work Plan) (BEI 2006).

The following types of IDW were generated from field activities:

- decontamination washwater
- purgewater from groundwater sampling
- soil cuttings
- asphalt and concrete cores
- used PPE and disposable sampling equipment
- nonhazardous solid waste (refuse)

Liquid IDW was stored in a Baker aboveground storage tank with a secondary containment system. Solid IDW and contaminated sampling equipment (e.g., acetate liners with soil) were placed in a covered, portable roll-off bin lined with plastic sheeting. Uncontaminated PPE was placed in an industrial waste bin. Mixing regular trash and nonhazardous construction debris with potentially contaminated IDW was avoided.

Each waste container was clearly marked to indicate the waste source; however, these labels were not used for shipping or disposal purposes. Before disposal or shipment off-site, containers were labeled with appropriate United States Department of Transportation identification and classification information by the waste disposal subcontractor.

The waste disposal contractor, NRC Environmental Services (NRC), of Alameda, California, collected IDW samples for analyses and waste profiling. It was concluded that the IDW generated during this investigation was not classified as listed waste under Title 40 *Code of Federal Regulations* Section 261.31–261.33. Following waste profiling, IDW was removed from the site by NRC on February 2, 2006. The liquid IDW was considered nonhazardous waste and was transferred by NRC to the Altamont Landfill in Livermore, California. The solid IDW (i.e., soil) was considered nonhazardous waste and was transferred by NRC to the Forward Landfill in Manteca, California. All manifests were signed, copied, and filed by the Navy's Resident Officer in Charge of Construction for Alameda Point. Waste manifests are included in Attachment C3.

C16 REFERENCES

American Society for Testing and Materials. 1993. Standard Guide for Soil Gas Monitoring in the Vadoze Zone. ASTM D5314-93. Reapproved in 2003.

ASTM. *See* American Society for Testing and Materials.

Bechtel Environmental, Inc. 2006. Final Work Plan for Remedial Investigation for IR Site 35, Areas of Concern in Transfer Parcel EDC-5, Alameda Point, Alameda, California. January.

Bechtel National, Inc. 2004. Navy CLEAN Program Procedures Manual. Latest revision.

BEI. *See* Bechtel Environmental, Inc.

BNI. *See* Bechtel National, Inc.

United States Environmental Protection Agency. 2005. Test Methods for Evaluating Solid Wastes. SW-846. At http://www.epa.gov/epaoswer/hazwaste/test/main.htm.

U.S. EPA. *See* United States Environmental Protection Agency.

ATTACHMENT C1

SURVEY DATA

DATE:12-29-05
JOB: A03566-4

ALAMEDA NAVAL AIR STATION
CTO-077, IR SITE 35 AT ALAMEDA POINT
BORING HOLE LOCATIONS

K&W PT. NO.	LOCATION ID	NORTHING	EASTING	ELEVATION	DESCRIPTION
1448	A01SB01	2114259.2	6039315.5	8.92	BORE HOLE
1449	A01SB02	2114148.8	6039349.3	9.60	BORE HOLE
1450	A01SB03	2114138.3	6039298.9	9.24	BORE HOLE
1457	A02SB01	2115100.8	6040589.8	9.31	BORE HOLE
1458	A02SB02	2115091.6	6040620.1	9.30	BORE HOLE
1459	A02SB03	2115043.0	6040580.1	9.48	BORE HOLE
1460	A02SB04	2115041.8	6040613.1	9.66	BORE HOLE
1451	A03SB01	2115064.5	6041058.8	9.70	BORE HOLE
1452	A03SB02	2115004.5	6041029.8	9.12	BORE HOLE
1453	A03SB03	2114988.5	6041040.2	8.98	BORE HOLE
1454	A03SB04	2115036.0	6041033.8	9.82	BORE HOLE
1455	A03SB05	2115010.7	6041057.8	9.53	BORE HOLE
1456	A03SB06	2115036.6	6041069.8	9.68	BORE HOLE
1461	A05SB01	2114782.1	6043320.7	8.73	BORE HOLE
1462	A05SB02	2114800.9	6043354.2	8.30	BORE HOLE
1463	A05SB03	2114774.2	6043344.3	8.28	BORE HOLE
1464	A05SB04	2114779.4	6043363.3	8.42	BORE HOLE
1465	A06SB01	2114261.0	6042066.4	9.03	BORE HOLE
1466	A06SB02	2114251.7	6042053.2	9.00	BORE HOLE
1467	A06SB03	2114241.7	6042042.5	9.06	BORE HOLE
1468	A06SB04	2114240.3	6042065.1	9.10	BORE HOLE
1469	A06SB05	2114229.8	6042051.4	9.37	BORE HOLE
1470	A06SB06	2114212.5	6042064.9	8.96	BORE HOLE
1584	A08SB01	2113844.9	6042713.1	11.68	BORE HOLE
1583	A08SB02	2113853.8	6042753.3	11.33	BORE HOLE
1582	A08SB03	2113857.6	6042780.4	11.48	BORE HOLE
1472	A08SB04	2113838.7	6042785.5	11.55	BORE HOLE
1471	A08SB05	2113795.5	6042763.5	11.77	BORE HOLE
1473	A09SB01	2113541.0	6041354.2	9.85	BORE HOLE
1474	A09SB02	2113564.4	6041415.7	9.86	BORE HOLE
1475	A09SB03	2113612.8	6041395.0	10.51	BORE HOLE
1476	A09SB04	2113646.1	6041366.3	11.11	BORE HOLE
1496	A10SB01	2113506.5	6042193.4	11.55	BORE HOLE
1495	A10SB02	2113491.9	6042208.8	11.97	BORE HOLE
1493	A10SB03	2113469.6	6042263.4	12.27	BORE HOLE
1492	A10SB04	2113448.0	6042311.6	11.79	BORE HOLE

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DATE:12-29-05
JOB: A03566-4

ALAMEDA NAVAL AIR STATION
CTO-077, IR SITE 35 AT ALAMEDA POINT
BORING HOLE LOCATIONS

K&W PT. NO.	LOCATION ID	NORTHING	EASTING	ELEVATION	DESCRIPTION
1494	A10SB05	2113489.5	6042237.2	11.91	BORE HOLE
1478	A11SB01	2113505.2	6041433.8	10.20	BORE HOLE
1479	A11SB02	2113420.0	6041615.1	11.28	BORE HOLE
1480	A11SB03	2113297.8	6041453.7	11.38	BORE HOLE
1481	A11SB04	2113227.8	6041596.7	11.00	BORE HOLE
1504	A12SB01	2112975.1	6042066.4	10.96	BORE HOLE
1503	A12SB02	2113030.9	6042113.2	11.96	BORE HOLE
1502	A12SB03	2113027.1	6042151.2	12.16	BORE HOLE
1501	A12SB04	2113028.0	6042164.4	12.31	BORE HOLE
1500	A12SB05	2113013.1	6042179.0	11.95	BORE HOLE
1505	A12SB05A	2112981.1	6042207.1	11.84	BORE HOLE ADDED
1498	A12SB06	2113070.0	6042190.1	12.62	BORE HOLE
1499	A12SB07	2113044.9	6042185.0	12.13	BORE HOLE
1506	A12SB08	2113043.6	6042219.5	11.94	BORE HOLE
1507	A12SB09	2113029.6	6042253.5	11.19	BORE HOLE
1508	A12SB10	2113037.1	6042301.2	11.00	BORE HOLE
1497	A12SB11	2113121.2	6042206.2	12.70	BORE HOLE
1511	A12SB12	2113106.0	6042339.4	11.59	BORE HOLE ADDED
1509	A12SB13	2113067.7	6042336.3	11.40	BORE HOLE
1510	A12SB14	2113053.9	6042353.4	10.98	BORE HOLE
1516	A13SB01	2112876.6	6042723.9	10.79	BORE HOLE
1517	A13SB02	2112825.6	6042746.2	11.79	BORE HOLE
1518	A13SB03	2112810.0	6042703.4	12.07	BORE HOLE
1515	A13SB04	2112930.0	6042622.8	12.17	BORE HOLE
1512	A13SB05	2113000.1	6042617.0	11.51	BORE HOLE
1514	A13SB06	2112874.8	6042558.6	11.07	BORE HOLE
1513	A13SB07	2112933.9	6042581.6	11.10	BORE HOLE
1522	A15SB01	2113121.6	6043248.0	11.62	BORE HOLE
1520	A15SB02	2113137.2	6043794.3	9.71	BORE HOLE
1521	A15SB03	2112989.6	6043914.0	8.58	BORE HOLE
1540	A17SB01	2112853.5	6040914.8	11.65	BORE HOLE
1541	A17SB02	2112738.0	6040901.2	11.72	BORE HOLE
1542	A17SB03	2112645.6	6040894.3	9.95	BORE HOLE
1535	A18SB01	2112245.1	6040363.0	10.83	BORE HOLE
1536	A18SB02	2112215.8	6040416.6	11.30	BORE HOLE
1537	A18SB03	2112269.4	6040408.0	11.20	BORE HOLE

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ALAMEDA NAVAL AIR STATION
CTO-077, IR SITE 35 AT ALAMEDA POINT
BORING HOLE LOCATIONS

K&W PT. NO.	LOCATION ID	NORTHING	EASTING	ELEVATION	DESCRIPTION
1538	A18SB04	2112303.6	6040368.3	10.96	BORE HOLE
1531	A20SB01	2112149.4	6039927.0	11.13	BORE HOLE
1532	A20SB02	2112130.7	6040033.1	11.04	BORE HOLE
1533	A21SB01	2111982.6	6040333.4	9.76	BORE HOLE
1534	A21SB02	2111967.2	6040402.2	10.08	BORE HOLE
1543	A23SB01	2112438.0	6042027.0	10.68	BORE HOLE
1544	A23SB02	2112355.1	6041933.9	11.13	BORE HOLE
1545	A23SB03	2112250.3	6042044.7	10.39	BORE HOLE
1546	A23SB04	2112180.6	6041935.8	10.89	BORE HOLE
1547	A23SB05	2112045.3	6042086.9	9.74	BORE HOLE
1548	A23SB06	2111981.1	6041968.2	10.59	BORE HOLE
1549	A23SB07	2112028.8	6041632.4	11.29	BORE HOLE
1570	A23SB08	2112451.6	6042392.8	11.62	BORE HOLE
1581	A23SB09	2112231.4	6042347.9	11.19	BORE HOLE
1571	A23SB10	2112360.1	6042449.7	11.92	BORE HOLE
1572	A23SB11	2112313.9	6042399.1	11.56	BORE HOLE
1569	A23SB12	2112249.6	6042216.2	10.62	BORE HOLE
1573	A23SB13	2112342.7	6042361.7	11.16	BORE HOLE
1580	A23SB14	2111999.2	6042960.3	11.80	BORE HOLE
1567	A23SB15	2112141.9	6042433.5	11.27	BORE HOLE
1575	A23SB16	2112140.7	6042475.2	11.59	BORE HOLE
1561	A23SB17	2112096.3	6042432.7	11.49	BORE HOLE
1566	A23SB18	2112055.2	6042328.9	10.82	BORE HOLE
1560	A23SB19	2112013.0	6042424.9	11.39	BORE HOLE
1565	A23SB20	2111887.2	6042313.6	10.83	BORE HOLE
1558	A23SB21	2111842.8	6042438.6	11.51	BORE HOLE
1564	A23SB22	2111791.2	6042305.2	10.82	BORE HOLE
1576	A23SB23	2112129.6	6042598.3	11.86	BORE HOLE
1562	A23SB24	2112062.9	6042578.0	11.33	BORE HOLE
1563	A23SB25	2111993.9	6042579.5	11.01	BORE HOLE
1559	A23SB26	2111927.4	6042489.6	11.56	BORE HOLE
1578	A23SB27	2112076.3	6042653.8	11.86	BORE HOLE
1577	A23SB28	2112052.3	6042643.1	11.49	BORE HOLE
1579	A23SB29	2112016.4	6042759.4	11.75	BORE HOLE
1568	A23SB30	2112140.5	6042262.0	10.73	BORE HOLE
1550	A23SB31	2111933.6	6042159.9	10.15	BORE HOLE

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ALAMEDA NAVAL AIR STATION
CTO-077, IR SITE 35 AT ALAMEDA POINT
BORING HOLE LOCATIONS

K&W PT. NO.	LOCATION ID	NORTHING	EASTING	ELEVATION	DESCRIPTION
1551	A23SB32	2111807.3	6042147.3	10.03	BORE HOLE
1552	A23SB33	2111736.6	6042221.0	10.76	BORE HOLE
1553	A23SB34	2111607.6	6042139.8	10.77	BORE HOLE
1554	A23SB35	2111493.2	6042136.0	9.87	BORE HOLE
1555	A23SB36	2111486.9	6042221.3	11.15	BORE HOLE
1557	A23SB37	2111727.6	6042362.9	10.86	BORE HOLE
1556	A23SB38	2111543.4	6042292.0	11.30	BORE HOLE
	A23SB39	NOT LOCATED AT THIS TIME			BORE HOLE ADDED
1574	A23SB40	2112347.3	6042415.3	12.61	BORE HOLE ADDED
1528	A24SB01	2112054.8	6043804.5	12.11	BORE HOLE
1526	A25SB01	2111468.4	6043631.9	10.51	BORE HOLE
1524	A25SB02	2111441.4	6043680.5	10.46	BORE HOLE
1525	A25SB03	2111425.6	6043632.3	10.56	BORE HOLE
1523	A25SB04	2111153.4	6043883.5	11.64	BORE HOLE
1331	AST 152	2113196.0	6043667.2	11.09	BORE HOLE(FIRST LOCATION)
1530	D205SB01	2111729.2	6039637.1	9.20	BORE HOLE
1529	D205SB02	2111706.6	6039721.4	8.94	BORE HOLE ADDED
1485	D78SB01	2113429.8	6041710.0	11.49	BORE HOLE
1484	D78SB02	2113415.3	6041824.9	11.83	BORE HOLE
1482	D78SB03	2113296.0	6041718.1	13.16	BORE HOLE
1483	D78SB04	2113303.2	6041825.5	12.67	BORE HOLE
1486	D79SB01	2113390.4	6041910.1	12.02	BORE HOLE
1487	D79SB02	2113387.1	6042026.9	12.67	BORE HOLE
1489	D79SB03	2113285.2	6041911.9	12.37	BORE HOLE
1488	D79SB04	2113224.7	6042023.8	12.78	BORE HOLE
1477	S016SB01	2113953.5	6041175.7	10.06	BORE HOLE
1490	S017SB01	2113760.5	6041666.8	12.34	BORE HOLE
1539	S039SB01	2112156.7	6040799.8	10.80	BORE HOLE
1519	S152SB01	2113190.4	6043665.7	11.26	BORE HOLE
1527	S173SB01	2111672.6	6043836.3	11.72	BORE HOLE
1491	S392SB01	2113287.0	6042201.5	13.06	BORE HOLE

Kier & Wright Engineers Surveyors, Inc.
1233 Quarry Lane, Suite 145
Pleasanton, CA 94566
Phone (925) 249-6555 Fax (925) 249-6563

ATTACHMENT C2

CHAIN-OF-CUSTODY FORMS

APPL - Analysis Request Form 49199

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: ALAMEDA 00035 AOC 23/EBS Parcel 71
PO #: CTO 0077
Chain of Custody (Y/N): Y # 23276-77,55,57,68-70
RAD Screen (Y/N): Y pH (Y/N): Y
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 11/30/05 Time: 10:00
Delivered by: FED EX
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): SEE CRF
Color: VOA/GREEN/ORGGRN
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson
QC Report Type: DVP4/EDD/CA
Due Date: 12/14/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS!
PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
VOCs and SVOCs + TICs

Client ID for AX31183W32 ws mislabeled. Went off of collection time on COC.
One amber liter of AX31180 arrived broken.

Sample Distribution:
GC: 4-$80BT, 4-$87UW, 4-$PCBW, 3-$SIMW, 3-$TPUW
Extractions: 4-_SEP004, 3-_SEP004S, 3-_SEP011X, 4-_SEP025
VOA: 7-$86UW, 3-$GAUW
Metals: 2-$HG-D, 2-$MT2F
Wetlab: 2-$1601

Charges:

Invoice To:

	Client ID		APPL ID	Sampled		Analyses Requested
1.	C077G103	X-SPK	AX31179W	11/29/05	11:30	$80BT, $86UW, $87UW, $GAUW, $PCBW, $SIMW, $TPUW
2.	C077G101	X-SPK	AX31180W	11/29/05	11:40	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW
3.	C077G102	X-SPK	AX31181W	11/29/05	11:40	$80BT, $86UW, $PCBW
4.	C077TB02	X-SPK	AX31182W	11/29/05	16:00	$86UW
5.	C077R001	X-SPK	AX31183W	11/29/05	15:05	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW
6.	C077R002	X-SPK	AX31184W	11/29/05	15:10	$86UW

7.	C077TB01	X-SPK	AX31185W	11/29/05	15:10	$86UW
8.	C077G104	X-SPK	AX31186W	11/29/05	11:30	$87UW

AOC 23/EBS Parcel 71

CLEAN

CHAIN-OF-CUSTODY RECORD

23277

Site Name: Alameda 00035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): Gary Yao
Signature(s): Gary Yao

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number: GW-077-AOC23-02 p.12
GW-077-AOC23-01

Pay Items/ Analyses Required

6.20	6.15	7.18	7.3	7.25	8.3	9.2	1.5	1.15
VOCs 8260B	TPH-gas 8015M	TPH-ff/8015BM	SVOCs 8270C (PAHs)	PAHs 8270C SIM	Pest/PCBs 8081A/8082	Metals 6010B/7000 Series	VOCs 8260B	TPH-gas 8015M

Preservation (4°C): HCl

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775364	11/29/05 1050	A23SB02	Soil	7		01,02 03 / 10,11 12 / 20	
C0775365	1055	↓				01,02 03 / 10,11 12 / 20	
C0775366	1100	↓				01,02 03 / 10,11 12 / 20	
C0775370	1330	A23SB04				01,02 03 / 10,11 12 / 20	
C0775371	1340	↓				01,02 03 / 10,11 12 / 20	MS/MSD - SVOCs and PAHs
C0775372	↓ 1350	↓	↓	↓		01,02 03 / 10,11 12 / 20	
C077GB03	1130	A23SB02	Water	5		01 02 03 / 10 11	
C077GB01	1140	A23SB01	↓	3		01 02 03 / 10 11	
C077GB02	↓ 1140	↓	↓	3		01 02 03	Dup
C077TB02	↓ 1600	FQC	↓	2		01 02	Trip blank

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Mike Bechtel	FedEx	11/29/05	1730	Ship to Lab
		11/30/05	1000	

Comments/Instructions:

Method of Shipment: FedEx
Airbill No.: 8413 8310 8272
Total No. of Containers: 42
Total No. of Coolers Shipped: 1
Lab SDG: 49199 + 49200
Cooler Temp.: 4.0°C

AOC 23/EBS Parcel 71

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23255

Site Name: Alameda DDD35
CTO Number: DD77
Site Contact/Supervisor: Johansen

Sampler(s): J. Johansen, M. Leddy
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno CA 93722
Field Logbook/Page Number: GW-077-AOC23-02

Pay Items/ Analyses Required

6.2D VOCs/8260B	6.15 TPH-gas/8015B	7.18 TPH-diesel/8015B	7.3 SVOCs/8270C	7.25 PAHs/8270C (SIM)	9.3 PCBs/8082	9.2 Metals/6010B	150 VOCs 8260B	1.15 TPH-gas 8015
							HCL	

Preservation (4°C)

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775361	11/29/05 1030	A235B01	Soil	7		01 02 03 10 11 12 20	0-2
C0775361	11/29/05 1030	A235B01	Soil	6		01 02 03	MS/MSD
C0775362	11/29/05 1040	A235B01	Soil	7		01 02 03 10 11 12 20	2-4
C0775363	11/29/05 1115	A235B01	Soil	7		01 02 03 10 11 12 20	4-8
C0775367	11/29/05 1330	A235B03				01 02 03 10 11 12 20	0-2'
C0775366	11/29/05 1340					01 02 03 10 11 12 20	2-4'
C0775369	11/29/05 1350					01 02 03 10 11 12 20	4-8'
CO77R001	11/29/05 1505	FQC	water	3		01 02 03 10 11	Rinsate
CO77R002	11/29/05 1510	FQC	water	3		01 02 03	Rinsate
CO77TB01	11/29/05 1510	FQC	water	2		01 02	Trip Blank

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Bechtel	FedEx	11/29/05	1530	Ship to lab
		11/30/05	1000	

Comments/Instructions:

Method of Shipment: Fed Ex
Airbill No.: 841338108328
Total No. of Containers: 56
Total No. of Coolers Shipped: 1
Lab SDG: 49199+49200
Cooler Temp.: 3.5°C

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AOC 23/EBS Parcel 71

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23276

Site Name: Alameda 000352
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): [illegible], M. Leddy
Signature(s): [illegible]

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno CA 93722
Field Logbook/Page Number: GW-0077-AOC23-02 p 11, 1

Pay Items/ Analyses Required

1.15 TPH-gas/8015-M
2.18 TPH-diesel/8015B-M
2.3 SVOCs/8270C SIM
2.25 PAHs/8270C SIM
3.3 Pesticides/8081A
4.2 Metals/6010B/7000
5.38 TDS/160.1
1.50 VOCs/8260B

Preservation (4°C): HCl, HNO3, HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0077G01	11/28/05 1140	A23SB01	Water	4		10 11 30 31 32 50 51 60 70 80	B-12'
~~C0077G02~~	11/28/05 1140	A23SB01	Water	6		50 51 60 70 80	DUP of B
C0077R01	11/28/05 1505	FBC	water	4		10 11 20 21 22 30 31 32 40 41 42 50 51 60 70 80	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
M. Prestrie/Bechtel	Fed Ex	11/28/05	1730	Ship to Lab	*Field filtered metals
					Method of Shipment: Fed Ex
					Airbill No.: 8113 8310 8309
		11/30/05	1000		Total No. of Containers: 8

Total No. of Coolers Shipped: 1
Lab SDG: 49199
Cooler Temp.: 30°C

AOC 231 EBS Parcel #1

GY02

CLEAN

CHAIN-OF-CUSTODY RECORD

23269

Site Name: Alameda0035
CTO Number: 0077
Site Contact/Supervisor: JJohansen

Sampler(s): G. Yao
Signature(s): Gary Yao

Pay Items/ Analyses Required

1.15 TPH-gas 8015-M
2.18 TPH-ext 8015B(M)
2.3 SVOCs 8270C (SIM)
2.25 PAHs 8270C (SIM)
3 Pest/PCBs 8081A/8082
4.2 Metals 6010B/7470A
5.38 TDS 160.1

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno CA 93722
Field Logbook/Page Number:

Preservation (4°C): HCl, ICE

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0776103	11/29/05 1130	A23SB02	Water			50, 51, 52	
C0776104	↓	↓	↓			30, 31, 32	
							GY

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	FedEx	11/29/05	1730	Ship to Lab
GY				
		11/30/05	1000	

Comments/Instructions: * field filtered

Method of Shipment: FedEx
Airbill No.: 8413 8310 8342
Total No. of Containers: 6
Total No. of Coolers Shipped: 1
Lab SDG: 49199
Cooler Temp.: 2.0°C

AOC 23/EBS Parcel 71

6401

CLEAN

CHAIN-OF-CUSTODY RECORD

23257

Site Name: Alameda DOD 35
CTO Number: 0127
Site Contact/Supervisor: Johansen

Sampler(s): G. Yao
Signature(s): Gary Yao

Pay Items/ Analyses Required

1.15 TPH-gas 8015M
2.19 TPH-F 8015M
2.3 SVOCs 8270C (PAHs)
2.25 PAHs 8270C SIM
3.3 Resi-RBSL 8260B*
4.2 Metals 6010B*
5.38 TDS 160.1

Preservation (4°C): HCl, HNO3

TAT (in days): 2 | 7 | (14) | 30

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
CETVG103	11/29/05 1130	A23SB02	Water	9		20 21 22 / 33 35 / 44 45	GY

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	FedEx	11/29/05	1730	Ship to lab
		11/30/05	1000	

Comments/Instructions: * field filtered

Method of Shipment: FedEx
Airbill No.: 8443 8310 8331
Total No. of Containers: 9
Total No. of Coolers Shipped: 1
Lab SDG: 49199
Cooler Temp.: 3.5°C

AOC 231 EBS Parcel 41

CLEAN

CHAIN-OF-CUSTODY RECORD

23268

Site Name: Alameda 00235
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): JBernstein, MLeddy
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number: GW-077-AOC231-02 pg 1

Pay Items/ Analyses Required: 1.15 TPH-gas/8015M; 2.18 TPH-ff/2015B-M; 2.3 SVOCs/8270M (8 PAHs); 2.45 PAHs/8270M SIM; 3.3 Pest/PCBs/8081A/8082A; 4.2 Metals/6010B/7470A; 5.39 TDS/160.1

Preservation (4°C): HCl; HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077FBK01	11/29/05 1505	FQC	Water	10		30 31 32 40 41 42 50 51 52 60 70	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
M. Metre/Bechtel	Fed EX	11/29/05	1730	Ship to lab
		10/20/05	1000	

Comments/Instructions: ~~*field filtered~~ JB

Method of Shipment: FedEX
Airbill No.: 8413 8310 8294
Total No. of Containers: 10
Total No. of Coolers Shipped: 1
Lab SDG: 49199
Cooler Temp.: 4.5°C

AOC 231 EBS Parcel 71

CLEAN

CHAIN-OF-CUSTODY RECORD

23270

Site Name: Alameda 0035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): J. Bernstein, M. Leddy
Signature(s): [signature] Maureen Leddy

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno CA 93722
Field Logbook/Page Number: GW-077-AOC23-02 pg 11,1

Pay Items/ Analyses Required: 1,15 TPH-GAS 8015-M; 2,18 TPH-FF 8015B-M; 2,3 SVOCs 8270C (full); 2,25 PAHs 8270C SIM; 3,3 Rest/RCBs 8270C SIM; 4,2 Metals 6010B/7000; 5,36 TDS 160.1

Preservation (4°C): HCl; Cool

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0077G101	11/21/05 1140	A235B01	W	10		70	8-12'
C0077G102	↓ ↓	↓	↓	3			dup

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
M. Petrie/Bechtel	Fed EX	11/21/05	1730	Ship to lab
		11/30/05	1000	

Comments/Instructions: *field filtered

Method of Shipment: Fed EX
Airbill No.: 791353102383
Total No. of Containers: 13
Total No. of Coolers Shipped: 1
Lab SDG: 49199
Cooler Temp.: 3.0°C

COOLER RECEIPT FORM

Project: Alameda 00035 Date Received: 11/30/05

Coolers: Number of Coolers: 7

YES NO Were coolers and samples screened for radioactivity?

YES NO Were custody seals on outside of cooler? How many? 7 Date on seal? 11/29/05

Name on seal? torn while removing

YES NO NA Were custody seals unbroken and intact at the time of arrival?

YES NO Did the cooler come with a shipping slip (air bill, etc.)? Carrier name: Fed Ex

Shipping slip numbers: 1) 8413 8310 8320 2) 8413 8310 8309 3) 8413 8310 8294

YES NO NA Was the shipping slip scanned into the database? 4) 8413 8310 8283 5) 8413 8310 8272

YES NO NA If cooler belongs to APPL, has it been logged into the ice chest database? 6) 8413 8310 8331, 8342

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): Fed Ex ln wet ice bubble wrap Samples

YES NO NA For hand delivered samples was sufficient ice present to start the cooling process?

YES NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: Correction factor:

Cooler temp(s): 1) 3.0° 2) 4.0° 3) 2.0° 4) 3.5° 5) 3.0° 6) 4.5° 7) 3.5° 8)

Chain of custody:

YES NO Was a chain of custody received?

YES NO Were the custody papers signed in the appropriate places?

YES NO Was the project identifiable from custody papers?

YES NO Did the chain of custody include date and time of sampling?

YES NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

YES NO Were container labels in good condition?

YES NO Was the client ID on the label?

YES NO Was the date of sampling on the label?

YES NO Was the time of sampling on the label?

YES NO Did all container labels agree with custody papers?

Sample Containers:

YES NO Were all containers sealed in separate bags?

YES NO Did all containers arrive unbroken?

YES NO Was there any leakage from samples?

YES NO Were any of the lids cracked or broken?

YES NO Were correct containers used for the tests indicated?

YES NO Was a sufficient amount of sample sent for tests indicated?

YES NO NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea: AX31182W02 AX31185 W01

Smaller than a pea: AX31182 W01

Preservation & Hold time:

YES NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO NA Were correct preservatives added to the samples?

YES NO NA Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO NA Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies: Client ID for AX31183W32 was mislabled. Went off of collection time on COC. One amber liter of AX31180 arrived broken-

Signature of personnel receiving samples: Libby Anderson Second reviewer:

Signature of project manager notified: DA Date and Time of notification: 11/30/05 AM

Name of client notified: Laura Date and Time of notification: 11/30/05 pm

Information given to client: told her of broken container and that we still have plenty by whom (Initials): DA

APPL - Analysis Request Form 49200

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: ALAMEDA 00035 AOC23/EBS Parcel 71
PO #: CTO 0077
Chain of Custody (Y/N): Y # 23255,23277
RAD Screen (Y/N): Y pH (Y/N): N
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 11/30/05 Time: 10:00
Delivered by: FED EX
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): 3.5°C 4.0°C
Color: VOA/BLUEYELLOW
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson
QC Report Type: DVP4/EDD/CA
Due Date: 12/14/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS!
PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
VOCs and SVOCs + TICs

Client ID for AX31190 was mislabeled. Went off of collection time.

Sample Distribution: Charges: Invoice To:

GC: 12-$80BTS, 12-$87US, 12-$PCBS, 12-$SIMB, 12-$TPUS
Extractions: 12-_SON002, 12-_SON004, 12-_SON009S, 12-_SON009X
VOA: 12-$86US, 12-$GAUS
Metals: 12-$HG-S, 12-$MTL3
Wetlab: 12-MOIST

	Client ID		APPL ID	Sampled		Analyses Requested
1.	C077S361	SPKMS/MS	AX31187S	11/29/05	10:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD ON VOCs ONLY
2.	C077S362	X-SPK	AX31188S	11/29/05	10:40	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
3.	C077S363	X-SPK	AX31189S	11/29/05	11:15	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
4.	C077S367	X-SPK	AX31190S	11/29/05	13:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST

5.	C077S368	X-SPK	AX31191S	11/29/05	13:40	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
6.	C077S369	X-SPK	AX31192S	11/29/05	13:50	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
7.	C077S364	X-SPK	AX31193S	11/29/05	10:50	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
8.	C077S365	X-SPK	AX31194S	11/29/05	10:55	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
9.	C077S366	X-SPK	AX31195S	11/29/05	11:00	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
10.	C077S370	X-SPK	AX31196S	11/29/05	13:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
11.	C077S371	SPKMS/MS	AX31197S	11/29/05	13:40	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD ON SVOC/PAHS ONLY
12.	C077S372	X-SPK	AX31198S	11/29/05	13:50	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST

AOC 23/EBS Parcel 71

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23255

Site Name: Alameda ODD35
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): J. Bornstein, M. Leddy
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno CA 93722
Field Logbook/Page Number: GW-077-AOC23-02

Pay Items/ Analyses Required: 6.2D VOCs/8260B; 6.15 TPH-gas/BTEX/8015M; 7.18 TPH-diesel/8015M; 7.3 SVOCs/8270C (PAHs); 7.25 PAHs/8270C SIM; 9.3 Pest/PCBs/8081A/8082; 9.2 Metals/6010B; 1.50 VOCs 8260B; 1.15 TPH-gas 8015

Preservation (4°C): HCL

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775361	11/29/05 1030	A23SB01	Soil	7 3 6		01 02 03 10 11 12 20	0-2
C0775361	11/29/05 1030	A23SB01	Soil	6		01 02 03 10 11 12	MS/MSD
C0775362	11/29/05 1040	A23SB01	Soil	7		01 02 03 10 11 12 20	2-4
C0775363	11/29/05 1115	A23SB01	Soil	7		01 02 03 10 11 12 20	4-8
C0775367	11/29/05 1330	A23SB03				01 02 03 10 11 12 20	0-2'
C0775368	11/29/05 1340					01 02 03 10 11 12 20	2-4'
C0775369	11/29/05 1350	↓	↓	↓		01 02 03 10 11 12 20	4-8'
CO77RB01	11/29/05 1505	FQC	water	3 5		01 02 03 10 11	Rinsate
CO77RB02	11/29/05 1510	FQC	water	3		01 02 03	Rinsate
CO77TB01	11/29/05 1510	FQC	water	2		01 02	Trip blank

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
/Bechtel	FedEx	11/29/05	1530	Shipping
		11/30/05	1000	

Comments/Instructions:

Method of Shipment: FedEx
Airbill No.: 841383108329

Total No. of Coolers Shipped: 1

Total No. of Containers: 58

Lab SDG: 49200
Cooler Temp: 3.5°C

AOC 23/EBS Parcel 71

CLEAN

CHAIN-OF-CUSTODY RECORD

23277

Site Name: Alameda 00035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): Gary Yao
Signature(s): Gary Yao

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number: GW-077-AOC23-02 p.12
GW-077-AOC23-01

Pay Items/ Analyses Required: 6.20 VOCs 8260 B; 6.15 TPH-gas 8015 M; 7.18 TPH-ff 8015 BM; 7.3 SVOCs 8270 C (PAHs); 7.25 PAHs 8270 C SIM; 9.3 PCBs 8082 A; 9.2 Metals 6010 B/7000 Series; 1.50 VOCs 8260 B; 1.15 TPH-gas 8015 M

Preservation (4°C): H

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0T753G4	11/29/05 1050	A23SB02	Soil	7		01,02,03,10,11,12,20	
C0T753G5	1055	↓	↓	↓		01,02,03,10,11,12,20	
C0T753G6	1100	↓	↓	↓		01,02,03,10,11,12,20	
C0T753T0	1330	A23SB04	↓	↓		01,02,03,10,11,12,20	
C0T753T1	1340	↓	↓	↓		01,02,03,10,11,12,20	MS/MSD - SVOCs and PAHs
C0T753T2	↓ 1350	↓	↓	↓		01,02,03,10,11,12,20	
C077BG03	1130	A23SB02	Water	5		01,02,03,10,11	
C077G01	1140	A23SB01	↓	3		01,02,03,10,11	
C077G02	↓ 1148	↓	↓	3		01,02,03	DUP
C077TB02	↓ 1600	FQC	↓	2		01,02	Trip blank

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Bechtel	FedEx	11/29/05	1730	Ship to Lab
		11/30/05	1000	

Comments/Instructions:

Method of Shipment: FedEx
Airbill No.: 8413 8316 8272
Total No. of Containers: 42
Total No. of Coolers Shipped: 1
Lab SDG: 49200
Cooler Temp: 4.0°C

COOLER RECEIPT FORM

Project: Alameda 00035 Date Received: 11/30/05

Coolers: Number of Coolers: 2

(YES) NO Were coolers and samples screened for radioactivity?

(YES) NO Were custody seals on outside of cooler? How many? 4 Date on seal? 11/29/05

Name on seal? torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

(YES) NO Did the cooler come with a shipping slip (air bill, etc.)? Carrier name: Fed Ex

Shipping slip numbers: 1) 841383108320 2) 841383108272 3)

YES (NO) NA Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap Samples

YES NO (NA) For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: #B250392 Correction factor: 0

Cooler temp(s): 1) 3.5° 2) 4.0° 3) 4) 5) 6) 7) 8)

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

(YES) NO Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

YES (NO) Did all container labels agree with custody papers?

Sample Containers:

(YES) (NO) LA Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

(YES) NO Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

YES NO (NA) Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO (NA) Were correct preservatives added to the samples?

YES NO (NA) Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO (NA) Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

~~Client~~ Lab notified if pH was not adequate:

Deficiencies: ~~Sample~~ LA Client ID for AX31190 was mislabled. Went off of collection time.

Signature of personnel receiving samples: Libby Cardenas Second reviewer:

Signature of project manager notified: DA Date and Time of notification: DA 11/30/05

Name of client notified: Laura via email Date and Time of notification: DA 12/1/05

Information given to client: Customer ID was 30, 31, 33 - 33 mislabled 32

by whom (Initials): DA

APPL - Analysis Request Form 49235

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda 00035 AOC 23 EBS 125,126,171
PO #: CTO 0077
Chain of Custody (Y/N): Y # SEE ARF COMMENT
RAD Screen (Y/N): Y pH (Y/N): Y
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/03/05 Time: 16:22
Delivered by: FED EX
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): SEE CRF
Color: VOA/YELLPUR/ORGGRN
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson TDX
QC Report Type: DVP4/EDD/CA
Due Date: 12/17/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs. Requires only LCS.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
VOCs and SVOCs + TICs
COC #23186, 23189, 23288, 23295, 23296, 23307, 23308
Missing one container of AX31394 (C077G105A); container W73 was not received.
CHANGE IN ARF: added sample because C077G105A had 2 collection dates & times. 12-6-05 rp

Sample Distribution: Charges: Invoice To:
C: 5-$80BT, 3-$87UW, 5-$PCBW, 5-$SIMW, 4-$TPUW
Extractions: 3- SEP004, 5- SEP004S, 4- SEP011, 5- SEP025
VOA: 8-$86UW, 4-$GAUW
Metals: 8-$MT2F, 1-$HG-D
Wetlab: 6-$1601

	Client ID		APPL ID	Sampled		Analyses Requested
1	C077TB05	X-SPK	AX31384W	12/02/05	13:30	$86UW
2	C077G151	X-SPK	AX31385W	12/02/05	11:45	$1601, $86UW, $MT2F
3	C077G152	X-SPK	AX31386W	12/02/05	11:45	$86UW, $MT2F
4	C077G154	X-SPK	AX31387W	12/02/05	12:30	$86UW, $MT2F
5	C077G148	X-SPK	AX31388W	12/02/05	13:00	$1601, $80BT, $86UW, $87UW, $GAUW, $MT2F, $PCBW, $SIMW, $TPUW
6	C077G149	X-SPK	AX31389W	12/02/05	13:00	$GAUW, $TPUW

7	C077G147	SPKMS/MS	AX31390W 12/02/05	10:00	$1601, $80BT, $86UW, $87UW, $GAUW, $MT2F, $PCBW, $SIMW, $TPUW -- MS/MSD FOR SIM
8	C077TB06	X-SPK	AX31391W 12/02/05	14:00	$86UW
9	C077R004	X-SPK	AX31392W 12/02/05	14:00	$1601, $80BT, $86UW, $87UW, $GAUW, $MT2F, $PCBW, $SIMW, $TPUW
10	C077G109A	X-SPK	AX31393W 12/02/05	10:30	$1601, $80BT, $MT2F, $PCBW, $SIMW
11	C077G106A	SPKMS/MS	AX31394W 12/02/05	08:30	$1601, $80BT, $HG-D, $MT2F, $PCBW -- MS/MSD FOR PEST/PCB,TDS
12	C077G105	X-SPK	AX31505W 11/30/05	08:30	$SIMW

BECHTEL **CLEAN**

CHAIN-OF-CUSTODY RECORD

23186

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JDHANSEN

Sampler(s): G. Yee, M. Leahy
Signature(s): Gary Yee

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: GW-077-AOC23-02
GW-077-AOC23-01

Pay Items/ Analyses Required

Preservation (4°C)	3.3 Pest/PCBs	4.2 Metals	6.3 TDS	2.2 RAD's	8270C SIM
HNO3					

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0T7G105A	12/02/05 830	A23S803	Water	9		50, 53, 54, 60, 56, 57 / 70, 73	MS/MSD for Pest/PCBs and TDS
C0T7G105A	11/29/05 830	↓	↓	2		40, 41	5-9'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
[illegible] (Bechtel)	FedEX	12/02/05	1700	Ship to Lab	* field filtered
		12/03/05	1622		

Method of Shipment: FedEX
Airbill No.: 839108916081
Total No. of Containers: 12
Total No. of Coolers Shipped: 1
Lab SDG: 49235
Cooler Temp.: 0°C

AOC 23 EBS 125, 126

1/3

CLEAN

CHAIN-OF-CUSTODY RECORD

23189

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yao
Signature(s): Gary Yao

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 N SWIFT AV FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTTS436	12/02/05 900	A235B35	SOIL	7		01,02,03 10,11,12 20 →	MS/MSD for Pest/PCB 0-2'
COTTS437	930	↓		7		01,02,03 10,11,12 20 →	2-4'
COTTS438	1000	↓		13	GY 12/3/05	01,02,03,04,05 11,12,13 20 →	MS/MSD for VOCs 4-8'
COTTS445	1030	A235B38		4		01,02,03,04 20	0-2' MS/MSD for metals
COTTS446	1040	↓		4		01,02,03,04 20	2-4'
COTTS447	1050	↓		4		01,02,03,04 20	4-8'
COTTS448	1015	A235B39		4		01,02,03,04 20	0-2'
COTTS449	1045	↓		4		01,02,03,04 20	2-4'
COTTS450	1115	↓		4		01,02,03,04 20	4-8'
COTTB005	↓ 1330	FQC	↓	2		01,02	Trip Blank

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	FedEx	12/02/05	1700	Ship to Lab
		12/03/05	1622	

Comments/Instructions: *SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: FedEx
Airbill No.: 8544 6025 8767
Total No. of Containers: 53
Total No. of Coolers Shipped: 1
Lab SDG: 49235
Cooler Temp.: 0°C

BECHTEL CLEAN AOC23 125

CHAIN-OF-CUSTODY RECORD

23308

Site Name: ALAMEDA OU2B5
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): M. LEDDY
Signature(s): [signature]

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE, FRESNO, CA 93722
Field Logbook/Page Number: SHS - 077 - 01
GW - 077 - AOC23 - 01

Pay Items/ Analyses Required:

Pay item	Analysis	Preservation (4°C)
2.18	8015B-M TPH-EE *	
2.3	8270C SVOCs	
2.25	8270C-SIM PAHs	
3.13	8081A/8082 PEST/PCB	
4.2	6010B/7000 METALS (wally) **	HNO_3
5.38	160.1 TDS	

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077R004	12/2 1400	RINSATE	WATER	10		20-21, 30-31, 40-41, 50-51, 60, 70	

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
[signature] / Bechtel	FED EX	12/2/05	1700	Ship to LAB
		12/03/05	1622	

Comments/Instructions:
* SILICA GEL CLEANUP, IF NEEDED / added
** FILTER & PRES. IN FIELD

Method of Shipment: FEDEX
Airbill No.: 8391 0896 6070
Total No. of Coolers Shipped: 1
Total No. of Containers: 10
Lab SDG: 49235
Cooler Temp.: 0°C

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~~AOC~~ AOC23 125,71

CLEAN

CHAIN-OF-CUSTODY RECORD

23307

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): M. LEDDY
Signature(s): mjeddy

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE, FRESNO, CA 93722
Field Logbook/Page Number: GW-077-AOC23-01
GW-077-AOC23-02

Pay Items/ Analyses Required

2.25	3.3	5.38	A.2	2.3	2.18	5.9
8270C-SIM PAHs	8021A/8260B PEST/PCB	160.1 TDS	6010B/7000 METALS (NOT Hg)***	8270C SVOCs	8015B-M TPHd,g	DECANT AT LAB***

Preservation (4°C): HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G147	12/2 1000	A23SB35	WATER	4		50-54 70 60	6-11' = screen
~~C077G148~~	~~12/2 1020~~	~~A23SB06~~	~~WATER~~				
C077G109A	12/2 1030	A23SB06	WATER	6		40-44 50-54 70 60	6-11' = screen

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Chris / BEC	FedEx	12/2/05	1700	ship to lab
		12/03/05	1627	

Comments/Instructions:
SILICA-GEL CLEANUP IF NEEDED
FILTER & PRES IN FIELD
DECANT ALL UNPRES, EXCEPT TDS, AT LAB

Method of Shipment: FEDEX
Airbill No.: 839108966107
Total No. of Containers: 10
Total No. of Coolers Shipped: 1
Lab SDG: 49235
Cooler Temp.: 0°C

AOC 23 125

CLEAN

CHAIN-OF-CUSTODY RECORD

23296

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): M-LEDDY
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4303 W. SWIFT AVE, FRESNO, CA 93722
Field Logbook/Page Number: GW-077-AOC23-02
GW-077-AOC23-01

Pay Items/ Analyses Required

	1.15	2.18	2.3	2.25	2.3	4.2	5.38	5.9	1.50
	RSK-144 TPH gas	8015B-M TPH-D *	8260C SVOC	8270C-SIM PAHs	Perkin/8082 PEST/PCBs	6010B/7000 Metals (10 Mg) **	1631 TBS	DECANT AT LAB ***	8260B VOC
Preservation (4°C)									
HCl					HNO3			HCl	

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G197	12/2/05 1000	A23SB35	WATER	15		10,11 20,21 32,31 40,41,43→46 01→03	MS/MSD FOR PAHs
C077TBD6	12/2/05 1400	FQC	WATER	2		46 01	Trip Blank
[illegible]							
C077R084	12/2/05 1400	RINSATE	WATER	5		10-11 01→03	ER

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
[illegible] /BEI	FedEx	12/2/05	1700	Ship to lab
		12/03/05	1622	

Comments/Instructions: Added TEMP BLANK
* SILICA-GEL CLEANUP, IF NEEDED
** FILTER & PRES, IN FIELD
*** DECANT ALL UNPRES, EXCEPT TBS, AT LAB

Method of Shipment: FedEx
Airbill No. 839168966892
Total No. of Containers: 22
Total No. of Coolers Shipped: 1
Lab SDG: 49235
Cooler Temp.: 0°C

AOC 23 EBS ~~125~~ 7 GY
125, 126

CLEAN

CHAIN-OF-CUSTODY RECORD

23288

Site Name: ALAMEDA 00035	Sampler(s): G. Yee
CTO Number: 0077	Signature(s): Gary Yee
Site Contact/Supervisor: JOHANSEN	

Analytical Laboratory Name: APPL

Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722

Field Logbook/Page Number:

Pay Items/ Analyses Required

1.15 AK103-M TPH-gas
2.18 8015B-M TPH-D *
2.3 8270C SVOCs
2.25 8270C-SIM PAHs
3.3 8081A/8082, PEST/PCBs
4.2 6010B/7000 METALS, No Hg ***
5.38 Total TDS
5.9 DECANT AT LAB ***

Preservation (4°C): HCl, HNO_3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0TTG151	12/02/05 1145	A2358338	WATER	2		60 70	
C0TTG152	1145	↓		1		60	
C0TTG154	1230	A2358339		1		60	
C0TTG148	↓ 1300	A2358336	↓	10		~~20~~ 20 21 30 31 40 41 50 51 60 70	
C0TTG149	12/02/05 1300	↓	Water	2		~~20~~ 20 21 ~~30~~ 31 GY	

GY

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yee/Bechtel	FedEx	12/02/05	1700	Ship to Lab
		12/03/05	1622	

Comments/Instructions:
* SILICA GEL CLEANUP, IF NEEDED
** FILTERED & PRES. IN FIELD
*** DECANT ALL UNPRES. SAMPLES EXCEPT TDS AT LAB

Method of Shipment: FedEx

Airbill No.: 8544 6005 8718

Total No. of Coolers Shipped: 1

Total No. of Containers: 16

Lab SDG: 49235

Cooler Temp.: 0°C

AOC 23 EBS 125, 126

3/3

CLEAN

CHAIN-OF-CUSTODY RECORD

23295

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: IHANSEN

Sampler(s): G. Yee
Signature(s): Gary Yee

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

	1.15	2.18	2.3	2.25	3.3	4.2	5.3B	5.9	1.50
	8015-M TPHgas	8015B-M TPH-d *	8270C SVOCs	8270C-SIM PAHs	8081A/8082 PEST/PCBs	6010B/7000 METALS (No Hg)**	Wet TDS	DECANT AT LAB***	8260B VOCs
Preservation (4°C) HCl					HNO3			HCl	

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTT6151	12/02/05 1145	A23S338	WATER	3		01 02 03	T-12
COTT6152	1145	↓		3		01 02 03	↓
COTT6154	1230	A23S339		3		01 02 03	
COTT6148	1300	A23S336		5		10 11 01 02 03	
COTT6149	↓ 1300	↓	↓	2		10 11	

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yee / Bechtel	FedEX	12/02/05	1700	Ship to Lab
		12/03/05	1622	

Comments/Instructions:
* SILICA GEL CLEAN UP, IF NEEDED
** FILTER & PRES. IN FIELD
*** DECANT ALL UNPRES. SAMPLES, EXCEPT TDS AT LAB

Method of Shipment: FedEX
Airbill No.: 8514 6605 8767
Total No. of Containers: 16
Total No. of Coolers Shipped: 1
Lab SDG: 49235
Cooler Temp.: 0°C

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/3/05

Coolers: Number of Coolers: 7

YES NO Were coolers and samples screened for radioactivity?

YES NO Were custody seals on outside of cooler? How many? 7 Date on seal? NA

Name on seal? Torn while removing

YES NO NA Were custody seals unbroken and intact at the time of arrival?

YES NO Did the cooler come with a shipping slip (air bill, etc.)? Carrier name: Fed Ex

Shipping slip numbers: 1) See CoCs. 2) 3)

YES NO NA Was the shipping slip scanned into the database?

YES NO NA If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap samples

YES NO NA For hand delivered samples was sufficient ice present to start the cooling process?

YES NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB250392 Correction factor: 0

Cooler temp(s): 1) 2) 3) 4) 5) 6) 7) 8)

Chain of custody:

YES NO Was a chain of custody received?

YES NO Were the custody papers signed in the appropriate places?

YES NO Was the project identifiable from custody papers?

YES NO Did the chain of custody include date and time of sampling?

YES NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

YES NO Were container labels in good condition?

YES NO Was the client ID on the label?

YES NO Was the date of sampling on the label?

YES NO Was the time of sampling on the label?

YES NO Did all container labels agree with custody papers?

Sample Containers:

YES NO Were all containers sealed in separate bags?

YES NO Did all containers arrive unbroken?

YES NO Was there any leakage from samples?

YES NO Were any of the lids cracked or broken?

YES NO Were correct containers used for the tests indicated?

YES NO Was a sufficient amount of sample sent for tests indicated?

YES NO NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea: AX31391 W01

Smaller than a pea: AX31384 W01

Preservation & Hold time:

YES NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO NA Were correct preservatives added to the samples?

YES NO NA Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO NA Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies: Missing one container of AX 31394. -> Container W73 was NOT Received. C077G105A

Signature of personnel receiving samples: Libby Andersen Second reviewer:

Signature of project manager notified: DA Date and Time of notification: 12/5/05

Name of client notified: Tom Kurzpak Date and Time of notification: 12/6/05

Information given to client: emailed this sheet

by whom (Initials): DA

APPL - Analysis Request Form 49212

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda 035 AOC 23/EBS Parcels 71 & 72
P.O #: CTO 0077
Chain of Custody (Y/N): Y # See ARF comments
RAD Screen (Y/N): Y pH (Y/N): Y
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/01/05 Time: 09:45
Delivered by: FED EX
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): SEE CRF
Color: VOA/ORG/ORGRN
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson DA
QC Report Type: DVP4/EDD/CA
Due Date: 12/15/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
VOCs and SVOCs + TICs

COC #s 23259,23274,23282,23305,23310,23311,23312

Sample Distribution: Charges: Invoice To:
GC: 4-$87UW, 4-$TPUW, 4-$SIMW, 2-$80BT, 2-$PCBW
Extractions: 4- SEP004, 4- SEP011, 4- SEP004S, 2-SEP025
VOA: 9-$86UW, 4-$GAUW
Metals: 2-$HG, 2-$MTL1, 1-$HG-D, 1-$MT2F
Wetlab: 7-$1601

	Client ID		APPL ID	Sampled		Analyses Requested
1	C077G105	X-SPK	AX31251W	11/30/05	08:30	$86UW, $87UW, $GAUW, $TPUW
2	C077G107	X-SPK	AX31252W	11/30/05	13:00	$1601, $86UW, $SIMW
3	C077G108	X-SPK	AX31253W	11/30/05	13:00	$1601, $86UW, $SIMW
4	C077TB04	X-SPK	AX31254W	11/30/05	13:45	$86UW
5	C077R003	X-SPK	AX31255W	11/30/05	14:00	$1601, $80BT, $86UW, $87UW, $GAUW, $HG, $MTL1, $PCBW, $SIMW, $TPUW
6	C077G103A	X-SPK	AX31256W	11/30/05	08:30	$1601, $HG, $MTL1

7	C077G104A	X-SPK	AX31257W	11/30/05	08:30	$1601
8	C077G106	SPKMSMI	AX31258W	11/30/05	09:30	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $RCBW, $SIMW, $TPUW MS/MSD GAS ONLY
9	C077TB03	X-SPK	AX31259W	11/30/05	13:00	$86UW
10	C077G110	X-SPK	AX31260W	11/30/05	13:15	$1601, $86UW
11	C077G109	X-SPK	AX31261W	11/30/05	14:00	$86UW, $87UW, $GAUW, $TPUW

AOC 23/EBS Parcel 71 Blue #1

BECHTEL **CLEAN**

CHAIN-OF-CUSTODY RECORD

23259

Site Name: Alameda DDD35
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): J. Bornstein, M. Leddy
Signature(s): [signature] M. Leddy

Pay Items/ Analyses Required: 1.15 TPH-gas/8015-M; 2.18 TPH-d/8015B-M; 2.3 SVOCs/8270C; 2.25 PAHs/8270C SIM; 3.3 Pest/PCBs/8081/8082; 4.2 Metals/6010/7000; 5.38 TDS/160.1; 1.50 VOCs/8260B

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av., Fresno, CA 93722
Field Logbook/Page Number: FL-077-AOC23-01, pg 2.

Preservation (4°C): HCl; HNO3; HCL

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G105	11/30/05 0830	A23SB03	Water	6		20 21 22, 30 31 32, 40	5-9'
C077G107	↓ 1300	A23SB05	↓	1		70	8-12'
C077G108	↓ 1300	↓	↓	1		70	Dup
C077R003	↓ 1400	FQC	↓	3		20 21 22	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh/Bechtel	Fed EX	11/30/05	1700	Ship to lab
[signature]		12/1/05	0945	

Comments/Instructions: * field filtered

Method of Shipment: Fed EX
Airbill No.: 839108966048
Total No. of Containers: 11
Total No. of Coolers Shipped: 1
Lab SDG: 49212
Cooler Temp.: 4.0°C

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RCD #2

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23305

Site Name: Alameda Site 35
CTO Number: 0077
Site Contact/Supervisor: E. Johansen

Sampler(s): J. Bornstein / M. Leddy
Signature(s): [signature] / [signature]

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Ave. Fresno CA 93722
Field Logbook/Page Number: FL-077-AOC23-01, pg. 2

Pay Items/ Analyses Required: 1,2,5 PAHs | 8270C SIM | 5,38 TDS | 160.1 | 4,2 Metals | 6010B/7000

Preservation (4°C): HNO_3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G107	11/30/05 1300	A23SBd5	water	3		40 41 42	8-121
C077G108	1300	↓	|	3		40 41 42	DUP
C077R003	1400	FBC	↓	2		70 60	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
[signature] / Bechtel	FedEx	11/30/05	1700	shipto lab	
					Method of Shipment: FedEx
					Airbill No.: 839108966660
					Total No. of Containers: 8
	[signature]	12/1/05	0945		

Total No. of Coolers Shipped: 1
Lab SDG: 49212
Cooler Temp.: 4.0°C

AOC 23/EBS Parcel 71

CLEAN

CHAIN-OF-CUSTODY RECORD

23311

Site Name: Alameda Site 35
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): G. Yas
Signature(s): Gary Yas

Pay Items/ Analyses Required: 2.18 TPH-d/#/8015B

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Ave., Fresno, CA 93722
Field Logbook/Page Number:

Preservation (4°C)

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
CQTTG106	11/30/05 930	A23SB04	Water	9		20, 21, 22, 23, 24, 25, 26, 27, 28	MS/MSD

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Gary Yas/Bechtel	FedEX	11/30/05	1700	Ship to Lab	
		12/1/05	0945		

Method of Shipment: FedEX
Airbill No.: 839108966037
Total No. of Containers: 9
Total No. of Coolers Shipped: 1
Lab SDG: 49212
Cooler Temp.: 3.5°C

AOC 23/EBS Parcel 71

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23274

Site Name: Alameda 00035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): G. Yao
Signature(s): Gary Yao

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 1023 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

1.15 TPH-gas (8015M)
2.18 TPH-ff (8015B-M)
2.3 SVOCs (8270C SIM)
2.25 PAHs (8270C SIM)
3.3 PestPCBs (8081A/8082)
4.2 Metals (6010B)*
5.38 TDS (160.1)

Preservation (4°C): HCl, H2SO4

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0T7G109	11/30/05 1400	A235B006	Water	6		20,21,22 30,31,32	

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Gary Yao/Bechtel	FedEx	11/30/05	1700	Ship to lab	* Field filtered
					Method of Shipment: FedEx
					Airbill No.: 8391 0896 6026
		12/1/05	0945		Total No. of Containers: 6

Total No. of Coolers Shipped: 1
Lab SDG: 49212
Cooler Temp.: 4.0°C

AOC 23 | EBS Parcels 71 & 72

CLEAN

CHAIN-OF-CUSTODY RECORD

23310

Site Name: Alameda Site 35
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): G. Yao
Signature(s): Gary Yao

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Ave., Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

1.5D	1.15	2.18	2.3	2.25	3.3	4.2	5.3B
8260B	VOCs	TPH-gas	TPH-dsl	SVOCs	8015-M	8270C SIM	TDS
8015B-M	8015B-M	8270C (No PAHs)	8270C SIM	PAHs	PCBs	Metals*	160.1
8082	8082	8082	8082	8082	8082	6010B*	

Preservation (4°C): HCl, HCl, HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTTG103A	11/30/05 830	A23SB02	Water	2		60 70	6-11'
COTTG104A	830	↓	↓	1		70	6-11'
COTTG106	↓ 930	A23SB04	↓	18		01,02 05,11 03 13,14 30,31 40,41 42 50,51 52 60 70	6-11' MS/MSD for TPH-DRO
COTTTB03	11/30/05 1300	FQC	Water	2		01,02 G.U.	Trip Blank
COTTG110	1315	A23SB07		4		01,02 03 70	6-11'
COTTG109	↓ 1400	A23SB06	↓	5		01,02 03 10 11	6-11'

GU

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Gary Yao/Bechtel	FedEx	11/30/05	1700	Ship to Lab	*field filtered
					Method of Shipment: FedEx; Total No. of Coolers Shipped: 1
					Airbill No.: 8391 0896 6015
		12/1/05	0945		Total No. of Containers: ~~25~~ 32; Lab SDG: 49212; Cooler Temp: 3.0°C

GU

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ADC 23/EBS Parcel 72   Blue #2

BECHTEL

CLEAN

CHAIN-OF-CUSTODY RECORD

23282

Site Name: Alameda site 00035
CTO Number: 0077
Site Contact/Supervisor: Johanson

Sampler(s): J. Bernstein, M. Leddy
Signature(s): [signature] M. Leddy

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno CA 93722
Field Logbook/Page Number: FL-077-ADC23-01, Pg 2

Pay Items/Analyses Required: HCl 1-3 VOCs/8260B; 2.38 TDS/160.1; 2.3 SVOCs/8270C (No PAHs); 2.25 PAHs/8270C SIM; 3.3 Pest/PCBs 8081A 8082

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
0077R003	11/30/05 1400	FQC	water	9		30 31 32; 40 41 42; 50 51 52	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh/Bechtel	Fed EX	11/30/05	1700	Ship to lab
	[signature]	12/1/05	0945	

Comments/Instructions:

Method of Shipment: Fed EX
Airbill No.: 8413 8310 8310
Total No. of Containers: 9
Total No. of Coolers Shipped: 1
Lab SDG: 49212
Cooler Temp.: 4.6°C

RED# 1 - Volatiles

CLEAN

CHAIN-OF-CUSTODY RECORD

23312

Site Name: Alameda Site 35
CTO Number: 0077
Site Contact/Supervisor: E. Johansen

Sampler(s):
Signature(s):

Analytical Laboratory Name: ADPL
Analytical Laboratory Address: 4203 W. Swift Ave, Fresno CA 93722
Field Logbook/Page Number: ~~Gold~~ FL-077-AOC.23-01 pg. 2

Pay Items/ Analyses Required: 6.20 VOCs | 8260B; 6.15 TPH-d | 8015M; 7.18 TPH-g | 8015-M; 7.3 SVOCs | 8015B-M; 7.25 PAHs | 8270C (SIM); 6.3 PCBs | 8270C (SIM); 9.2 Metals | 6010B/7000; 1.15 TPH-g | 8015-M; 1.50 VOCs | 8260B

Preservation (4°C): HCL; HCL

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775373	11/30/05 0930	A23SB05	Soil	4		01 02 03 04	0-2
C0775375	1030	↓	↓	4		01 02 03 04	4-8
C077G105	0830	A23SB03	water	5		10 11 01 02 03	5-9'
C077G107	1300	A23SB05		3		01 02 03	8-12'
C077G108	1300	A23SB05		3		01 02 03	DUP
C077TB04	1345	FQC		2		01 02	TRIP BLANK
C077RQ03	1400	FQC	↓	5		10 11 01 02 03	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh/Bechtel	FedEX	11/30/05	1700	Ship to lab
		12/1/05	0945	

Comments/Instructions:

Method of Shipment:
Airbill No.: 8391 0896 6059
Total No. of Containers: 26
Total No. of Coolers Shipped: 1
Lab SDG: 49212/49213
Cooler Temp.: 4°C, 4.0°C

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/1/05

Coolers: Number of Coolers: 7

(YES) NO Were coolers and samples screened for radioactivity?

(YES) NO Were custody seals on outside of cooler? How many? 14 Date on seal? NA

Name on seal? Torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

(YES) NO Did the cooler come with a shipping slip (air bill, etc.)? Carrier name: Fed Ex

Shipping slip numbers: 1) See CoC. 2) 3)

YES (NO) NA Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap + samples

YES NO (NA) For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB250392 Correction factor: 0

Cooler temp(s): 1) 4.0° 2) 4.0° 3) 3.5° 4) 4.0° 5) 3.0° 6) 4.0° 7) 3.5° 8)

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

(YES) NO Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

(YES) NO Did all container labels agree with custody papers?

Sample Containers:

YES (NO) Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

YES (NO) Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

(YES) NO NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea: AX31254 W01 W02 AX31259 W01 W02

Smaller than a pea: AX31251 W01

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

(YES) NO NA Were correct preservatives added to the samples?

(YES) NO NA Was the pH taken of all non-VOA preserved samples and written on the sample container?

(YES) NO NA Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies:

Signature of personnel receiving samples: Libby Anderson Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

APPL - Analysis Request Form 49213

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda 035 AOC 23/EBS Parcels 71 & 110
RO #: CTO 0077
Chain of Custody (Y/N): Y # 23271,23312
RAD Screen (Y/N): Y pH (Y/N): Y
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/01/05 Time: 09:45
Delivered by: FED EX
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): 4.0°C
Color: VOA/BLUEYELLOW
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson
QC Report Type: DVP4/EDD/CA
Due Date: 12/15/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
VOCs and SVOCs + TICs

Sample Distribution: Charges: Invoice To:
GC: 6-$80BTS, 6-$87US, 6-$PCBS, 8-$SIMB, 6-$TPUS
Extractions: 6-_SON002, 6-_SON004, 6-_SON009, 8-_SON009S
VOA: 8-$86US, 6-$GAUS
Metals: 6-$HG-S, 6-$MTL3
Wetlab: 8-MOIST

	Client ID		APPL ID	Sampled		Analyses Requested
1.	C077S376	SPKMS/MS	AX31262S	11/30/05	09:15	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR TPH-FF
2.	C077S377	X-SPK	AX31263S	11/30/05	09:25	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
3.	C077S378	X-SPK	AX31264S	11/30/05	09:35	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
4.	C077S385	X-SPK	AX31265S	11/30/05	13:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST

5	C077S386	X-SPK	AX31266S	11/30/05	13:40	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
6	C077S387	SPKMSMS	AX31267S	11/30/05	13:50	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST, MS/MSD FOR VOC
7	C077S373	X-SPK	AX31268S	11/30/05	09:30	$86US, $SIMB, MOIST
8	C077S375	X-SPK	AX31269S	11/30/05	10:30	$86US, $SIMB, MOIST

AOC 23/EBS Parcels ~~110~~ 71 GY and 110 RED #2

CLEAN

CHAIN-OF-CUSTODY RECORD

23271

Site Name: Alameda 00035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): G. Yao
Signature(s): Gary Yao

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0TT5376	11/30/05 915	A235B006	Soil	7		01,02 03 10,11 12 20	MS/MSD for TPH-ff 0-2'
C0TT5377	925	↓	↓	7		01,02 03 10,11 12 20	2-4'
C0TT5378	935	↓	↓	7		01,02 03 10,11 12 20	4-8'
C0TT5385	1330	A235B12	↓	7		01,02 03 10,11 12 20	0-2'
C0TT5386	1340	↓	↓	7		01,02 03 10,11 12 20	2-4'
C0TT5387	↓ 1350	↓	↓	13		01→ 09 10,11 12 20	4-8' MS/MSD for VOCs

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh / Bechtel	FedEx	11/30/05	1700	Ship to Lab
		12/1/05	0945	

Comments/Instructions:

Method of Shipment: FedEX
Airbill No.: 8391 0896 6059
Total No. of Containers: 48
Total No. of Coolers Shipped: 1
Lab SDG: 49213
Cooler Temp.: 4.0°C

AOC 23/EBS Parcels ~~110~~ 71 GY and 110 RED #1

CLEAN

CHAIN-OF-CUSTODY RECORD

23271

Site Name: Alameda 00035
CTO Number: 0077
Site Contact/Supervisor: Johnson

Sampler(s): G. Yao
Signature(s): Gary Yao

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: 6.20 VOCs 8260B; 6.15 TPH-gas 8015-M; 7.18 TPH-ff/8015-M; 7.3 SVOCs 8270C (PAHs only); 7.25 PAHs 8270C SIM; 8.3 Perchlorate 6850; 9.2 Metals 6010B/7000 series; 15 BTEX 8260B

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0077536	11/30/05 915	A235B006	Soil	7		01,02 03 10,11 12 20	MS/MSD 0-2 for TPH-ff
C0077537	925	↓	↓	7		01,02 03 10,11 12 20	2-4'
C0077538	935	↓	↓	7		01,02 03 10,11 12 20	4-8'
C0077585	1330	A235B12		7		01,02 03 10,11 12 20	0-2'
C0077586	1340	↓		7		01,02 03 10,11 12 20	2-4'
C0077587	1350	↓	↓	13		01 09 10,11 12 20	4-8' MS/MSD for VOCs

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
D. McHugh / Bechtel	FedEx	11/30/05	1700	Ship to Lab	
					Method of Shipment: FedEx; Total No. of Coolers Shipped: 1
					Airbill No.: 8391 0896 6059
					Total No. of Containers: 48; Lab SDG:
		12/1/05	0945		Cooler Temp.:

CLEAN

RED# + - volatiles

CHAIN-OF-CUSTODY RECORD

23312

Site Name: Alameda Site 35
CTO Number: 0077
Site Contact/Supervisor: E. Johnson

Sampler(s):
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Ave, Fresno CA 93722
Field Logbook/Page Number: Cotati FL-077-AOC-23-01 pg. 2

Pay Items/ Analyses Required: VOCs / 8260B; TPH-g / 8015M; TPH-D / 8015B-M; SVOCs / 8270C; PAHs / 8270C SIM; BTEX / 8260B; Acetates / 8260B; TPH-g / 8015-M; VOCs / 8260B

Preservation (4°C): HCL; HCL

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775373	11/30/05 0930	A23SB05	Soil	34		01 02 03; 01 02 03; 20	0-2
C0775375	1030	↓	↓	4		01 02 03; 20	4-8
C077G105	0850	A23SB03	water	5		10 11; 01 02 03	5-9'
C077G107	1300	A23SB05		3		01 02 03	8-12'
C077G108	1300	A23SB05		3		01 02 03	DUP
C077TB04	1345	FQC		2		01 02	TRIP BLANK
C077RB03	1400	FQC	↓	5		10 11; 01 02 03	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D McHugh / Bechtel	FedEx	11/30/05	1700	Ship to lab
		12/1/05	0945	

Comments/Instructions:

Method of Shipment:
Airbill No.: 8391 0896 6059
Total No. of Containers: 26
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/1/05

Coolers: Number of Coolers: 1

YES NO Were coolers and samples screened for radioactivity?

YES NO Were custody seals on outside of cooler? How many? 2 Date on seal? NA

Name on seal? torn while removing

YES NO NA Were custody seals unbroken and intact at the time of arrival?

YES NO Did the cooler come with a shipping slip (air bill, etc.)? Carrier name: Fed Ex

Shipping slip numbers: 1) See COC. 2) 3)

YES NO NA Was the shipping slip scanned into the database?

YES NO NA If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap + samples

YES NO NA For hand delivered samples was sufficient ice present to start the cooling process?

YES NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB250392 Correction factor: 0

Cooler temp(s): 1) 4.0 2) 3) 4) 5) 6) 7) 8)

Chain of custody:

YES NO Was a chain of custody received?

YES NO Were the custody papers signed in the appropriate places?

YES NO Was the project identifiable from custody papers?

YES NO Did the chain of custody include date and time of sampling?

YES NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

YES NO Were container labels in good condition?

YES NO Was the client ID on the label?

YES NO Was the date of sampling on the label?

YES NO Was the time of sampling on the label?

YES NO Did all container labels agree with custody papers?

Sample Containers:

YES NO Were all containers sealed in separate bags?

YES NO Did all containers arrive unbroken?

YES NO Was there any leakage from samples?

YES NO Were any of the lids cracked or broken?

YES NO Were correct containers used for the tests indicated?

YES NO Was a sufficient amount of sample sent for tests indicated?

YES NO NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

YES NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO NA Were correct preservatives added to the samples?

YES NO NA Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO NA Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies:

Signature of personnel receiving samples: Libby Andrus Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

APPL - Analysis Request Form 49236

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda 00035 AOC23, EBS 125,126
PO #: CTO 0077
Chain of Custody (Y/N): Y #
RAD Screen (Y/N): Y pH (Y/N): N
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/03/05 Time: 16:22
Delivered by: FED EX
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): 0°C
Color: VOA/YELLOWPURPLE
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson DA
QC Report Type: DVP4/EDD/CA
Due Date: 12/17/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
VOCs and SVOCs + TICs

Sample Distribution: Charges: Invoice To:
GC: 11-$80BTS, 11-$87US, 11-$PCBS, 11-$SIMB, 11-$TPUS
Extractions: 11-_SON002, 11-_SON004, 11-_SON009, 11-_SON009S
VOA: 18-$86US, 12-$GAUS
Metals: 17-$HG-S, 17-$MTL3
Wetlab: 17-MOIST

	Client ID		APPL ID	Sampled		Analyses Requested
1.	C077S436	SPKMS/MS	AX31395S	12/02/05	09:00	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR PEST,PCB
2.	C077S437	X-SPK	AX31396S	12/02/05	09:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
3.	C077S438	SPKMS/MS	AX31397S	12/02/05	10:00	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR VOC
4.	C077S445	SPKMS/MS	AX31398S	12/02/05	10:30	$86US, $HG-S, $MTL3, MOIST -- MS/MSD FOR METALS

5	C077S446	X-SPK	AX31399S	12/02/05	10:40	$86US, $HG-S, $MTL3, MOIST
6	C077S447	X-SPK	AX31400S	12/02/05	10:50	$86US, $HG-S, $MTL3, MOIST
7	C077S448	X-SPK	AX31401S	12/02/05	10:15	$86US, $HG-S, $MTL3, MOIST
8	C077S449	X-SPK	AX31402S	12/02/05	10:45	$86US, $HG-S, $MTL3, MOIST
9	C077S450	X-SPK	AX31403S	12/02/05	11:15	$86US, $HG-S, $MTL3, MOIST
10	C077S439	X-SPK	AX31404S	12/02/05	12:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
11	C077S440	X-SPK	AX31405S	12/02/05	13:00	$86US, $GAUS
12	C077S441	SPKMS/MS	AX31406S	12/02/05	13:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR PAH
13	C077S433	SPKMS/MS	AX31407S	12/02/05	14:00	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR TPH-FF,SVOC
14	C077S434	X-SPK	AX31408S	12/02/05	14:10	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
15	C077S435	X-SPK	AX31409S	12/02/05	14:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
16	C077S430	X-SPK	AX31410S	12/02/05	14:40	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
17	C077S431	X-SPK	AX31411S	12/02/05	14:50	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
18	C077S432	SPKMS/MS	AX31412S	12/02/05	15:00	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR PEST/PCB

AOC 23, EBS 125 2/3

CLEAN

CHAIN-OF-CUSTODY RECORD

23180

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHNSEN

Sampler(s): G. Yao
Signature(s): Gary Yao

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: 6.20 8260B VOCs; 6.15 8015-M TPH-DRO; 7.18 8015B-M TPH-GRO *; 7.3 8270C SVOCs; 7.25 8270C-SIM PAHs; 8.3 8081A/8082 Pest/PCBs; 9.2 6010B/7000 TAL Metals

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTTS429	12/02/05 1230	A235B36	Soil	6 7 GY		01,02,03,10,11,12,20 →	1-2'
COTTS440	1300	↓	↓	5		01,02,03,10,11	2-3'
COTTS441	1330	↓	↓	7		01,02,03,10,11,12,20 →	4.5-6' MS/MSD for PAHs
COTTS433	1400	A235B34	↓	7		01,02,03,10,11,12,20 →	1-2' MS/MSD for TPH-DRO
COTTS434	1410	↓	↓	7		01,02,03,10,11,12,20 →	2-3'
COTTS435	1430	↓	↓	7		01,02,03,10,11,12,20 →	5-6'
COTTS430	1440	A235B33	↓	7		01,02,03,10,11,12,20 →	1-2'
COTTS431	1450	↓	↓	7		01,02,03,10,11,12,20 →	3-4'
COTTS432	↓ 1500	↓	↓	7		01,02,03,10,11,12,20 → GY	6-7.5' MS/MSD for PCBs

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	FedEx	12/02/05	1700	Ship to Lab
		12/3/05	1622	

Comments/Instructions: *Silica-gel cleanup if needed

Method of Shipment: FedEx
Airbill No.: 8544 6005 8767
Total No. of Containers: 61
Total No. of Coolers Shipped: 1
Lab SDG: 49236
Cooler Temp: 0.0°C

AOC 23 EBS 125, 126

CLEAN

CHAIN-OF-CUSTODY RECORD

23189 1/3

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JDHANSEN

Sampler(s): G. Yao
Signature(s): Gary Yao

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 N SWIFT AV FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: 6.20 8260B VOCs; 8.15 8015-M TPHg gas; 7.18 8015B-M TPH-d *; 7.3 8270C SVOCs; 7.25 8270C-SIM PAHs; 8.2 8081A/8082 PEST/PCB; 7.24 6010B/7000 TAL METALS; 1.30 8260B VOCs

Preservation (4°C): HCl

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTTS436	12/02/05 900	A23SB35	Soil	7		01,02,03 10,11,12 20	0-2' MS/MSD for Pest/PCB
COTTS437	930	↓		7		01,02,03 10,11,12 20	2-4'
COTTS438	1000	↓		13	GY 12/3/05	05,06,07,08,09 11,12 20	4-8' MS/MSD for VOCs
COTTS445	1030	A23SB38		4		01,02,03,04 20	0-2' MS/MSD for metals
COTTS446	1040	↓		4		01,02,03,04 20	2-4'
COTTS447	1050	↓		4		01,02,03,04 20	4-8'
COTTS448	1015	A23SB39		4		01,02,03,04 20	0-2'
COTTS449	1045	↓		4		01,02,03,04 20	2-4'
COTTS450	1115	↓		4		01,02,03,04 20	4-8'
COTTTB05	↓ 1330	FQC	↓	2		01,02	Trip Blank

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Gary Yao/Bechtel	FedEx	12/02/05	1700	Ship to Lab	*SILICA-GEL CLEANUP, IF NEEDED
					Method of Shipment: FedEx; Total No. of Coolers Shipped: 1
					Airbill No.: 8544 6605 8767
					Total No. of Containers: 53; Lab SDG: 49236
		12/03/05	1622		Cooler Temp.: 0.0°C

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/3/05

Coolers: Number of Coolers: 1

(YES) NO Were coolers and samples screened for radioactivity?

(YES) NO Were custody seals on outside of cooler? How many? 1 Date on seal? NA

Name on seal? torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

(YES) NO Did the cooler come with a shipping slip (air bill, etc.)? Carrier name: Fed Ex

Shipping slip numbers: 1) see COC. 2) 3)

YES (NO) NA Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap samples

YES NO (NA) For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB250392 Correction factor: 0

Cooler temp(s): 1) 0.0° 2) 3) 4) 5) 6) 7) 8)

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

(YES) NO Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

(YES) NO Did all container labels agree with custody papers?

Sample Containers:

(YES) NO Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

YES (NO) Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

YES NO (NA) Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO (NA) Were correct preservatives added to the samples?

YES NO (NA) Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO (NA) Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies: no container rec'd for moisture AX 31405, 5440

Signature of personnel receiving samples: Libby Anderson Second reviewer:

Signature of project manager notified: DA Date and Time of notification: 12/7/05

Name of client notified: DA Toni Date and Time of notification: 12/7/05

Information given to client: no soil for % moisture

by whom (Initials): DA

APPL - Analysis Request Form

49232

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda 00035 AOC 23 EBS 125/DG 78,79
PO #: CTO 0077
Chain of Custody (Y/N): Y # SEE ARF COMMENT
RAD Screen (Y/N): Y pH (Y/N): Y
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/03/05 Time: 15:30
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): SEE CRF
Color: VOA/RED/ORGGRN
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson
QC Report Type: DVP4/EDD/CA
Due Date: 12/17/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
VOCs and SVOCs + TICs

COC # 23196, 23290, 23293, 23294, 23374, 23376, 23377, 23378, 23379, 23380

Sample Distribution:
GC: 9-$80BT, 9-$87UW, 9-$PCBW, 10-$SIMW, 9-$TPUW
Extractions: 9- SEP004, 10- SEP004S, 9- SEP011, 9- SEP025
VOA: 10-$86UW, 10-$GAUW
Metals: 9-$MT2F, 7-$HG-D
Wetlab: 9-$1601

Charges:

Invoice To:

	Client ID		APPL ID	Sampled		Analyses Requested
1	C077TB07	X-SPK	AX31349W	12/03/05	12:50	$86UW
2	C077G145	X-SPK	AX31350W	12/03/05	08:00	$1601, $80BT, $86UW, $87UW, $GAUW, $MT2F, $PCBW, $SIMW, $TPUW
3	C077G191	X-SPK	AX31351W	12/03/05	13:30	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW
4	C077G143	X-SPK	AX31352W	12/03/05	08:00	$1601, $80BT, $86UW, $87UW, $GAUW, $MT2F, $PCBW, $SIMW, $TPUW
5	C077G192	X-SPK	AX31353W	12/03/05	13:30	$GAUW, $HG-D, $MT2F

APPL - Analysis Request Form 49232

6	C077G185	X-SPK	AX31354W	12/03/05	09:30	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW
7	C077G187	X-SPK	AX31355W	12/03/05	10:00	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW
8	C077G183	X-SPK	AX31356W	12/03/05	10:30	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW
9	C077G181	X-SPK	AX31357W	12/03/05	13:00	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW
10	C077G182	X-SPK	AX31358W	12/03/05	13:00	$86UW, $GAUW
11	C077R005	X-SPK	AX31359W	12/03/05	14:00	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW
12	C077G184	X-SPK	AX31360W	12/03/05	10:30	$TPUW
13	C077G186	X-SPK	AX31361W	12/03/05	09:30	$87UW
14	C077G144	X-SPK	AX31362W	12/03/05	08:00	$80BT, $PCBW
15	C077G188	X-SPK	AX31363W	12/03/05	10:00	$SIMW
16	C077G146	X-SPK	AX31364W	12/03/05	08:00	$1601, $SIMW

DG 78,79

CLEAN

CHAIN-OF-CUSTODY RECORD

23380

Site Name: Alameda DD835
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): G Yao
Signature(s): Gary Yao

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

Preservation (4°C)	6.20 8260B VOCs	6.165 8015M TPHgas	7.18 8015B-M TPH-D *	7.3 8270C SVOCs (NO PAH)	7.265 8270C SIM PAH	8.2 8081A/8082 PEST/PCB	9.2 6010B/7000 TAL METALS	1.560 8260B VOCs
HCl								

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTTS501	12/3/05 830	DTSSB03	SOIL	7		01,02 03 / 10,11 12 / 20 →	1-2'
COTTS508	840	↓	↓	7		01,02 03 / 10,11 12 / 20 →	2-3'
COTTS509	850	↓	↓	7		01,02 03 / 10,11 12 / 20 →	6-7.5' MS/MSD for metals
COTTS510	930	DTSSB04	↓	4		01,02 / 10,11	~~2-3'~~ 0.5-1.5' cy
COTTS511	940	↓	↓	7		01,02 03 / 10,11 12 / 20 →	2-3'
COTTS512	950	↓	↓	7		01,02 03 / 10,11 12 / 20 →	5-6.5' MS/MSD for PAHs & Pesticides
COTTS507	1050	DTSSB02	↓	13		01,02 03 / 10 → 18 / 20 →	1-2' MS/MSD for TPH-gas
COTTS505	1055	↓	↓	7		01,02 03 / 10,11 12 / 20 →	2.5-3.5'
COTTS506	1105	↓	↓	7		01,02 03 / 10,11 12 / 20 →	5-6'
COTTTB01	↓ 1250	FQC	Water	2		01 02	Trip Blank

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Gary Yao/Bechtel	[signature] Lab Courier	12/03/05	1530	Lab Courier	* SILICAGEL CLEAN UP, IF NEEDED
					Method of Shipment: Lab Courier / Total No. of Coolers Shipped: 1
					Airbill No.:
					Total No. of Containers: 68 / Lab SDG: 49232 / Cooler Temp: 0.5°C

AOC 23 EBS 125

CLEAN

CHAIN-OF-CUSTODY RECORD

23294

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): M. Leddy
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4100 W. SWIFT AV, FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

Preservation (4°C)	1.15	2.18	2.3	2.35	3.3	4.2	5.38	5.9	1.50
	8015B-W TPH-dies	8015B-W TPH-GF *	8270C-SIM SVOCs	8270C-SIM PAHs	6010B/8082 PCBs/PCBs	6010B/7000 METALS (NO Hg) **	160.1 TDS	DECANT AT LAB ***	8260B VOCs
HCl					HNO3		HCl		

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0776145	12/3 900	A235B34	WATER	10		20 21, 30 31, 40 41, 50 51, 60, 70	
C0776146	12/3 900	A235B34	WATER	3		40 41, 70	Dup

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
[illegible]/BEI	[illegible]/APPL	12/3/05		shipped/lab

Comments/Instructions: Added temp blank
* SILICA GEL CLEANUP, IF NEEDED
** FILTERED & PRES. IN FIELD
*** DECANT ALL UNPRES. SAMPLES, EXCEPT TDS AT LAB

Method of Shipment: courier
Airbill No.: —
Total No. of Containers: 13
Total No. of Coolers Shipped: 1
Lab SDG: 49232
Cooler Temp.: 4.0°C

PG 78

CLEAN

CHAIN-OF-CUSTODY RECORD

23374

Site Name: Alameda DDD35	Sampler(s): M LEDDY
CTO Number: DD77	Signature(s):
Site Contact/Supervisor: Johansen	

Analytical Laboratory Name: APPL

Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722

Field Logbook/Page Number:

Pay Items/ Analyses Required

Pay Item	Analysis	Preservation (4°C)
1.15	8015-M TPH-d (SG)*	HCl
2.18	8015B-M TPH-d*	
2.3	8270C SVOCs (Non PAH)	
2.25	8270C SIM PAH	
9.12	8081A/8082 PEST/PCB	
4.12	6010B/7000 METALS**	
5.38	160.1 TDS	
5.9	Decant at lab**	HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G191	12/3 1330	D79SB01	WATER	10		20 21, 30 31, 40 41, 50 51, 60, 70	
C077G192	12/3 1332	D79SB01	WATER	1		60	

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
BECHTEL	APPL Inc	12/3/05	1530	COURIER TO LAB

Comments/Instructions:
* SILICA GEL CLEANUP, IF NEEDED
** FILTERED & PRES. IN FIELD
*** DECANT ALL UNPRES. SAMPLES, EXCEPT TDS

Method of Shipment: LAB COURIER

Airbill No.:

Total No. of Containers: 11

Total No. of Coolers Shipped: 1

Lab SDG: 49232

Cooler Temp.: 2.0°C

AOC 23 EBS 125 / DG78

CLEAN

CHAIN-OF-CUSTODY RECORD

#9 *** 23293

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): MLEDDY
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

1.15	2.18	2.3	2.25	3.3	4.2	5.38	59	1.50
8015-M TPH G's	8015B-M TPHd *	8270C SVOCs	8270C-SIM PAHs	8081A/8082 PEST/PCB	6010B/7000 METALS-N	160.1 TDS	PAHANT AT LAB ***	8260B VOCs

Preservation (4°C): HCl | | | | | HNO3 | | | HCl | | |

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G145	12/3 900	A23SB34	WATER	5		10,11 ... 01->03	
C077G191	12/3 1330	D79SB01	↓	↓		10,11 ... 01->02	
C077G143	12/3 930	A23SB33	WATER	↓		10,11 ... 01->03	
C077G192	12/3 1330	D79SB01	↓	+2 (MS)		10,11 ... 01->03 (MSD)	
C077G185	12/3 930	D78SB03	WATER	5		10,11 ... 01->03	
C077G187	12/3 1000	D78SB04	↓	↓		10,11 ... 01->03	
C077G183	12/3 1030	D78SB02	↓	↓		10,11 ... 01->03	
C077G181	12/3 1300	D78SB01	↓	↓		10,11 ... 01->03	
C077G182	12/3 1300	D78SB01	↓	↓		10,11 ... 01->03	
C077R005	12/3 1400	FBC	WATER	↓		10,11 ... 01->03	

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Mjeddy Bechtel	APPL INC	12/03/05	1530	LabCourier

Comments/Instructions:
* SILICA GEL CLEAN UP, IF NEEDED
** FILTERED & PRES IN FIELD
*** DECANT ALL UNPRES. SAMPLES, EXCEPT TDS, AT LAB

Method of Shipment: LabCourier
Airbill No.:
Total No. of Containers: 47
Total No. of Coolers Shipped: 1
Lab SDG: 49232
Cooler Temp: 2.0

DG 78

CLEAN

CHAIN-OF-CUSTODY RECORD

23379

Site Name: Alameda DDD35
CTO Number: DD77
Site Contact/Supervisor: Johansen

Sampler(s): M. LEDDY
Signature(s): [signature]

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required:
- 1.15 8015-M TPH-G
- 2.18 8015B-M TPH-D *
- 2.3 8260C SVOCs (NON PAH)
- 2.25 8270C SIM PAHs
- 3.3 8081/8082 PEST/PCB
- 4.2 6010B/7000 METALS **
- 5.38 160.1 TDS
- 5.9 DECANT AT LAB ***

Preservation (4°C): HCl; HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)											Remarks (e.g., MS, MSD)
C077G187	12/3 1000	D78SB04	WATER	10			20 21	30 31	40 41	50 51	60	70					
C077G188	12/3 1000	D78SB04	WATER	2					40 41								DUP

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
[signature]/BEI	[signature]/APPL Inc	12/3/05		Ship to lab

Comments/Instructions: Added temp blank
* SILICA-GEL CLEAN UP IF NEEDED
** FILTERED AND PRESERVED IN FIELD
*** DECANT ALL UNPRES. SAMPLES AT LAB, EXCEPT TDS

Method of Shipment: Lab Courier
Total No. of Coolers Shipped: 1
Airbill No.: —
Total No. of Containers: 12
Lab SDG: 49232
Cooler Temp.: 2.5°C

AOC 23 EBS 125

CLEAN

CHAIN-OF-CUSTODY RECORD

23290

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): MLEDDY
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

1.15	2.16	2.3	2.25	3.3	4.2	5.38	5.9
8015-M TPH gas	8015B-M TPH-d *	8270C SVOCs	8270C-SIM PAHs	8081A/8082 PEST/PCBs	6010B/7000 METALS, Hg ***	160.1 TDS	DECANT AT LAB ***

Preservation (4°C): HCl, H2SO4

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G145	12/3	A23SB33	WATER				
C077G193	12/3 850	A23SB33	WATER	10		20 21; 30 31; 40 41; 50 51; 60; 70	
C077G199	12/3 850	A23SB33	WATER	2		50 51	

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Eric Flom / Bechtel	[illegible] / APPL Inc	12/3/05	1530	Courier to Lab

Comments/Instructions:
* SILICA GEL CLEANUP, IF NEEDED
** FILTERED & PRES IN FIELD
*** DECANT ALL UNPRES SAMPLES, EXCEPT TDS AT LAB

Method of Shipment: LAB COURIER
Airbill No.:
Total No. of Containers: 12
Total No. of Coolers Shipped: 1
Lab SDG: 49232
Cooler Temp.: 4.0°C

BECHTEL **CLEAN**

CHAIN-OF-CUSTODY RECORD

23376

Site Name: Alameda DOD 35
CTO Number: DD77
Site Contact/Supervisor: Johansen

Sampler(s): M LEDDY
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

1.16	2.18	2.23	2.25	3.22	4.12	9.38	5.9
8015-M TPH-gas	8015B-M TPH-d*	8270C SVOCs (NON PAH)	8270C SIM PAHs	6010B/7000 Metals ***	6010B/7000 Metals **	Wet TDS	DECANT AT LAB ***

Preservation (4°C)

HCl					HNO3 w/ Hg								

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G181	12/3 1300	D79SB01	WATER	10		20 21, 30 31, 40 41, 50 51, 60, 70	
C077G182	12/3 1300	D79SB01	WATER (M)				

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Bechtel	APPL	12/3/05	1530	COURIER TO LAB

Comments/Instructions:
* SILICA-GEL CLEANUP, IF NEEDED
** FILTERED AND PRES. IN FIELD
*** DECANT ALL UNPRES. SAMPLES AT LAB, EXCEPT TDS

Method of Shipment: LAB COURIER
Airbill No.:
Total No. of Containers: 10
Total No. of Coolers Shipped: 1
Lab SDG: 49232
Cooler Temp.: 3.5°C

DG 78

CLEAN

CHAIN-OF-CUSTODY RECORD

23378

Site Name: Alameda DD035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): MLEDDY
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

1.15 8015-M TPH-gas
2.18 8015B-M TPH-d *
2.3 8270C SVOCs (NON PAHs)
2.25 8270C SIM PAHs
3.3 8081A/8082 PEST/PCB
4.2 6010B/7000 METALS **
5.38 160.1 TDS
5.9 DECANT AT LAB ***

Preservation (4°C): HCl, HNO3

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G185	12/3 930	D78SB03	WATER	10		20 21, 30 31, 40 41, 50 51, 60, 70	
C077G186	12/3 930	D78SB03		2		30 31, 40 41 (MS)	

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
[signature] /Bechtel	[signature] /APPL Inc	12/3/05	1530	Courier to Lab

Comments/Instructions:
* SILICA-GEL CLEANUP IF NEEDED
** FILTERED & PRES. IN FIELD
*** DECANT ALL UNPRES. SAMPLES AT LAB, EXCEPT TDS

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 12
Total No. of Coolers Shipped: 1
Lab SDG: 49232
Cooler Temp.: 3.0°C

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DG 79

CLEAN

CHAIN-OF-CUSTODY RECORD

23196

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): M LEDDY
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE, FRESNO, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

	1.15	2.18	2.13	2.25	3.3	4.12	5.38	5.9
	8015-M TPH-gas	8015B-M TPH-d*	8270C SVOCs (NAPH ONLY)	8270C SIM PAH	6081A/8082 PEST/PCB	6010B/7000 METALS**	160.1 TDS	DECANT AT LAB***
Preservation (4°C)								
HCl					H_2SO_4			

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077R05	12/3 1400	FRC	WATER	10		20 21 / 30 31 / 40 41 / 50 51 / 60 / 70	RINSATE

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
BECHTEL	APPL INC	12/3/05	1530	SHIP TO LAB
		12/4/05	1800	

Comments/Instructions:
*SILICA GEL CLEANUP IF NEEDED
** FILTERED & PRES. IN FIELD
*** DECANT UNPRES. SAMPLES, EXCEPT TDS, AT LAB

Method of Shipment: LAB COURIER
Airbill No.:
Total No. of Containers: 10
Total No. of Coolers Shipped: 1
Lab SDG: 49232
Cooler Temp.: 3.0°C

12/4

DG 78

BECHTEL **CLEAN**

CHAIN-OF-CUSTODY RECORD

GW

23377

Site Name: Alameda DD235
CTO Number: DD77
Site Contact/Supervisor: Johansen

Sampler(s): M. EDDY
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

1.16 (8015-M TPH-gas) | 2.18 (8015B-M TPH-dp *) | 2.3 (8270C SVOCs (non PAHs)) | 2.25 (8270C-SIM PAHs) | 2.3 (8081A/8082 Pest/PCB) | 4.2 (6010B/7000 Metals **) | 5.38 (160.1 TDS) | 5.9 DECANT AT LAB ***

Preservation (4°C): HCl | HNO3

TAT (in days): 2 | 7 | (4) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G183	12/3 1030	D78SB02	WATER	1 0		20 21, 30 31, 40 41, 50 51, 60, 70	
				2 GW			
C077G184	12/3 1030	D78SB02	WATER	2		20 21	Dup

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
BEI		12/3/05		ship to lab
		12/4/05	1200	

Comments/Instructions: Added temp blank

* SILICA-GEL CLEANUP, IF NEEDED
** FILTERED AND PRES. IN FIELD
*** DECANT ALL UNPRES. SAMPLES AT LAB, EXCEPT TDS

Method of Shipment: lab courier
Airbill No.: →
Total No. of Containers: 12
Total No. of Coolers Shipped: 1
Lab SDG: 49232
Cooler Temp.: 2.5°C

12/4

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COOLER RECEIPT FORM

Project: Alameda Date Received: 12/3/05

Coolers: Number of Coolers: 9

(YES) NO Were coolers and samples screened for radioactivity?

(YES) NO Were custody seals on outside of cooler? How many? 18 Date on seal? NA

Name on seal? torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

YES (NO) Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO (NA) Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap samples

(YES) NO NA For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB250392 Correction factor: 0

Cooler temp(s): 1) 0.5° 2) 4.0° 3) 2.0° 4) 2.5° 5) 4.0° 6) 3.5° 7) 3.0° 8) 3.0° 9) 2.5°

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

(YES) NO Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

(YES) NO Did all container labels agree with custody papers?

Sample Containers:

YES (NO) Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

YES (NO) Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

(YES) NO NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea: AX31349W02

Smaller than a pea: AX31349W01

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

(YES) NO NA Were correct preservatives added to the samples?

(YES) NO NA Was the pH taken of all non-VOA preserved samples and written on the sample container?

(YES) NO NA Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies:

Signature of personnel receiving samples: Libby Anderson Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

APPL - Analysis Request Form 49233

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda 00035 DG 78, 79
PO #: CTO 0077
Chain of Custody (Y/N): Y # 23380,23234
RAD Screen (Y/N): Y pH (Y/N): N
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/03/05 Time: 15:30
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): 0.5°C
Color: VOA/BLUEYELLOW
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson DA
QC Report Type: DVP4/EDD/CA
Due Date: 12/17/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
VOCs and SVOCs + TICs

Sample Distribution: Charges: Invoice To:
GC: 14-$80BTS, 14-$87US, 14-$PCBS, 14-$SIMB, 14-$TPUS
Extractions: 14-_SON002, 14-_SON004, 14-_SON009, 14-_SON009S
VOA: 15-$86US, 15-$GAUS
Metals: 14-$HG-S, 14-$MTL3
Wetlab: 14-MOIST

	Client ID		APPL ID	Sampled	Analyses Requested
1	C077S507	X-SPK	AX31365S	12/03/05 08:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
2	C077S508	X-SPK	AX31366S	12/03/05 08:40	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
3	C077S509	SPKMS/MS	AX31367S	12/03/05 08:50	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR METAL ONLY
4	C077S510	X-SPK	AX31368S	12/03/05 09:30	$86US, $GAUS
5	C077S511	X-SPK	AX31369S	12/03/05 09:40	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST

6	C077S512	SPKMS/M	AX31370S	12/03/05 09:50	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST, MS/MSD FOR PAHS PEST PCBS
7	C077S504	SPKMS/M	AX31371S	12/03/05 10:50	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST, MS/MSD FOR TPH-GAS
8	C077S505	X-SPK	AX31372S	12/03/05 10:55	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
9	C077S506	X-SPK	AX31373S	12/03/05 11:05	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
10	C077S501	X-SPK	AX31374S	12/03/05 12:20	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
11	C077S502	X-SPK	AX31375S	12/03/05 12:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
12	C077S503	X-SPK	AX31376S	12/03/05 12:40	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
13	C077S521	SPKMS/M	AX31377S	12/03/05 12:50	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST, MS/MSD FOR VOCS
14	C077S522	SPKMS/M	AX31378S	12/03/05 13:00	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST, MS/MSD FOR SVOCS
15	C077S523	X-SPK	AX31379S	12/03/05 13:10	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST

DG 78,79

CLEAN

CHAIN-OF-CUSTODY RECORD

23380

Site Name: Alameda DD235
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): G Yao
Signature(s): Gary Yao

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTTS501	12/3/05 830	D78SB03	SOIL	7		01,02,03 / 10,11,12 / 20 →	1-2'
COTTS508	840	↓		7		01,02,03 / 10,11,12 / 20 →	2-3'
COTTS509	850	↓		7		01,02,03 / 10,11,12 / 20 →	6-7.5' MS/MSD for metals
COTTS510	930	D78SB04		4		01,02 / 10,11	~~2-3'~~ 0.5-1.5' GY
COTTS511	940	↓		7		01,02,03 / 10,11,12 / 20 →	2-3'
COTTS512	950	↓		7		01,02,03 / 10,11,12 / 20 →	5-6.5' MS/MSD for PAHs & Perchl
COTTS507	1050	D78SB02		13		01,02,03 / 10,12 / 20 →	1-2' MS/MSD for TPH-gas
COTTS505	1055	↓		7		01,02,03 / 10,11,12 / 20 →	2.5-3.5'
COTTS506	1105	↓		7		01,02,03 / 10,11,12 / 20 →	5-6'
COTTTB01	↓ 1250	FQC	Water	2		01,02 / 10,11 / 20 →	Trip Blank

Preservation (4°C): 6.20, 6.15, 7.18, 7.3, 7.25, 8.22, 9.2, 1.50 HCl

TAT (in days): 2 | 7 | (14) | 30

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	[signature] Doc	12/03/05	1530	Lab Courier

Comments/Instructions: * SILICAGEL CLEAN UP, IF NEEDED

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 68
Total No. of Coolers Shipped: 1
Lab SDG: 49233
Cooler Temp.: 0.5°C

DG 78,79

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23234

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yao
Signature(s): Gary Yao

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: 6.20 8260B VOCS; 6.15 8015-M TPH-gas; 7.18 8015B-M TPH-P *; 7.3 8270C SVOC (w/o PAH); 7.25 8270C SIM PAH; 8.3 8081A/8082 PEST/PCB; 9.2 6010B/7000 METALS; 1.50 8260B VOCS

Preservation (4°C); HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0TTS501	12/03/05 1220	D785B01	SOIL	7		01,02,03 / 10,11,12 / 20 →	0-1'
C0TTS502	↓ 1230	↓	↓	7		01,02,03 / 10,11,12 / 20 →	3-4'
C0TTS503	↓ 1240	↓	↓	7		01,02,03 / 10,11,12 / 20 →	4-5'
C0TTS521	↓ 1250	D795B01	↓	13		01-09 / 10,11,12 / 20 →	1-2' MS/MSD for VOCS
C0TTS522	↓ 1300	↓	↓	7		01,02,03 / 10,11,12 / 20 →	3-4' MS/MSD for SVOCS
C0TTS523	↓ 1310	↓	↓	7		01,02,03 / 10,11,12 / 20 →	4.5-5.5'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao / Bechtel	[signature] / APPL Inc	12/03/05	1530	Lab Courier

Comments/Instructions: * SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: Lab Courier
Total No. of Coolers Shipped: 1
Airbill No.:
Total No. of Containers: 48
Lab SDG: 49233
Cooler Temp: 0.5°C

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/3/05

Coolers: Number of Coolers: 1

(YES) NO Were coolers and samples screened for radioactivity?

(YES) NO Were custody seals on outside of cooler? How many? 2 Date on seal? NA

Name on seal? torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

YES (NO) Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO (NA) Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap samples

(YES) NO NA For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB250392 Correction factor: 0

Cooler temp(s): 1) 0.5° 2) 3) 4) 5) 6) 7) 8)

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

(YES) NO Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

(YES) NO Did all container labels agree with custody papers?

Sample Containers:

YES (NO) Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

YES (NO) Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

YES NO (NA) Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO (NA) Were correct preservatives added to the samples?

YES NO (NA) Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO (NA) Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies: no container rec'd for moisture on AX 31368, 5510

Signature of personnel receiving samples: Libby Anderson Second reviewer:

Signature of project manager notified: DA Date and Time of notification: 12/7/05

Name of client notified: Toni Date and Time of notification: 12/7/05

Information given to client: no soil for % moisture

by whom (Initials): TAT

AOC 23/EBS Parcels 123, 124, 125, 126

CLEAN

CHAIN-OF-CUSTODY RECORD

23363

Site Name: Alameda 00035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): G Yao, O Khan, MJ
Signature(s): Gary Yao, OK
MSwanson, MS

Pay Items/ Analyses Required: 4.30 Mercury/1631*

Analytical Laboratory Name: Brooks Rand LLC
Analytical Laboratory Address: 3958 6th Av. NW, Seattle WA, 98107
Field Logbook/Page Number:

Preservation (4°C): GW HNO3

TAT (In days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0TTG145	12/03/05 800	A23SB34	Water	1		90	
C0TTG143	↓ 800	A23SB33				90	
C0TTSW01	12/07/05 1430	FQC				90	Not Filtered Source Water Blank
C0TTG150	12/08/05 915	A23SB37				90	5-10'
C0TTG127	1000	A23SB22				90	4-9'
C0TTG142	1630	A23SB32				90	4-9'
C0TTG141	↓ 1250	A23SB31	↓	↓		90	3-8'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Gary Yao/Bechtel	FedEx	12/08/05	1700	Ship to Lab	*field filtered
	Jennell Jumpp/Brooks Rand	12/9/05	8:10		

Method of Shipment: FedEx
Airbill No.: 8508 1451 5229
Total No. of Containers: 7
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

APPL - Analysis Request Form 49247

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda AOC 23 EBS/123 DG 79
PO #: CTO 0077
Chain of Custody (Y/N): Y # 23176-77,23195,2330
RAD Screen (Y/N): Y pH (Y/N): N
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/06/05 Time: 08:00
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): 1.0°C
Color: VOA/YELLOWPURPLE
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: DIANE ANDERSON mp for DA
QC Report Type: DVP4/EDD/CA
Due Date: 12/20/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
****** NO TICs required ******

Sample Distribution: C: 18-$80BTS, 12-$87US, 18-$PCBS, 12-$SIMB, 12-$TPUS
Extractions: 18-_SON002, 12-_SON004, 12-_SON009
VOA: 12-$86US, 12-$GAUS
Metals: 18-$HG-S, 18-$MTL3
Wetlab: 18-MOIST

Charges:

Invoice To:

	Client ID		APPL ID	Sampled		Analyses Requested
1.	C077S524	X-SPK	AX31464S	12/05/05	08:20	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
2.	C077S525	X-SPK	AX31465S	12/05/05	08:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
3.	C077S526	X-SPK	AX31466S	12/05/05	08:40	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
4.	C077S530	X-SPK	AX31467S	12/05/05	09:10	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
	C077S531	X-SPK	AX31468S	12/05/05	09:20	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST

6	C077S532	SPKMS/MS	AX31469S	12/05/05 09:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR SVOCS ONLY
7	C077S527	X-SPK	AX31470S	12/05/05 10:10	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
8	C077S528	SPKMS/MS	AX31471S	12/05/05 10:20	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR GAS
9	C077S529	SPKMS/MS	AX31472S	12/05/05 10:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR PEST/PCB ONLY
10	C077S394	X-SPK	AX31473S	12/05/05 13:00	$80BTS, $HG-S, $MTL3, $PCBS, MOIST -- PCBS ONLY
11	C077S395	X-SPK	AX31474S	12/05/05 13:10	$80BTS, $HG-S, $MTL3, $PCBS, MOIST -- PCBS ONLY
12	C077S396	X-SPK	AX31475S	12/05/05 13:20	$80BTS, $HG-S, $MTL3, $PCBS, MOIST -- PCBS ONLY
13	C077S397	X-SPK	AX31476S	12/05/05 14:00	$80BTS, $HG-S, $MTL3, $PCBS, MOIST -- PCBS ONLY
14	C077S398	X-SPK	AX31477S	12/05/05 14:10	$80BTS, $HG-S, $MTL3, $PCBS, MOIST -- PCBS ONLY
15	C077S399	X-SPK	AX31478S	12/05/05 14:20	$80BTS, $HG-S, $MTL3, $PCBS, MOIST -- PCBS ONLY
16	C077S379	X-SPK	AX31479S	12/05/05 14:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
17	C077S380	SPKMS/MS	AX31480S	12/05/05 14:40	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR GAS ONLY
18	C077S381	X-SPK	AX31481S	12/05/05 14:50	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST

Volatiles - Soil

BECHTEL **CLEAN**

CHAIN-OF-CUSTODY RECORD

23309

Site Name: Maraida Site 35
CTO Number: 0077
Site Contact/Supervisor: E. Johansen

Sampler(s): J. Bornstein, M. Leddy
Signature(s): [signature] M Leddy

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Ave, Fresno CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

6.20	6.15	7.18	7.3	7.25	8.3	9.2
8260B VOCs	8015-M TPH-D	8015-M TPH-G/BTEX*	8270C SVOCs	8270C SVOCs PAHs	8081A/8082 PCB	6010B (TCDD Method)

Preservation (4°C)

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775524	12/5/05 0820	D795B02	Soil	6 6 7		01 02 03 10 11 12 20	0-1'
C0775525	0830	↓	↓	↓		01 02 03 10 11 12 30	3-4'
C0775526	0840	↓	↓	↓		01 02 03 10 11 12 35	5.5-6.5'
C0775530	0910	D795B04	↓	↓		01 02 03 10 11 12	1-2'
C0775531	0920	↓	↓	↓		01 02 03 10 11 12	2-3'
C0775532	0930	↓	↓	↓		01 02 03 10 11 12	6.5-8'
C0775527	1010	D795B03	↓	↓		01 02 03 10 11 12	0-1'
C0775528	1020	↓	↓	↓		01 02 03 10 11 12	2-3'
C0775528	1020	↓	↓	↓		13,14 15,16 17,18	2-3' MS/MSD
C0775529	1030	↓	↓	↓		01 02 03 10 11 12	4-5.5

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh/Bechtel	[signature] Apptex	12/5/05	1700	Ship to lab
		12/6/05	0800	

Comments/Instructions: * Silica gel cleanup, if necess.

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 66
Total No. of Coolers Shipped: 1
Lab SDG: 49247
Cooler Temp.: 1.0°C

AOC 23 EBS 1277

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23176

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): J. Bornstein, M. Leddy
Signature(s): J. Bornstein, M. Leddy

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

6.20 8260B VOCs	6.15 8015-M TPH gas	7.18 8015B-M TPH D *	7.13 8270C SVOCs	7.252 8270C-SIM PAHs	8.3 8081A/8082 PEST/PCBs	9.2 6010B/7000 TAL METALS	8.18 PCBs only Bobz
Preservation (4°C)							

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775394	12/5/05 1300	A235B15	SOIL	1		20 20	1.5-2.5'
C0775395	1310	↓	↓	↓		20 20	2.5-3.5'
C0775396	1320	↓	↓	↓		20 20	6.5-7.5'
C0775397	1400	A235B16	↓	↓		20 20	1.5-2'
C0775398	1410	↓	↓	↓		20 20	3-4'
C0775399	1420	↓	↓	↓		20 20	7.5-8'
C0775379	1430	A235B09	↓	↓		20 →	1-2'
C0775380	1440	↓	↓	↓		20 →	3-4'
C0775381	1450	↓	↓	↓		20 →	7-8'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh / Bechtel	[signature] / APPL Inc	12/5/05	1700	Ship to Lab
		12/6/05	0800	

Comments/Instructions: * SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 9
Total No. of Coolers Shipped: 1
Lab SDG: 49247
Cooler Temp.: 1.0°C

AOC 23 EBS 123 volatiles - soil

CLEAN

CHAIN-OF-CUSTODY RECORD

23177

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): J. Bornstein, M. Leddy
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

8260B VOCs	8015-M TPH gas	8015B-M TPH dsl *	8270C SVOCs	8270C:SIM PAHs	8081A/8082 PEST/PCB	6010B/7000 TAL metals
6.20	6.15	7.18	7.3	7.25	8.3	9.2

Preservation (4°C)

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775379	12/5/05 1430	A23SB09	SOIL	6		01 02 03 10 11	1-2'
C0775380	1440			6		01 02 03 10 11 12	3-4'
C0775380	1440			6		13 14 15 16 17 18	3-4' ms/msd
C0775381	1450			6		01 02 03 10 11 12	7-8'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. Mehugh / Bechtel	[signature] / APPL Doc	12/5/05	1700	Ship to lab
		12/6/05		

Comments/Instructions: * SILICA-GEL CLEANUP IF NEEDED

Method of Shipment: courier
Airbill No.: NA
Total No. of Containers: 24
Total No. of Coolers Shipped: 1
Lab SDG: 49247
Cooler Temp.: 1.0°C

DG 79

CLEAN

CHAIN-OF-CUSTODY RECORD

23195

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): J. Bornstein, M. Leddy
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

Container Nos. (2 digit)	6.20 8260B VOCs	6.15 8015-M TPHgas	7.18 8015B-M TPH-D*	7.3 8270C SVOCs (NON PAH)	7.25 8270C SIM PAH	8.3 8081A/8082 PEST/PCB	9.12 6010B/7000 METALS	1.60 8260B VOCs
Preservation (4°C)							HCl	
20								
21								

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775524	12/5/05 0820	D79SB02	SOIL	1		20	0-1'
C0775525	0830					20	3-4'
C0775526	0840					20	5.5-6.5
C0775530	0910	D79SB04				20	1-2'
C0775531	0920					20	2-3'
C0775532	0930					20	6.5-8'
C0775532	0930					21 22	6.5-8' MS/MSD
C0775527	1010	D79SB03				20	0-1'
C0775528	1020					20	2-3'
C0775529	1030			21		20 20 20 20	4-5.5' MS/MSD for 8081 8082

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh / Bechtel	APPL Inc.	12/5/05	1700	Ship to lab
		12/06/05	0800	

Comments/Instructions: *SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: courier
Airbill No.: NA
Total No. of Containers: 10

Total No. of Coolers Shipped: 1
Lab SDG: 49247
Cooler Temp.: 1.0°C

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/6/05

Coolers: Number of Coolers: 1

(YES) NO Were coolers and samples screened for radioactivity?

(YES) NO Were custody seals on outside of cooler? How many? 1 Date on seal? NA

Name on seal? torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

YES (NO) Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers:1) 2) 3)

YES NO (NA) Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap samples

(YES) NO NA For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB250392 Correction factor: Ø

Cooler temp(s): 1) I.D 2) 3) 4) 5) 6) 7) 8)

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

YES (NO) Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

(YES) NO Did all container labels agree with custody papers?

Sample Containers:

(YES) NO Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

YES (NO) Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

YES NO (NA) Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO (NA) Were correct preservatives added to the samples?

YES NO (NA) Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO (NA) Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies:

Signature of personnel receiving samples: Libby Anderson Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

APPL - Analysis Request Form 49257

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda AOC 23/EBS 123 Parcel 110
PO #: CTO 0077
Chain of Custody (Y/N): Y # 23297,175,265,254
RAD Screen (Y/N): Y pH (Y/N): N
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/07/05 Time: 08:00
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): 1.5°C
Color: VOA/YELLOWPURPLE
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson mp for DA
QC Report Type: DVP4/EDD/CA
Due Date: 12/21/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
****** NO TICs required ******

Sample Distribution: Charges: Invoice To:
GC: 12-$80BTS, 12-$87US, 12-$PCBS, 12-$SIMB, 12-$TPUS
Extractions: 12-_SON002, 12-_SON004, 12-_SON009, 12-_SON009S
VOA: 12-$86US, 12-$GAUS
Metals: 12-$HG-S, 12-$MTL3
Wetlab: 12-MOIST

	Client ID		APPL ID	Sampled	Analyses Requested
1.	C077S451	X-SPK	AX31533S	12/06/05 15:00	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
2.	C077S452	X-SPK	AX31534S	12/06/05 15:10	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
3.	C077S453	X-SPK	AX31535S	12/06/05 15:15	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
4.	C077S401	X-SPK	AX31536S	12/06/05 13:10	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST

5	C077S402	SPKMS/MS	AX31537S	12/06/05	13:20	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR SVOCS
6	C077S379	X-SPK	AX31538S	12/06/05	14:00	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
7	C077S380	X-SPK	AX31539S	12/06/05	14:10	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
8	C077S381	X-SPK	AX31540S	12/06/05	14:20	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
9	C077S382	X-SPK	AX31541S	12/06/05	09:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
10	C077S383	X-SPK	AX31542S	12/06/05	09:40	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
11	C077S384	SPKMS/MS	AX31543S	12/06/05	09:50	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR METALS
12	C077S400	X-SPK	AX31544S	12/06/05	13:00	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST

AOC 23 EBS 123

CLEAN

CHAIN-OF-CUSTODY RECORD

23297

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: DHANSEN

Sampler(s): J. Bornstein, M. Leddy
Signature(s): [signature] M. Leddy

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

6.1	6.2	6.15	7.1	7.3	7.25	8.3	9.2
1,1 DCE VOCs	8260B VOCs	8015M TPH-g	TPH-d 8015B-M	SVOCs 8270C (SIM)	PAHs 8270C (SIM)	Pest/PCBs 8081A/8082	Metals 6010B/7000

Preservation (4°C): HCl | HCl | HCl

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
			WATER				
C0775451	12/6/05 1500	A23SB40	Soil	7		01 02 03 10 11 12 20	1-2'
C0775452	1510			7		01 02 03 10 11 12 20	2-3'
C0775453	1515			7		01 02 03 10 11 12 20	7-8'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. Murtaugh/Bechtel	[signature] Li/APPL	12/6/05	1700	Ship to lab
		12/07/05	0800	

Comments/Instructions:

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 21
Total No. of Coolers Shipped: 1
Lab SDG: 49257
Cooler Temp: 1.5°C

AOC 23 EBS 123 Volatiles

CLEAN

CHAIN-OF-CUSTODY RECORD

23175

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): J Boroughs, M. Leddy
Signature(s): J Boroughs, M Leddy

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

6.10	8260B	VOCs
6.15	8015-M	TPHgas
7.18	8015Bm	TPHd *
9.2	6010B/7000	TAL METALS
1.15	TPH-gas/BTEX	8015M
1.5	VOCs	8260B

Preservation (4°C): HCL, HCL

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775401	12/6/05 1310	A23SB18	SOIL	6		01 02 03; 10 11 12	3-4'
C0775402	1320	↓				01 02 03; 10 11 12	6.5-8'
C0775379	1400	A23SB13				01 02 03; 10 11 12	1-2'
C0775380	1410	↓				01 02 03; 10 11 12	2-3'
C0775381	1420	↓	↓	↓		01 02 03; 10 11 12	4-5'
C077G122	1300	A23SB18	Water	5		10 11; 01 02 03	3-8'
C077TB09	1400	FQC		2		01 02 03 ea BB	TRIP
C077G112	1400	A23SB13		~~3~~ 5		10 11; 01 02 03	5-8'
C077G112	1400	↓		6		01,05 02,03 04,06	5-8 MS/MSD
C077RC07	1500	FQC	↓	5		10 11; 01 02 03	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh/Bechtel	[illegible]/APPL	12/6/05	1700	Ship to Lab
		12/07/05	0800	

Comments/Instructions: * SILICA GEL CLEANUP, IF NEEDED

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 73
Total No. of Coolers Shipped: 1
Lab SDG: 49257/49262
Cooler Temp.: 1.5°C

ADC 23/EBS Parcel UD — Volatiles

CLEAN

CHAIN-OF-CUSTODY RECORD

23265

Site Name: Alameda DDD35
CTO Number: 0077
Site Contact/Supervisor: Johnsen
Sampler(s): J. Bornstein, M. Liddy
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: TPH-GCS 8015-M; TPH-D 8015-M; SVOCs 8270C; PAHs 8270C SIM; Pest/PCBs 8081A; Metals 6010B; TOC 160.1; VOCs 8260B; VOCs 8260B; TPH-D 8015-M; VOCs 8260B

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Preservation (4°C)	Remarks (e.g., MS, MSD)
C077G115	12/6/05 0830	A23SB12	Water	5		HCl / none / HCl / none	8-13'
C077S382	0930	A23SB10	Soil	6			1-2'
C077S383	0940	A23SB10					2-3'
C077S384	0950	A23SB10					4-5.5'
C077G116	0800	A23SB09	Water	5			6-11'
C077G128	0900	A23SB23					5-10'
C077G129	0900	A23SB23					5-10' dup
C077G113	1020	A23SB10					5-10'
C077G114	1000	A23SB11					5-10'
C077S400	1300	A23SB18	Soil	6			1-2'

TAT (in days): 2 | 7 | (14) | 30

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh / Bechtel	[illegible] / APPL Inc.	12/6/05	1700	Ship to lab
		12/07/05	0800	

Comments/Instructions: *field filtered

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 54
Total No. of Coolers Shipped: 1
Lab SDG: 49257
Cooler Temp.: 1.5°C

AOC 23/EBS Parcel 110 w/volatiles

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23254

Site Name: Alameda DD35
CTO Number: DD77
Site Contact/Supervisor: Johansen

Sampler(s): J. Bonaduce, M. Leddy
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: 6.2D VOCs (8260B); 6.15 TPH-gas (8015M); 7.18 TPH-Ext (8015B-M); 7.3 SVOCs (8270C-SIM); 7.25 PAHs (8270C-SIM); 8.3 Pest/PCBs (8081A/8082); 9.2 Metals (6010B/7000); Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
~~C0775382 A23SB1d~~	~~12/6/05 0930~~	~~A23SB1d~~	~~Soil~~			~~01~~	1-2
C0775382	12/6/05 0930	A23SB1d	Soil	1		20	1-2'
C0775383	0940	A23SB1d		1		20	2-3'
C0775384	0950	A23SB1d		1		20	4-5.5' MS/MSD for Anal
C0775400	1300	A23SB18		1		20	1-2'
C0775401	1310	A23SB18		1		20	3-4'
C0775402	1320	A23SB18		1		20	6.5-8 MS/MSD for SVOCs
C0775379	1400	A23SB13		1		20	1-2'
C0775380	1410	↓		1		20	~~3-4~~ 2-3'
C0775381	↓ 1420	↓	↓	1		20	4-5'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh/Bechtel	[signature]/APPL	12/6/05	1700	Ship to lab
		12/7/05	0800	

Comments/Instructions:

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 9
Total No. of Coolers Shipped: 1
Lab SDG: 49257
Cooler Temp.: 1.5°C

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COOLER RECEIPT FORM

Project: Alameda Date Received: 12/7/05

Coolers: Number of Coolers: 1

(YES) NO Were coolers and samples screened for radioactivity?

(YES) NO Were custody seals on outside of cooler? How many? 1 Date on seal? NA

Name on seal? torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

YES (NO) Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO (NA) Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap samples

(YES) NO NA For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB250392 Correction factor: 0

Cooler temp(s): 1) 1.5° 2) 3) 4) 5) 6) 7) 8)

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

(YES) NO Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

(YES) NO Did all container labels agree with custody papers?

Sample Containers:

YES (NO) Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

YES (NO) Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

YES NO (NA) Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO (NA) Were correct preservatives added to the samples?

YES NO (NA) Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO (NA) Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies:

Signature of personnel receiving samples: Libby Anderson Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

APPL - Analysis Request Form 49262

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda AOC 23/EBS Parcel 110
PO #: CTO 0077
Chain of Custody (Y/N): Y # See ARF comments
RAD Screen (Y/N): Y pH (Y/N): Y
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/07/05 Time: 08:00
Delivered by: FED EX
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): SEE CRF
Color: VOA/BROWN/ORGGRN
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson rp for DA
QC Report Type: DVP4/EDD/CA
Due Date: 12/21/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
****** NO TICs required ******

See CRF for comments; email replies.
COC #23175, 23260, 23261, 23262, 23265, 23266, 23267, 23272, 23273

Sample Distribution: Charges: Invoice To:
SG: 8-$80BT, 8-$87UW, 8-$PCBW, 8-$SIMW, 10-$TPUW
Extractions: 8-_SEP004, 8-_SEP004S, 10-_SEP011, 8-_SEP025
VOA: 10-$86UW, 9-$GAUW
Metals: 8-$HG-D, 8-$MT2F
Wetlab: 8-$1601

	Client ID		APPL ID	Sampled		Analyses Requested
1	C077G122	SPKMS/MS	AX31574W	12/06/05	13:00	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW -- MS/MSD FOR SIM/PEST/PCB ONLY
2	C077TB09	X-SPK	AX31575W	12/06/05	14:00	$86UW
3	C077G112	SPKMS/MS	AX31576W	12/06/05	14:00	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW
4	C077R007	X-SPK	AX31577W	12/06/05	15:00	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW
	C077G115	X-SPK	AX31578W	12/06/05	08:30	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW

6	C077G116	X-SPK	AX31579W	12/06/05	08:00	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW
7	C077G128	X-SPK	AX31580W	12/06/05	09:00	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW
8	C077G129	X-SPK	AX31581W	12/06/05	09:00	$86UW, $GAUW, $TPUW
9	C077G113	X-SPK	AX31582W	12/06/05	10:20	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW
10	C077G114	X-SPK	AX31583W	12/06/05	10:00	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW
11	C077G117	X-SPK	AX31584W	12/06/05	08:00	$TPUW

ADC 23/EBS Parcel UD Volatiles

CLEAN

CHAIN-OF-CUSTODY RECORD

23265

Site Name: Alameda DD 35
CTO Number: 0077
Site Contact/Supervisor: Johnsen

Sampler(s): J. Bornstein, M. Teddy
Signature(s):

Pay Items/ Analyses Required: TPH-GCS 8015-M (1.5); TPH-D 8015-M (4.5); SVOCs 8270C (2.2); PAHs 8270C SIM (2.25); PetroFlag 8015-M (3.3); Metals 6010B (4.2); TOC (5.3); VOCs 8260B (1.5); VOCs 8260B (6.20); TPH-G 8015-M (6.15); VOCs 8260B (1.5)

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Preservation (4°C): HCl (1); none (2); HCl (3); none (4)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G115	12/6/05 0830	A23SB12	Water	5		01 02 03 04 05	8-13'
C077S382	0930	A23SB10	Soil	6		01 02 03 10 11 12	1-2'
C077S383	0940	A23SB10	↓	↓		01 02 03 10 11 12	2-3'
C077S384	0950	A23SB10	↓	↓		01 02 03 10 11 12	4-5.5'
C077G116	0800	A23SB09	Water	5		10 11 01 02 03	6-11'
C077G128	0900	A23SB23	↓	↓		10 11 01 02 03	5-10'
C077G129	0900	A23SB23	↓	↓		10 11 01 02 03	5-10' dup
C077G113	1020	A23SB10	↓	↓		10 11 01 02 03	5-10'
C077G114	1000	A23SB23	↓	↓		10 11 01 02 03	5-10'
C077S400	1300	A23SB18	Soil	6		01 02 03 10 11 12	1-2'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
J. Mclaugh / Bechtel	[illegible] / APPL Inc.	12/6/05	1700	Ship to lab
		12/07/05	0800	

Comments/Instructions: *field filtered

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 54
Total No. of Coolers Shipped: 1
Lab SDG: 24925 / 24926
Cooler Temp.: 1.5°C

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AOC 23 EBS 123 Volatiles

CLEAN

CHAIN-OF-CUSTODY RECORD

23175

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): J. Boroughs, M. Leddy
Signature(s): J. Boroughs, M. Leddy

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

6.20	6.15	7.18	9.2	1.15	1.5
8260B VOCs	8015-M TPHgas	8015B-M TPHd *	6010B/7000 TAL METALS	TPH-Gas/BTEX	VOCs/8260B

Preservation (4°C): HCL HCL

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775401	12/6/05 1310	A235B18	SOIL	6		01 02 03 10 11 12	3-4'
C0775402	1320	↓				01 02 03 10 11 12	6.5-8'
C0775379	1400	A235B13				01 02 03 10 11 12	1-2'
C0775380	1410	↓				01 02 03 10 11 12	2-3'
C0775381	1420	↓	↓	↓		01 02 03 10 11 12	4-5'
C077G122	1300	A235B18	Water	5		10 11 HCL 01 02 03	3-8'
C077TB09	1400	FBC		2		01 02 03	TRIP
C077G112	1400	A235B13		~~3~~ 5		10 11 01 02 03	5-8'
C077G112	1400	↓		6		01 02 03 04 05 06	5-8 MS/MSD
C077R007	1500	FBC	↓	5		10 11 01 02 03	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh / Bechtel	[signature] / APPL	12/6/05	1700	Ship to Lab
		12/07/05	0800	

Comments/Instructions: * SILICA GEL CLEANUP, IF NEEDED

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 73

Total No. of Coolers Shipped: 1
Lab SDG: 4925/4926
Cooler Temp: 5°C

AOC 23/EBS Parcel 11D

CLEAN

CHAIN-OF-CUSTODY RECORD

23262

Site Name: Alameda 00035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): J. Johansen
Signature(s):

Pay Items/ Analyses Required

1.5 TPH-gas 8015-M
2.18 TPH-ff 8015B-M
2.23 SVOCs 8270C (PAHs)
2.25 PAHs 8270C SIM
3.3 Pest/PCBs 8081A/8082A
4.2 Metals 6010B/7000
5.38 TDS 160.1

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Preservation (4°C): HCl, HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G116	12/6/05 0800	A23SB09	Water	6		20 21 / 30 31 / 50 51	6-11'
C077G117	0800	A23SB09		2		20 21	6-11' dup
C077G128	0900	A23SB23		6		21 / 40 41 / 50 51 / 60 70 *	5-10' dup
							* containers for C077G128 per Toni 12-8-05 rp

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
DAR/BEI	[illegible]/APPL Fax	12-6-05	1630	courier	* field filtered
					Method of Shipment: / Total No. of Coolers Shipped:
					Airbill No.:
					Total No. of Containers: / Lab SDG: 49262
		12/7/05	0800		Cooler Temp.: 2.5°C

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AOC 23 | EBS Parcel 110

CLEAN

CHAIN-OF-CUSTODY RECORD

23260

Site Name: Alameda 00035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): J Johansen
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

Container Nos. (2 digit)	Preservation (4°C)	Pay Items/ Analyses Required
1	HCl	1.5 TPH-GCS (8015M)
2		2.18 TPH-D (8015M)
3		2.3 SVOC (8270C)
4		2.25 PAHs (8270C SIM)
5		3.3 Resid PCBs (8082)
6		4.2 Metals (6010B/7000)
7		5.38 TDS (160.1)
8		
9		
10	NONE	

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0776122	12/6/05 1300	A23SB18	Water	3		46 50 51	MS/MSD 3-8'
C0776112	1400	A23SB13	↓	10		20 21 30 31 40 41 50 51 60 70	~~5-8~~ 4-9' **

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
CDM/BEI	[illegible]/APPL Inc	12-6-05	1630	courier
		12/09/05	0800	

Comments/Instructions:
* field filtered
** Sample labels have depth interval incorrectly listed as 5-8'

Method of Shipment: courier
Airbill No.: NA
Total No. of Containers: 13
Total No. of Coolers Shipped: 1
Lab SDG: 49262
Cooler Temp: 2.5°C

AOC 23/EBS Parcel 110

CLEAN

CHAIN-OF-CUSTODY RECORD

23272

Site Name: Alameda 00035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): M. LEDDY
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 1203 W. Swift Av. Fresno CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: 1.5 TPH-gas/8015-M; 2.18 TPH-D/8015B-M; 2.3 SVOCs/8270C SIM; 2.25 PAHs/8270C SIM; 3.3 Pest/PCBs/8081A/8082; 4.2 Metals/6010B/7000; 5.38 TDS/160.1

Preservation (4°C): HCl; HNO_3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0077R0004	12/6/05 1500	FQC.	WATER	10		20 21; 30 31; 40 41; 50 51; 60; 70	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
BECHTEL	APPL Inc	12/6/05	1700	Courier to Lab	* Field filtered
					Method of Shipment: Lab Courier
					Airbill No.: NA
		12/7/05	0800		Total No. of Containers: 10

Total No. of Coolers Shipped: 1
Lab SDG: 49262
Cooler Temp.: 2.0°C

AOC 23/EBS Parcel 110

CLEAN

CHAIN-OF-CUSTODY RECORD

23266

Site Name: Alameda 00035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): J. Bernstein
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

Preservation (4°C)

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G115	12/6/05 0830	A23SB12	Water	10		10 11 20 21 30 31 40 41 50 51 60 70 01 63	8-13'
C077G116	↓ 0800	A23SB09	↓	4 2 3		40	6-11'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
AR2 / BBI	[signature] TAL	12-6-05	1630	Courier
		12/7/05	0900	

Comments/Instructions: * field filtered

Method of Shipment: Courier
Airbill No.: n/a
Total No. of Containers: 14

Total No. of Coolers Shipped: 1
Lab SDG: 49262
Cooler Temp.: 3.5°C

AOC 23/EBS Parcel 110

BECHTEL **CLEAN**

CHAIN-OF-CUSTODY RECORD

23273

Site Name: Alameda DOD35
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): J Bornstein
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: 1.5 TPH-g/BTEX/MTBE; 2.18 TPH-d/e; 2.3 SVOCs; 2.25 PAHs/8270C SIM; 3.3 Pest/PCBs/8081A; 4.2 Metals/6010B/7000; 5.3 TDS/160.1

Preservation (4°C): HCl; HNO3

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G114	12/6/05 1000	A235B11	WATER	2		50 51	S-10'
C077G122	1300	A235B18		8		20 21; 30 31; 40 41; 60; 70	3-8'
C077G122	1300	A235B18		3		43 44 45	MS/MSD 3-8'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
BEI	APPL Inc	12-6-05	1630	courier	* field filtered
		12/7/05	0800		

Method of Shipment: courier
Airbill No.: NA
Total No. of Containers: 13
Total No. of Coolers Shipped: 1
Lab SDG: 49262
Cooler Temp.: 3.0°C

AOC 23/EBS Parcel 110

CLEAN

CHAIN-OF-CUSTODY RECORD

23267

Site Name: Alameda0000035
CTO Number: DD77
Site Contact/Supervisor: Johansen

Sampler(s): J Bernstein
Signature(s):

Pay Items/ Analyses Required

1.5 TPH-gas 8015-M
2.18 TPH-diff 8015B-M
2.3 SVOCs 8270C (SIM)
2.25 PAHs 8270C (SIM)
3.3 Pest/PCBs 8081A/8082A
4.2 Metals 6010B/7000
5.38 TDS/160.1

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Preservation (4°C): HCl, HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0776113	12/6/05 1020	A235Bi0	Water	4		20 21 / 30 31	5-10' *
C0776119	12/6/05 1000	A235B11	WATER	8		20 21 / 30 31 / 40 41 / 60 / 70	5-10' *

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
[illegible]/BET	[illegible]/APPL Inc	12-6-05 ~~12-6-05~~ DM	1630	courier
		12/7/05	0800	

Comments/Instructions: * field filtered

Method of Shipment: Courier
Airbill No.: N/A
Total No. of Containers: 12
Total No. of Coolers Shipped: 1
Lab SDG: 49262
Cooler Temp.: 3.0°C

AOC 23/EBS Parcel 11D

CLEAN

CHAIN-OF-CUSTODY RECORD

23261

Site Name: Alameda OD035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): J. Bernstein
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

1.5 TPH-GCFS (8015M)
2.18 TPH-FF (8015B/M)
2.3 SVOCs (8270C (SIM))
2.25 PAHs (8270C (SIM))
3 PCBs (8082)
4.2 Metals (6010B/7000B)*
5.3 TDS (160.1)

Preservation (4°C)

HCl | HNO3

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G129	12/6/05 0900	A23SB23	water	6 1		20	5-10' DUP
C077G128	0900	↓		5		20 21 30 31 40	5-10'
C077G113	1020	A23SB10		6		40 41 50 51 60 70	5-10'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
BRI	APPL INC	12-6-05 ~~12-6-05~~	1630	Courier	*field filtered
					Method of Shipment: courier
					Airbill No.: NA
					Total No. of Containers: 12
		12/7/05	0800		

Total No. of Coolers Shipped: 1
Lab SDG: 49262
Cooler Temp.: 1.5°C

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/7/05

Coolers: Number of Coolers: 8

YES NO Were coolers and samples screened for radioactivity?

YES NO Were custody seals on outside of cooler? How many? 8 Date on seal? NA

Name on seal? torn while removing

YES NO NA Were custody seals unbroken and intact at the time of arrival?

YES NO Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO NA Was the shipping slip scanned into the database?

YES NO NA If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap samples

YES NO NA For hand delivered samples was sufficient ice present to start the cooling process?

YES NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB25D392 Correction factor: 0

Cooler temp(s): 1) 1.5° 2) 3.0° 3) 3.0° 4) 2.5° 5) 3.5° 6) 2.0° 7) 2.0° 8) 2.5°

Chain of custody:

YES NO Was a chain of custody received?

YES NO Were the custody papers signed in the appropriate places?

YES NO Was the project identifiable from custody papers?

YES NO Did the chain of custody include date and time of sampling?

YES NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

YES NO Were container labels in good condition?

YES NO Was the client ID on the label?

YES NO Was the date of sampling on the label?

YES NO Was the time of sampling on the label?

YES NO Did all container labels agree with custody papers?

Sample Containers:

YES NO Were all containers sealed in separate bags?

YES NO Did all containers arrive unbroken?

YES NO Was there any leakage from samples?

YES NO Were any of the lids cracked or broken?

YES NO Were correct containers used for the tests indicated?

YES NO Was a sufficient amount of sample sent for tests indicated?

YES NO NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea: AX31575W02

Smaller than a pea: AX31575W01

Preservation & Hold time:

YES NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO NA Were correct preservatives added to the samples?

YES NO NA Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO NA Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies: Two sample containers set had same I.D. (use container count to separate the two sets / cooler was also use to determin the high groups. sample NOT received. C077G114 missing W31

Signature of personnel receiving samples: Libby Cinderson Second reviewer:

Signature of project manager notified: Revised for DA 12/8/05 Date and Time of notification: 12-07-05 17:30

Name of client notified: Toni Date and Time of notification: 12-7 + 12-8

Information given to client: Containers (on COC) C077G129 W41, W50, W51, W60+W70 for sample C077G128. by whom (Initials):

APPL - Analysis Request Form 49265

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda AOC 8,23 EBS/123 DG79
PO #: CTO 0077
Chain of Custody (Y/N): Y # 23370,23174,23225
RAD Screen (Y/N): Y pH (Y/N): N
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/08/05 Time: 08:00
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): 2.0°C
Color: VOA/YELLOWPURPLE
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson rp for DA
QC Report Type: DVP4/EDD/CA
Due Date: 12/22/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
***** NO TICs required *****

Sample Distribution: Charges: Invoice To:
17-$80BTS, 7-$87US, 17-$PCBS, 7-$SIMB, 12-$TPUS
Extractions: 17- SON002, 12- SON004, 7- SON009, 7- SON009S
VOA: 12-$86US, 6-$GAUS
Metals: 12-$HG-S, 12-$MTL3
Wetlab: 22-MOIST

	Client ID		APPL ID	Sampled		Analyses Requested
1.	C077S413	SPKMS/MS	AX31587S	12/07/05	09:10	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR METALS
2.	C077S412	X-SPK	AX31588S	12/07/05	09:00	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
3.	C077S414	X-SPK	AX31589S	12/07/05	09:20	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
4.	C077S421	X-SPK	AX31590S	12/07/05	11:30	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
5.	C077S422	X-SPK	AX31591S	12/07/05	11:35	$86US, $HG-S, $MTL3, $TPUS, MOIST

6	C077S423	SPKMS/MS	AX31592S	12/07/05	11:40	$86US, $HG-S, $MTL3, $TPUS, MOIST -- MS/MSD FOR METALS
7	C077S418	X-SPK	AX31593S	12/07/05	14:30	$86US, $HG-S, $MTL3, $TPUS, MOIST
8	C077S419	SPKMS/MS	AX31594S	12/07/05	14:35	$86US, $HG-S, $MTL3, $TPUS, MOIST -- MS/MSD FOR VOCs only
9	C077S420	X-SPK	AX31595S	12/07/05	14:40	$86US, $HG-S, $MTL3, $TPUS, MOIST
10	C077S424	X-SPK	AX31596S	12/07/05	15:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
11	C077S425	SPKLTDV	AX31597S	12/07/05	15:35	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- LTD VOL FOR TPH-FF
12	C077S426	X-SPK	AX31598S	12/07/05	15:40	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
13	C077S119	X-SPK	AX31599S	12/07/05	10:05	$80BTS, $PCBS, MOIST -- PCB ONLY
14	C077S120	X-SPK	AX31600S	12/07/05	10:10	$80BTS, $PCBS, MOIST -- PCB ONLY
15	C077S117	X-SPK	AX31601S	12/07/05	10:20	$80BTS, $PCBS, MOIST -- PCB ONLY
16	C077S118	X-SPK	AX31602S	12/07/05	10:25	$80BTS, $PCBS, MOIST -- PCB ONLY
17	C077S115	X-SPK	AX31603S	12/07/05	10:55	$80BTS, $PCBS, MOIST -- PCB ONLY
18	C077S116	X-SPK	AX31604S	12/07/05	11:00	$80BTS, $PCBS, MOIST -- PCB ONLY
19	C077S113	X-SPK	AX31605S	12/07/05	11:15	$80BTS, $PCBS, MOIST -- PCB ONLY
20	C077S114	SPKMS/MS	AX31606S	12/07/05	11:20	$80BTS, $PCBS, MOIST -- PCB ONLY
21	C077S111	X-SPK	AX31607S	12/07/05	11:25	$80BTS, $PCBS, MOIST -- PCB ONLY
22	C077S112	X-SPK	AX31608S	12/07/05	11:30	$80BTS, $PCBS, MOIST -- PCB ONLY

PG 79

CLEAN

Volatiles - soil

CHAIN-OF-CUSTODY RECORD

23370

Site Name: Alameda DD035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): JB, ML, MP
Signature(s): JB ML MP

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Ave. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

8260B VOCs	8015B-M TPH-gas	8015B-M TPH-d *	8260B/8270C SVOCs	8270C SIM PAHs	8081A/8082 PEST/PCBs	6010B/7000 Metals	8260B VOCs
Lab ID	6 wks	7 days	7 days	7 days	0.3	2	1 wk

Preservation (4°C): HCl

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775413	12/7/05 0910	A235B25	SOIL	7		01 02 03 10 11 12 20 →	2.5-4' MS/MSD for metals
C0775412	0900	↓		7		01 02 03 10 11 12 20 →	1-2'
C0775414	0920	↓		7		01 02 03 10 11 12 20 →	5-6'
C0775421	1130	A235B28		4 7 [28]		01 02 03 05 [28] 20 →	1-2'
C0775422	1135	↓		4 7 [28]		01 02 03 20 → 09 05 20	3-4'
C0775423	1140	↓		4 7 [28]		01 02 03 20 → 09 05 20	5-6.5 MS/MSD for metals
C0775418	1430	A235B27		4		01 02 03 20 - 20	1-2'
C0775419	1435	↓		4		01 02 03 20 20	3-4
C0775419	1435	↓		9		01 02 03 04 05 20 9 10	3-4' MS/MSD
C0775420	1440	↓		4		01 02 03 20 20	5-6'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh / Bechtel	[signature] APPL Inc.	12/7/05	1700	Ship to Lab
		12/8/05	0800	

Comments/Instructions: * SILICA-GEL CLEAN UP, IF NEEDED

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 54
Total No. of Coolers Shipped: 1
Lab SDG: 49265
Cooler Temp.: 20°C

AOC 23 EBS 123

BECHTEL **CLEAN**

CHAIN-OF-CUSTODY RECORD

23174

Site Name: ALAMEDA 0035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, ML, MP
Signature(s): JB ML MP

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

9.2	8.18	8.3	7.25	7.3	7.18	6.15	6.12
6010B/7000 TAL METALS	8082 PCBs	8081A/8270C SIM PAHs	8270C SVOCs	8015B-M TPH-g	8015-M TPH-d	8260B VOCs	

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0779124	12/7/05 1530	A23SB29	SOIL	7		20 20 20 20 20 10 11 12 01 02 03	1-2'
C0775425	1535	↓	↓	6		20 20 20 20 20 10 11 01 02 03	3-4' insufficient volume for TPH-d
C0775426	↓ 1540	↓	↓	7		20 20 20 20 20 10 11 12 01 02 03	6-7

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh	[signature]	12/7/05	1700	Ship to Lab
	[signature]	12/8/05	0800	

Comments/Instructions:

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 20
Total No. of Coolers Shipped: 1
Lab SDG: 49265
Cooler Temp.: 2.0°C

AOC 8

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23225

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yao
Signature(s): Gary Yao

Pay Items/ Analyses Required: B.10 8082 PCBs

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 N SUGAR AV. FRESNO CA 93722
Field Logbook/Page Number: AOC 8

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTTS119	12/07/05 1005	A08SB05	SOIL	1		20	1-1.5'
COTTS120	1010	↓				20	3-3.5'
COTTS119	1020	A08SB04				20	1-1.5'
COTTS118	1025	↓				20	3-3.5'
COTTS115	1055	A08SB03				20	1-1.5'
COTTS116	1100	↓				20	3-3.5'
COTTS113	1115	A08SB02				20	1-1.5'
COTTS114	1120	↓				20	3-4' MS/MSD
COTTS111	1125	A08SB01				20	1-1.5'
COTTS112	↓ 1130	↓	↓	↓		20	3-3.5'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	[signature] APPL Inc	12/07/05	1700	Lab Courier
		12/08/05	0910	

Comments/Instructions:

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 10
Total No. of Coolers Shipped: 1
Lab SDG: 49265
Cooler Temp.: 2.0°C

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/8/05

Coolers: Number of Coolers: 1

(YES) NO Were coolers and samples screened for radioactivity?

(YES) NO Were custody seals on outside of cooler? How many? 1 Date on seal? NA

Name on seal? torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

YES (NO) Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO (NA) Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the Ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap & samples

(YES) NO NA For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: 1B2500392 Correction factor: 0

Cooler temp(s): 1) 2.0° 2) 3) 4) 5) 6) 7) 8)

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

(YES) NO Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

(YES) NO Did all container labels agree with custody papers?

Sample Containers:

YES (NO) Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

YES (NO) Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

YES NO (NA) Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO (NA) Were correct preservatives added to the samples?

YES NO (NA) Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO (NA) Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies:

Signature of personnel receiving samples: Tabby Cardenas Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

APPL - Analysis Request Form 49267

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda AOC 23/EBS Parcel 124, 125
PO #: CTO 0077
Chain of Custody (Y/N): Y # See ARF comments
RAD Screen (Y/N): Y pH (Y/N): Y
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/08/05 Time: 08:00
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): SEE CRF
Color: VOA/YELL/ORGRN
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson DA
QC Report Type: DVP4/EDD/CA
Due Date: 12/22/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
*** NO TICs required ***
COC #23198, 23199, 23291, 23292, 23313, 23368, 23382
AX31671: no TDS container rec'd; deleted analysis. 12-13-05 rp

Sample Distribution: 6-$80BT, 5-$87UW, 6-$PCBW, 5-$SIMW, 7-$TPUW
Extractions: 5- SEP004, 5- SEP004S, 7- SEP011, 6- SEP025
VOA: 8-$86UW, 5-$GAUW
Metals: 7-$HG-D, 7-$MT2L
Wetlab: 6-$1601

Charges:

Invoice To:

	Client ID		APPL ID	Sampled	Analyses Requested
1.	C077G132	X-SPK	AX31615W	12/07/05 10:30	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2L, $PCBW, $SIMW, $TPUW
2.	C077G130	X-SPK	AX31616W	12/07/05 11:20	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2L, $PCBW, $SIMW, $TPUW
3.	C077G155	X-SPK	AX31617W	12/07/05 13:00	$80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2L, $PCBW, $SIMW, $TPUW
4.	C077TB10		AX31618W	12/07/05 13:30	$86UW
5.	C077SW01	X-SPK	AX31619W	12/07/05 14:30	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2L, $PCBW, $SIMW, $TPUW

6.	C077G135		AX31620W	12/07/05	14:30	$1601, $86UW, $HG-D, $MT2L, $TPUW
7.	C077G136	MS/MSD	AX31621W	12/07/05	13:33	$1601, $86UW, $HG-D, $MT2L, $TPUW -- MS/MSD FOR METALS
8.	C077R008	X-SPK	AX31622W	12/07/05	15:30	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2L, $PCBW, $SIMW, $TPUW
9.	C077G131		AX31623W	12/07/05	11:20	$80BT, $PCBW

AOC 23 EBS 125 VOLATILES - Water

CLEAN

CHAIN-OF-CUSTODY RECORD

23291

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, ML, MP
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

1.15	2.18	2.3	2.25	3.3	4.2	5.36	5.96	1.5	6.50	6.45
8015-M TPHMO	8015B-M TPHd *	8260C 5 VOCs	8270C-SIM PAHs	6010B/7000 METALS, **	300.0/9056 TDS	DECANT AT LAB ***	8260B 3 VOCs		8260B VOCs	8015-M TPHgas

Preservation (4°C): HCl | HNO3 | HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G132	12/7/05 1030	A23SB25	WATER	5		10 11 / 01 02 03	5-10'
C077G130	1120	A23SB24				10 11 / 01 02 03	5-10'
C077G135	1300	A23SB40				10 11 / 01 02 03	6-11'
C077TB10	1330	FQC		2		01 02	TRIP
C077SW01	1430	FQC		5		10 11 / 01 02 03	Source Blank
C077G135	1430	A23SB27		3		01 02 03	5-10'
C077G136	1330	A23SB28		3		01 02 03	5-10'
C077RB08	1530	FQC		5		10 11 / 01 02 03	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. Melnyk / Bechtel	APPL Inc	12/7/05	1700	Ship to lab
		12/8/05	0800	

Comments/Instructions:
* SILICA GEL CLEANUP IF NEEDED
** FILTERED & PRES IN FIELD
*** DECANT ALL UNPRES. SAMPLES; EXCEPT TDS, AT LAB

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 33
Total No. of Coolers Shipped: 1
Lab SDG: 49267
Cooler Temp: 3.0°C

AOC 231 EBS Parcel 124

CLEAN

CHAIN-OF-CUSTODY RECORD

23368

Site Name: Alameda DD035
CTO Number: DD77
Site Contact/Supervisor: Johansen

Sampler(s): M. LEDDY, G YAP
Signature(s):

Pay Items/ Analyses Required

1.15 TPH-gas/BTEX
2.18 TPH-ext/8015B
2.3 SVOCs/8270C
2.26 PAHs/8270C SIM
3.3 Rest/8260B
4.2 Metals/6010B/7000
6.38 TDS/160.1

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 42D3W. Swift Av. Fresno CA 93722
Field Logbook/Page Number:

Preservation (4°C)

#1 | #2

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077RDDB	12/7/05 1530	FQC	WATER	10		20 21 / 30 31 / 40 41 / 50 51 / 60 / 70	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
M. Leddy Bechtel	[illegible] Tax.	12/7/05	1700	Courier to Lab	* field filtered
					Method of Shipment: Lab Courier
					Airbill No.:
					Total No. of Containers: 10
		12/8/05	0800		

Total No. of Coolers Shipped: 1
Lab SDG: 49267
Cooler Temp: 2.5°C

~~DG 19~~ AOC23

CLEAN

CHAIN-OF-CUSTODY RECORD

23313

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, ML, MP
Signature(s): JB ML MP

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4303 W. SWIFT AVE, FRESNO, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

	2.18	2.3	2.25	3.3	4.1	5.38	5.40
	8015B-M TPHE*	8260C SVOCs	8270C-SIM PAHs	8082A PCB*	6010B/7000 TTLC Mo**	160.1 TDS	DESICCANT AT LAB***
Preservation (4°C)				HNO3			

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)										Remarks (e.g., MS, MSD)
						20 21	30 31	40 41	50	60	70	X				
C077G130	12/7/05 1120	A23SB24	WATER	9					50			X				5-10'
C077G131	1120	↓	↓	2 ~~3~~					50 57			X				5-10 DUP

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
D. McHugh/Bechtel	[signature]	12/7/05	1700	Ship to LAB	*SILICA GEL CLEANUP (IF NEEDED) **FILTERED & PRESERVED IN FIELD ***DESICCANT AT LAB ALL UNPRES. SAMPLES, EXCEPT TDS
					Method of Shipment: Courier / Airbill No.: NA / Total No. of Coolers Shipped: 1
	[signature]	12/8/05	0800		Total No. of Containers: 9 11 / Lab SDG: 49267 / Cooler Temp.: 2.0°C

~~DC 19~~ AOC 23

CLEAN

CHAIN-OF-CUSTODY RECORD

23382

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JG, ML, MP
Signature(s): JG, ML, MP

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE, FRESNO, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

2.1.B	2.3	2.25	3.3	4.2	5.30	5.90
8015B-M TPHd**	8260C SVOCs	8270C SIM PAHs	8081A/8082 PCB's (NB)*	6010B/7000 TAL Metals**	160.1 TDS	DECANT AT LAB

Preservation (4°C): HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
~~C077G136~~	12/7/05 1330	A235B28	WATER			20,23 24 61,62 60 70	5-10' ~~MS/MSD for metals~~
C077G136	12/7/05 1330	A235B28	Water	7		20 21 22 60,61 62 70	5-10 MS/MSD for Metals
C077G135	1430	A235B27	↓	5		20 21 22 60 70	5-10'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh / Bechtel	[signature] Tae.	12/7/05	1700	Ship to lab
	[signature]	12/8/05	0800	

Comments/Instructions:
* SILICA GEL CLEANUP, IF NEEDED
** FILTERED & PRESER. IN FIELD
*** DECANT ALL UNPRES. SAMPLES, EXCEPT TDS, AT LAB

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 12
Total No. of Coolers Shipped: 1
Lab SDG: 49267
Cooler Temp.: 3.0°C

BECHTEL

~~DO 79~~ AOC 23

CLEAN

CHAIN-OF-CUSTODY RECORD

23199

Site Name: ALAMEDA 00035

CTO Number: 0077

Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, MP, ML

Signature(s): [signatures]

Analytical Laboratory Name: APPL

Analytical Laboratory Address: 4203 W. SWIFT AVE, FRESNO, CA 93722

Field Logbook/Page Number:

Pay Items/ Analyses Required:

Pay Item	Analysis	Preservation (4°C)
2.18	8015B-M TPH*	HCl
2.3	8270C SVOCs	
2.25	8270C-SIM PAHs	
3.3	8081A/8082 pest/PCB	
4.2	6010B/7000 TAL Metals**	HNO3
5.38	160.1 TDS	
5.40	DECANT AT LAB***	

TAT (in days): 2 | 7 | 14 (circled) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)							Remarks (e.g., MS, MSD)
C077G155	12/7/05 1300	A23SB40	WATER	~~10~~ 9 (ML)		20 21	30 31	40 41	50 51	60	~~70~~	X	6-11'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh/Bechtel	[signature]/APPL INC.	12/7/05	1700	Ship to lab
[signature]		12/8/05	0810	

Comments/Instructions:
* SILICA GEL CLEANUP, IF NEEDED
** FILTERED & PRESERVED IN FIELD
*** DECANT ALL UNPRES. SAMPLES AT LAB, EXCEPT TDS

Method of Shipment: Courier

Airbill No.: NA

Total No. of Coolers Shipped: 1

Total No. of Containers: 9

Lab SDG: 49267

Cooler Temp.: 3.0°C

AOC 23 EBS 125 ~~VOLATILES~~

BECHTEL **CLEAN**

CHAIN-OF-CUSTODY RECORD

23292

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, MP, ML
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AVE, FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

	1.15	2.18	2.3	2.25	3.3	4.2	5.3*	5.90	1.5	6.20	6.15
	8015-M TPH gas	8015B-M TPH-D *	8270C SVOCs	8270C-SIM PAHs	8081A/8082 PEST/PCBs	6010B/7000 METALS (AL, SB, AS, BA, BE, CD, CA, CR, CO, CU, FE, PB, MG, MN, HG, NI, K, SE, AG, NA, TL, V, ZN)	160.1 TDS	DECANT AT LAB**	8260B VOCs	8260B VOCs	Gasoline 8015-M TPH-G
Preservation (4°C)					HNO3		HCl				

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0776132	12/7/05 1030	A235B25	WATER	10		10 21 / 30 31 / 40 41 / 50 51 / 60 / 70 / X	5-10'
C0776131	↓ 1120	↓ A235B24	↓	1		51 / X	5-10'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh / Bechtel	[signature] / APPL Fax	12/7/05	1700	Ship to lab
	[signature]	12/8/05	0900	

Comments/Instructions:
* SILICA GEL CLEANUP, IF NEEDED
** FILTERED & PRES. IN FIELD
*** DECANT ALL UNPRES. SAMPLES, EXCEPT TDS, AT LAB

Method of Shipment: COURIER
Airbill No.: NA
Total No. of Containers: 11
Total No. of Coolers Shipped: 1
Lab SDG: 49267
Cooler Temp: 4.0°C

~~DG 79~~ AOC 23

CLEAN

CHAIN-OF-CUSTODY RECORD

23198

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, ML, MP
Signature(s): JB, ML, MP

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE, FRESNO, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077SW01	12/7/05 1430	FRC	WATER	10		20 21 30 31 40 41 50 51 60 70	Source Blank

Preservation (4°C): HNO3

TAT (in days): 2 | 7 | 14 | 30

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh/Bechtel	[illegible] Inc.	12/7/05	1700	Ship to Lab
		12/8/05	0700	

Comments/Instructions:
* FILTERED & PRESERVED IN FIELD
** SILICA GEL CLEANUP, IF NEEDED
*** DEFAULT ALL UNPRES. SAMPLES, EXCEPT TDS, AT LAB

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 10
Total No. of Coolers Shipped: 1
Lab SDG: 49267
Cooler Temp.: 3.0°C

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/8/05

Coolers: Number of Coolers: 7

(YES) NO Were coolers and samples screened for radioactivity?

(YES) NO Were custody seals on outside of cooler? How many? 7 Date on seal? NA

Name on seal? torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

YES (NO) Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO (NA) Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap samples

(YES) NO NA For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB25039 2 Correction factor: 0

Cooler temp(s): 1) 2.0° 2) 2.5° 3) 3.0° 4) 3.0° 5) 4.0° 6) 3.0° 7) 3.0° 8)

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

(YES) NO Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

(YES) NO Did all container labels agree with custody papers?

Sample Containers:

YES (NO) Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

YES (NO) Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

YES (NO) NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

(YES) NO NA Were correct preservatives added to the samples?

(YES) NO NA Was the pH taken of all non-VOA preserved samples and written on the sample container?

(YES) NO NA Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies:

Signature of personnel receiving samples: Toby Anderson Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

APPL - Analysis Request Form

49277

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda 0077 AOC23/EBS Parcel 124,25,2
PO #: CTO 0077
Chain of Custody (Y/N): Y # 23301,23283,23253
RAD Screen (Y/N): Y pH (Y/N): Y
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/09/05 Time: 08:00
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): 1.5°C
Color: VOA/YELLOWPURPLE
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson
QC Report Type: DVP4/EDD/CA
Due Date: 12/23/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
****** NO TICs required ******

Sample Distribution:
GC: 15-$80BTS, 15-$87US, 15-$PCBS, 15-$SIMB, 15-$TPUS
Extractions: 15-_SON002, 15-_SON004, 15-_SON009, 15-_SON009S
VOA: 18-$86US, 15-$GAUS
Metals: 18-$HG-S, 18-$MTL3
Wetlab: 18-MOIST

Charges:

Invoice To:

	Client ID		APPL ID	Sampled		Analyses Requested
1	C077S428	X-SPK	AX31673S	12/08/05	11:10	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
2	C077S429	X-SPK	AX31674S	12/08/05	11:20	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
3	C077S415	X-SPK	AX31675S	12/08/05	13:00	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
4	C077S416	SPKMS/MS	AX31676S	12/08/05	13:10	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR GAS ONLY

5	C077S417	X-SPK	AX31677S	12/08/05	13:20	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
6	C077S442		AX31678S	12/08/05	09:00	$86US, $HG-S, $MTL3, MOIST
7	C077S443		AX31679S	12/08/05	09:10	$86US, $HG-S, $MTL3, MOIST
8	C077S444		AX31680S	12/08/05	09:20	$86US, $HG-S, $MTL3, MOIST
9	C077S409	X-SPK	AX31681S	12/08/05	09:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
10	C077S410	X-SPK	AX31682S	12/08/05	09:40	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
11	C077S411	X-SPK	AX31683S	12/08/05	09:50	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
12	C077S427	X-SPK	AX31684S	12/08/05	11:00	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
13	C077S406	X-SPK	AX31685S	12/08/05	13:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
14	C077S407	SPKMS/MS	AX31686S	12/08/05	13:40	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR SVOC/PAH
15	C077S408	X-SPK	AX31687S	12/08/05	13:50	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
16	C077S404	X-SPK	AX31688S	12/08/05	15:40	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
17	C077S403	X-SPK	AX31689S	12/08/05	15:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
18	C077S405	X-SPK	AX31690S	12/08/05	15:50	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST

AOC 23 EBS 126,125 (volatiles ((

CLEAN

CHAIN-OF-CUSTODY RECORD

23301

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yee, JB
Signature(s): Gary Yee, JB

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

6.20	9.2	6.15	1.50	6.3	1.15	7.25	7.18	7.3
8260B VOCs	6010B/7000 TAL METALS	TPH-g / 8015M	8260B VOCs	PEST (8081B)	TPH-g / 8015M	PAHs 8270C	TPH-dr / 8015M	SVOCs 8270C

Preservation (4°C): HCl, HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775428	12/8/05 1110	A235B31	SOIL	7		01 02 03 20 21 22 23 24 20 20 →	2.5-3.5'
C0775429	1120	↓	↓	7		01 02 03 20 10 11 12 20 20 →	7-8'
C077GW2	1830	A235B32	Water	5		01 02 03 10 11	4-9'
C0775415	1300	A235B26	Soil	7		01 02 03 20 10 11 12 20 20 →	.3-1.3'
C0775416	1310			7		01 02 03 20 10 11 12 20 20 →	2.5-4
C0775416	1310			6		13 14 15 16 17 18	2.5-4 MS/MSD
C0775417	1320	↓	↓	7		01 02 03 20 10 11 12 20 20 →	4-5'
C077G141	1250	A235B31	WATER	11		01→09 10 11	MS/MSD VOCs
C077TB11	1400	FQC		2		01 02	TRIP BLANK
C077G121	1515	A235B17	↓	5		01 02 03 10 11	7-12'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh / Bechtel	[signature] / APPL Inc	12/8/05	1700	Ship to Lab
		12/9/05	0800	

Comments/Instructions:

Method of Shipment: Courier
Airbill No.: N/A
Total No. of Containers: 57
Total No. of Coolers Shipped: 1
Lab SDG: 49277
Cooler Temp.: 1.5°C

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AOC 23 EBS 126 Volatiles

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23283

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: DHANSEN

Sampler(s): JB, MP, ML, JD
Signature(s): JB, mp, ml, JD

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE, FRESNO, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

6120 8260B VOCs	9.2 6010B/7000 TAL METALS	6.15 TPH-g/8015M	150 8260B VOCs	1.15 TOX-SW 8015-M	8.2 PESTICIDES 8081A/8082	2.25 DIOXINS 8270C	7.18 TPH-d/8015B-M	7.3 SVOCs 8270C

Preservation (4°C): HCl | HCl

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775442	12/1/05 0900	A235B37	SOIL	4		01 02 03 20	1-2'
C0775443	0910	↓	↓	4		01 02 03 20	2-3.5'
C0775444	0920	↓	↓	4		01 03 20	5-6.5'
C077G137	0800	A235B29	Water	5		01 02 03 10 11	5-10'
C077G150	0915	A235B37	↓	3		01 02 03	5-10'
C0775409	0930	A235B22	Soil	~~8~~ 7		01 02 03 20 10 11 12 20 →	1-2'
C0775410	0940	↓	↓	↓		01 02 03 20 10 11 12 20 →	3-4'
C0775411	0950	↓	↓	↓		01 02 03 20 10 11 12 20 →	5-6'
C077G127	1000	A235B22	Water	5		01 02 03 10 11	4-9'
C0775427	↓ 1100	A235B31	Soil	7		01 02 03 20 10 11 12 20 →	1-2'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
D. McHugh / Bechtel	APPL Inc.	12/8/05	1700	Ship to lab	
				Method of Shipment: Courier	Total No. of Coolers Shipped:
				Airbill No.: NA	
				Total No. of Containers: 53	Lab SDG: 49277
		12/9/05	0800		Cooler Temp.: 1.5°C

AOC 23/EBS Parcel 124

CLEAN

CHAIN-OF-CUSTODY RECORD

23253

Site Name: Alameda DOD35
CTO Number: 0277
Site Contact/Supervisor: Johansen

Sampler(s): JB, MC, MP
Signature(s): JB, MC, MP

Pay Items/ Analyses Required: 6.2 DVOCs/8260B; 6.15 TPH-gas/8015M; 7.18 TPH-ff/8015B(M); 7.3 SVOCs/8270C(SIM); 7.25 PAHs/8270C(SIM); 8.3 Rest/RSK; 9.3 Metals/6010B; 15D VOCs/8260B; 11.5 TPH-d/8015M

Preservation (4°C): HCl, HCl

TAT (in days): 2 | 7 | (14) | 30

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno CA 93722
Field Logbook/Page Number:

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775406	12/8/05 1330	A23SB21	Soil	7		01 02 03 10 11 12 20 →	1-2'
C0775407	1340	↓	↓	8		01 02 03 10 11 12 20 20 21 20 24 20 20	2.5-4' MC/MSD for SVOC, PAH
C0775408	1350	↓	↓	7		01 02 03 10 11 12 20 →	4-5'
C0775404	1540	A23SB19	↓	7		01 02 03 10 11 12 20 →	2-3'
C0775403	1530	↓	↓	7		01 02 03 10 11 12 20 →	.25-1.25
C0775405	1550	↓	↓	7		01 02 03 10 11 12 20 →	4-5'
C0776133	1415	Water	Water	5		01 02 03 10 11	5-10'
~~C0776111~~	~~1250~~						
C0776126	1450	A23SB21	Water	5		01 02 03 10 11	5-10'
C0772009	1500	FQC	↓	↓		01 02 03 10 11	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Jacobs/Bechtel	[illegible]/APPL	12/8/05	1700	Ship to lab
		12/9/05	0800	

Comments/Instructions:

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 58
Total No. of Coolers Shipped: 1
Lab SDG: 49277
Cooler Temp: 1.5°C

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COOLER RECEIPT FORM

Project: Alameda Date Received: 12/9/05

Coolers: Number of Coolers: 1

(YES) NO Were coolers and samples screened for radioactivity?

(YES) NO Were custody seals on outside of cooler? How many? 1 Date on seal? NA

Name on seal? torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

YES (NO) Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO (NA) Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap Samples

(YES) NO NA For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB250392 Correction factor: 0

Cooler temp(s): 1) 1.5° 2) 3) 4) 5) 6) 7) 8)

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

(YES) NO Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

(YES) NO Did all container labels agree with custody papers?

Sample Containers:

YES (NO) Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

YES (NO) Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

YES NO (NA) Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO (NA) Were correct preservatives added to the samples?

YES NO (NA) Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO (NA) Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies:

Signature of personnel receiving samples: Libby Andrews Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

APPL - Analysis Request Form 49278

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda 0077 AOC23 EBS 123 - 126
PO #: CTO 0077
Chain of Custody (Y/N): Y # See ARF comments
RAD Screen (Y/N): Y pH (Y/N): Y
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/09/05 Time: 08:00
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): SEE CRF
Color: VOA/PNKPUR/ORGGRN/SU
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson DA
QC Report Type: DVP4/EDD/CA
Due Date: 12/23/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs. Requires only LCS.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
****** NO TICs required ******
COC #23172, 23178, 23252-3, 23283, 23301, 23314-5, 23363, 23366
Low-level Hg sent directly to Brooks Rand.

Sample Distribution: Charges: Invoice To:
GC: 6-$80BT, 7-$87UW, 6-$PCBW, 7-$SIMW, 8-$TPUW
Extractions: 7- SEP004, 7- SEP004S, 8- SEP011, 6-SEP025
VOA: 10-$86UW, 8-$GAUW
Metals: 7-$HG-D, 11-$MT2F
Wetlab: 9-$1601
Other: 7-SUB

	Client ID		APPL ID	Sampled		Analyses Requested
1.	C077G137	X-SPK	AX31691W	12/08/05	08:00	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW
2.	C077G150	SPKMS/MS	AX31692W	12/08/05	09:15	$1601, $86UW, $MT2F, SUB -- MS/MSD FOR METAL/TDS
3.	C077G127	X-SPK	AX31693W	12/08/05	10:00	$86UW, $87UW, $GAUW, $MT2F, $SIMW, $TPUW, SUB
4.	C077G133		AX31694W	12/08/05	14:15	$1601, $86UW, $GAUW, $HG-D, $MT2F, $TPUW

5	C077G126	SPKMS/MS	AX31695W	12/08/05	14:50	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW -- MS/MSD FOR PCB/PEST
6	C077R009	X-SPK	AX31696W	12/08/05	15:00	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW
7	C077G142	X-SPK	AX31697W	12/08/05	10:30	$1601, $80BT, $86UW, $87UW, $GAUW, $MT2F, $PCBW, $SIMW, $TPUW, SUB
8	C077G141	SPKMS/MS	AX31698W	12/08/05	12:50	$1601, $80BT, $86UW, $87UW, $GAUW, $MT2F, $PCBW, $SIMW, $TPUW, SUB -- MS/MSD FOR VOC
9	C077TB11		AX31699W	12/08/05	14:00	$86UW
10	C077G121	X-SPK	AX31700W	12/08/05	15:15	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW
11	C077G138		AX31701W	12/08/05	08:00	$HG-D, $MT2F
12	C077G134	X-SPK	AX31702W	12/08/05	14:15	$1601, $HG-D, $MT2F
13	C077G145		AX31770W	12/03/05	08:00	SUB
14	C077G143		AX31771W	12/03/05	08:00	SUB
15	C077SW01		AX31772W	12/03/05	14:30	SUB

AOC 23 EBS 126 Volatil

CLEAN

CHAIN-OF-CUSTODY RECORD

23283

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: DHANSEN

Sampler(s): JB, MP, ML, JD
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE, FRESNO, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

8260B VOCs	6010B/7000 TAL METALS	TPH-g / 8015M	8260B VOCs	TDH-d 8015-M (SILICA GEL CLEANUP)	DRO 8270C	TPH-d / 8015B-M	SVOCs 8270C
6.20	9.2	6.15	1.50	1.15	8.2	7.25	7.18	7.3

Preservation (4°C): HCl | HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775442	12/8/05 0900	A23SB37	SOIL	4		01 02 03 20	1-2'
C0775443	0910	↓	↓	4		01 02 03 20	2-3.5'
C0775444	0920	↓	↓	4		01 03 23 20	5-6.5'
C077G137	0800	A23SB29	Water	5		01 02 03 10 11	5-10'
C077G150	0915	A23SB37	↓	3		01 02 03	5-10'
C0775409	0930	A23SB22	Soil	~~6~~ 7		01 02 03 20 10 11 12 20 →	1-2'
C0775410	0940	↓	↓	↓		01 02 03 20 10 11 12 20 →	3-4'
C0775411	0950	↓	↓	↓		01 03 23 20 10 11 12 20 →	5-6'
C077G127	1000	A23SB22	Water	5		01 02 03 10 11	4-9'
C0775427	1100	A23SB31	Soil	7		01 02 03 20 10 11 12 20 →	1-2'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh / Bechtel	[signature] / APPL Inc.	12/8/05	1700	Ship to lab
		12/9/05	0800	

Comments/Instructions:

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 53
Total No. of Coolers Shipped:
Lab SDG: 49278
Cooler Temp.: 1.5°C

ACL 2315D Parcel 124

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23253

Site Name: Alameda DDD35
CTO Number: 0277
Site Contact/Supervisor: Johansen

Sampler(s): JB, MC, MP
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift, Av. Fresno CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: 6.2 DVOCs 8260DB; 6.15 TPH-gas 8015M; 7.18 TPH-SG 8015M; x.3 SVOCs 8270DC (PAHs); x.25 PAHs 8270DC SIM; 8.3 Pest/PCBs 8081B/8082A; 9.3 Metals 6010B/7000B; 1.5D VOCs 8260DB; 1.15 TPH-g 8015M

Preservation (4°C): HCl, HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775406	12/8/05 1330	A23SB21	Soil	7		01 02 03 10 11 12 20	1-2'
C0775407	1340	↓	↓	8		01 02 03 10 11 12 20 20 21 20 21 20 20	2.5-4' MS/MSD for SVOC, PAH
C0775408	1350	↓	↓	7		01 02 03 10 11 12 20	4-5'
C0775404	1540	A23SB19	↓	7		01 02 03 10 11 12 20	2-3'
C0775403	1530	↓	↓	7		01 02 03 10 11 12 20	.25-1.25
C0775405	1550	↓	↓	7		01 02 03 10 11 12 20	4-5'
C0776133	1415	~~Water~~	Water	5		01 02 03 10 11	5-10'
~~C0776141~~	~~1250~~						
C0776126	1450	A23SB21	Water	5		01 02 03 10 11	5-10'
C0776009	1500	FQC	↓	↓		01 02 03 10 11	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
J. McHugh / Bechtel	[illegible] APPL Inc	12/8/05	1700	Ship to lab
		12/9/05	0850	

Comments/Instructions:

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 58
Total No. of Coolers Shipped: 1
Lab SDG: 49278
Cooler Temp: 1.5°C

AOC 23 EBS 126,125 (volatiles

CLEAN

CHAIN-OF-CUSTODY RECORD

23301

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHNSTON

Sampler(s): G. Yee, JB
Signature(s): Gary Yee, JB

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: 6.2D 8260B VOCs; 9.2 Calc/TPH TAL METALS; 6.15 TPH-g / BOISTM; 1.50 8260B VOCs; 8.3 PCBs (PCBs 8082A/8082; 1.15 TPH-g / BOISTM; 4.25 PAHs 8270C; 2.18 TPH-D / BOISTM; 7.3 SVOCs / 8270C

Preservation (4°C): HCl; HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775428	12/8/05 1110	A235B31	SOIL	7		01 02 03; 20; 04 05 06; 20; 20; →	2.5-3.5'
C0775429	1120	↓	↓	7		01 02 03; 20; 10 11 12; 20; 20; →	7-8'
C077G142	1030	A235B32	Water	5		01 02 03; 10 11	4-9'
C0775415	1300	A235B26	Soil	7		01 02 03; 20; 10 11 12; 20; 20; →	.3-1.3'
C0775416	1310	↓	↓	7		01 02 03; 20; 10 11 12; 20; 20; →	2.5-4
C0775416	1310			6		13; 14 15; 16 17; 18	2.5-4 MS/MSD
C0775417	1320	↓	↓	7		01 02 03; 20; 10 11 12; 20; 20; →	4-5'
C077G141	1250	A235B31	WATER	11		01 → 09; 10 11	MS/MSD VOCs
C077TB11	1400	FQC	↓	2		01 02	TRIP BLANK
C077G121	1515	A235B17	↓	5		01 02 03; 10 11	7-12'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh / Bechtel	[signature] / APPL Inc	12/8/05	1700	Ship to Lab
		12/9/05	0800	

Comments/Instructions:

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 57
Total No. of Coolers Shipped: 1
Lab SDG: 49278
Cooler Temp.: 1.5

DB 79 ADL215

CLEAN

CHAIN-OF-CUSTODY RECORD

23314

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: HANSEN

Sampler(s): M. KEDDY, O. KAHN
Signature(s):

Pay Items/ Analyses Required

2.48	8015B - M TPHd
2.3	8270C SVOCs
2.25	8270C SIM PAHs/PCBs
3.3	8081A/8082 Pesticides/PCBs
4.2	6010B/7000 Metals*
5.38	W.C.1 TDS
5.90	DISCARD AT LAB

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE, FRESNO, CA 93722
Field Logbook/Page Number:

Preservation (4°C): HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G126	12/8/05 1350	AZ35B21	WATER	4		30 31 40 41	
C077G121	1515	AZ35B17		10		20 21 30 31 40 41 50 51 60 70	MS/MSD

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
[signature] Bechtel	[signature] Apple Inc	12/8/05		LAB COURIER	* FILTERED & PRESERVED IN FIELD ** DISCARD ALL UNPRES. SAMPLES, EXCEPT TOS AT LAB
					Method of Shipment: COURIER
					Airbill No.:
					Total No. of Containers: 14
	[signature]	12/9/05	0910		

Total No. of Coolers Shipped:
Lab SDG: 49278
Cooler Temp.:

ACC 23 EBS 123

CLEAN

CHAIN-OF-CUSTODY RECORD

23178

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): M. LEDDY, J. B
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

Preservation (4°C): HCl | H2SO4 | HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077RD09	12/8/05 1145	FQC	WATER	10		20 21 30 31 40 41 70 X 50 51 60	Results

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Beckt	APPL Inc.	12/8/05		COURIER TO LAB
		12/9/05	0800	

Comments/Instructions:
DEANT AT LAB ALL UNPRES. SAMPLES EXCEPT TDS
EXPRES. FIELD

Method of Shipment: COURIER
Airbill No.:
Total No. of Containers: 10
Total No. of Coolers Shipped: 1
Lab SDG: 49278
Cooler Temp.:

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AOC 23 / EBS Parcel 124

BECHTEL **CLEAN**

CHAIN-OF-CUSTODY RECORD

23172

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): M. LEDIN
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required:
1.15 TPH-gas/8015-M
2.18 TPH-ext/8015B-M
2.3 SVOCs/8270C (SOAHS)
2.25 PAHs/8270C SIM
3.3 Pest/PCBs/8081A/8082
4.2 Metals/6010B/7000*
5.38 TDS/160.1
5.90 DECANT AT LAB*

Preservation (4°C): HCl, HNO3

TAT (in days): 2 7 (14) 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G141	12/8/05 1250	A23SB31	WATER	8		20 21, 30 31, 40 41, 50 51	
C077G133	↓ 1415	A23SB26	↓	3		20 21 22	

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
BECHTEL	APPL INC	12/8/05	1700	LAB COURIER
		12/9/05	0800	

Comments/Instructions: *field filtered
**DECANT ALL UNPRES SAMPLES, EXCEPT TDS AT LAB

Method of Shipment: COURIER
Airbill No.: NA
Total No. of Coolers Shipped: 1
Total No. of Containers: 11
Lab SDG: 49228
Cooler Temp.: 3.0

AOC 23/EBS Parcel 124/3

CLEAN

CHAIN-OF-CUSTODY RECORD

X23366

Site Name: Alameda DD035
CTO Number: DD77
Site Contact/Supervisor: Johansen

Sampler(s): M. LEDDY, O. KIM
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

1.15 TPH-dsl 8015-M
2.19 TPH-HC 8015B-M
2.3 SVOCs 8270C (SIM)
2.25 PAHs 8270C (SIM)
3 Pest/PCBs 8081A/8082
3 Metals 6010B
4.2 TDS 160.1
5.36 Decant at lab *
5.90

Preservation (4°C): HCl, HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0776137	12/08/05 800	A235B29	Water	10		20 21, 30 31, 40 41, 50 51, 60, 70, X	5-10'
C0776138	800	↓		1		60	Dup., 5-10'
C0776142	1030	A235B32		8		20 21, 30 31, 40 41, 50 51, X	

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Mike Bechtel	[illegible] APPL Inc	12/8/05		LAB COURIER	* field filtered ** decant all unpreserved Samples except TDS
					Method of Shipment: COURIER / Total No. of Coolers Shipped: 1
					Airbill No.:
					Total No. of Containers: 19 / Lab SDG: 40278
		12/9/05	0800		Cooler Temp.: 2.0

AOC 23/EBS Parcel 124

CLEAN

CHAIN-OF-CUSTODY RECORD

23252

Site Name: Alameda 00035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): [illegible] LEDDY, JB
Signature(s):

Pay Items/ Analyses Required

1.15 TPH-gas/BTEX
2.18 TPH-DRO
2.3 EVOCs
2.2 PAHs
3.3 Rest/PCBs
4.2 Metals
5.30 TDS
6.9 Dissolved

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Preservation (4°C): HCl, HNO3

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G134	12/8/05 1915	A23SB26	WATER	2		60 70 X	dup
C077G133	↓	↓	↓	2		60 70 X	
C077G126	1450	A23SB21		10		20 21 / 50 51 / 53 56 / 60 70 X X	MS/MSD Rest/PCB

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
[illegible] BECHTEL	[illegible] APPL INC	12/9/05	1700	COURIER/VAN	* field filtered ** all unpreserved except TDS
		12/9/05	0800		

Method of Shipment: COURIER
Airbill No.: NA
Total No. of Containers: 14
Total No. of Coolers Shipped: 1
Lab SDG: 49278
Cooler Temp.: 2.5

~~077~~ AOC 23 EBS 123, 124, 126

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23315

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): M. LEDDY, M. SWANK
Signature(s): [signature]

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE, FRESNO, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required:
- 2.18 8015B-M TPH
- 2.3 8270C SVOCs
- 2.25 8270C SIM PAHs
- 3.3 8081A/8082 Pest / PCB
- 4.2 6010B/7000 metals (w/Hg)*
- 5.38 160.1 TDS
- 5.90 DECANT AT LAB**

Preservation (4°C): HNO3 (metals)

TAT (in days): 2 | 7 | 14 (circled) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	TPH	SVOCs	PAHs	Pest/PCB	Metals	TDS	Decant				Remarks (e.g., MS, MSD)
C077G150	12/8/05 0915	A23SB37	WATER	6						60→62	70→72	X				MS/MSD Metals and TDS
C077G127	12/8/05 1000	A23SB22	↓	7		20 21	30 31	40 41		60		X				
C077G142	12/8/05 1030	A23SB32	↓	2						60	70					
C077G141	12/8/05 1250	A23SB31	↓	2						60	70					
~~C077G~~		~~A23SB22~~	(MW)													

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
[signature] Bechtel	[signature] / APPL INC	12/8/05		LAB CONTRACT
	[signature]	12/9/05	0800	

Comments/Instructions:
* FILTERED & PRESERVED IN FIELD
** DECANT ALL UNPRES. SAMPLES, EXCEPT TDS AT LAB

Method of Shipment: Cour.
Airbill No.:
Total No. of Containers: 17
Total No. of Coolers Shipped: 1
Lab SDG: 49278
Cooler Temp.: 3.0

CLEAN

CHAIN-OF-CUSTODY RECORD

23363

Site Name: Alameda 00035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): G Yao, A KHAN, MJ
Signature(s): Gary Yao, AK MSwanson, MS

Analytical Laboratory Name: Brooks Rand LLC
Analytical Laboratory Address: 3958 6th Ave. NW, Seattle WA, 98107
Field Logbook/Page Number:

Pay Items/ Analyses Required: 8260 Mercury 1631*

Preservation (4°C): HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTTG145	12/03/05 800	A23SB34	Water	1		90	
COTTG143	↓ 800	A23SB33	↓	↓		90	
COTTSW01	12/07/05 1430	FQC				90	Not Filtered Source Water Blank
COTTG150	12/08/05 915	A23SB37				90	5-10'
COTTG127	1000	A23SB22				90	4-9'
COTTG142	1030	A23SB32				90	4-9'
COTTG144	↓ 1250	A23SB31	↓	↓		90	3-8'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Gary Yao/Bechtel	FedEx	12/08/05	1700	Ship to Lab	*field filtered
	Jewell Dupon/Brooks Rand	12/9/05	8:10		
					Method of Shipment: FedEx
					Airbill No.: 8508 4515229
					Total No. of Containers: 7
		12/12/05	0800		

Total No. of Coolers Shipped: 1
Lab SDG: 49278
Cooler Temp.: 1.5°C

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/9/05

Coolers: Number of Coolers: 7

YES NO Were coolers and samples screened for radioactivity?

YES NO Were custody seals on outside of cooler? How many? 7 Date on seal? NA

Name on seal? torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

YES (NO) Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO (NA) Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap samples

(YES) NO NA For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB2503 92 Correction factor: 0

Cooler temp(s): 1) 1.5° 2) 3.0° 3) 3.0° 4) 2.5° 5) 3.0° 6) 3.0° 7) 2.0° 8)

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

(YES) NO Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

(YES) NO Did all container labels agree with custody papers?

Sample Containers:

YES (NO) Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

YES (NO) Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

(YES) NO NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea: AX31699W01W02

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

(YES) NO NA Were correct preservatives added to the samples?

(YES) NO NA Was the pH taken of all non-VOA preserved samples and written on the sample container?

(YES) NO NA Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies:

Signature of personnel receiving samples: Libby Cederse Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (initials):

APPL - Analysis Request Form 49287

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda 00035 AOC23/EBS Parcel 121,23,
PO #: CTO 0077
Chain of Custody (Y/N): Y # 23281,23169,23167
RAD Screen (Y/N): Y pH (Y/N): N
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/10/05 Time: 08:00
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): 0.5°C
Color: VOA/BLUEPUR
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson DA
QC Report Type: DVP4/EDD/CA
Due Date: 12/24/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
****** NO TICs required ******

Sample Distribution:
GC: 3-$80BTS, 3-$87US, 3-$PCBS, 3-$SIMB, 3-$TPUS
Extractions: 3- SON002, 3- SON004, 3- SON009, 3- SON009S
VOA: 5-$86US, 3-$GAUS
Metals: 3-$HG-S, 3-$MTL3, 15-$MTL3(Pb)
Wetlab: 18-MOIST

Charges:

Invoice To:

	Client ID		APPL ID	Sampled		Analyses Requested
1	C077S391	SPKMS/MS	AX31777S	12/09/05	10:00	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR TPH-GAS
2	C077S392	X-SPK	AX31778S	12/09/05	10:15	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
3	C077S393	SPKMS/MS	AX31779S	12/09/05	10:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR PEST/PCB
4	C077S193		AX31780S	12/09/05	11:40	$MTL3(Pb), MOIST
5	C077S194		AX31781S	12/09/05	11:40	$MTL3(Pb), MOIST

6	C077S195		AX31782S	12/09/05 11:50	$MTL3(Pb), MOIST
7	C077S196		AX31783S	12/09/05 11:50	$MTL3(Pb), MOIST
8	C077S197		AX31784S	12/09/05 14:00	$MTL3(Pb), MOIST
9	C077S198		AX31785S	12/09/05 14:00	$MTL3(Pb), MOIST
10	C077S222		AX31786S	12/09/05 14:00	$MTL3(Pb), MOIST
11	C077S220	X-SPK	AX31787S	12/09/05 14:15	$86US, $MTL3(Pb), MOIST
12	C077S221	X-SPK	AX31788S	12/09/05 14:30	$86US, $MTL3(Pb), MOIST
13	C077S199		AX31789S	12/09/05 14:45	$MTL3(Pb), MOIST
14	C077S200		AX31790S	12/09/05 14:45	$MTL3(Pb), MOIST
15	C077S223		AX31791S	12/09/05 14:45	$MTL3(Pb), MOIST
16	C077S201		AX31792S	12/09/05 15:25	$MTL3(Pb), MOIST
17	C077S202		AX31793S	12/09/05 15:25	$MTL3(Pb), MOIST
18	C077S224		AX31794S	12/09/05 15:25	$MTL3(Pb), MOIST

AOC 23/EBS Parcel 122, 123, 124 VOLATILES

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23281

Site Name: Alameda DD035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): M. LEDDY
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

6.2D VOCs/8260B
6.15 TPH-DRO/8015M
3.18 TPH-GRO/8015M
7.3 SVOCs/8270C SIM
7.25 PAHs/8270C SIM
8.3 Pest/PCBs/8081A/8082
9.2 Metals/6010B/7470A
1.5D VOCs/8260B
1.13 TAMgas 8015M

Preservation (4°C): HCl HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0776123	12/9/05 800	A23SB19	WATER	5		01->03, 10, 11	
C0776139	900	A23SB20		5		01->03, 10, 11	
C0776124	830	A23SB20	WATER	5		01->03, 10, 11	
C0776118	1030	A23SB14		5		01->03, 10, 11	
C0776119	↓	↓		2		10, 11	
C077TB12	1400	FQC		2		01, 02	trip blank
C077R010	1330	FQC		5		01->03, 10, 11	Rinsate
C0775391	1000	A23SB14	SOIL	13		01->03, 10->18, 20	ms/msd TPH gas 1-2
C0775392	1015			7		01->03, 10->12, 20	3-4'
C0775393	1030	↓	↓	7		01->03, 10->12, 20, Z1	ms/msd post/RFB 2.5-3

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Bechtel		12/9/05	5:30 pm	COURIER TO LAB
		12/10/05	8:00	

Comments/Instructions:

Method of Shipment: COURIER
Airbill No.:
Total No. of Containers: 46
Total No. of Coolers Shipped: 1
Lab SDG: 49287 / 49289
Cooler Temp.: 5°C

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23169

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): M LEDDY
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number: AOC 12

Pay Items/ Analyses Required: 9.6 ICP LEAD 6.20 8260B VOCs

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775193	12/9/05 1140	A12SB02	SOIL	1		X	1-1.5'
C0775194	1140	↓		1		X	2-2.5'
C0775195	1150	A12SB03		1		X	1.5-2'
C0775196	1150	↓		1		X	2.5-3'
C0775197	1400	A12SB04		1		X	1-1.5'
C0775198	↓	↓		1		X	3-3.5'
C0775222	↓	↓		1		X	7.5-8'
C0775220	1415	A12SB02		4		X 01-03	7-8'
C0775221	1430	A12SB03		4		X 01-03	7-8'
C0775199	↓ 1445	A12SB05	↓	1		X	1.5-2'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Bechtel	APPL Inc	12/9/05	3:30 pm	COURIER/LAB
		12/10/05	8:00	

Comments/Instructions:

Method of Shipment: COURIER
Airbill No.:
Total No. of Containers: 16

Total No. of Coolers Shipped: 1
Lab SDG: 49287
Cooler Temp.: 0.5°C

BECHTEL **CLEAN**

CHAIN-OF-CUSTODY RECORD

23167

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): M LEDDY
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number: AOC 12

Pay Items/ Analyses Required: 9.6 ICP LEAD

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775200	12/9/05 1445	A12SB05	SOIL	1		X	3.5-4'
C0775223	↓ ↓	↓	↓	1		X	7.5-8'
C0775201	12/9/05 1525	A12SB06	SOIL	1		X	1-1.5'
C0775202	↓ ↓	↓	↓	1		X	3.5-4'
C0775224	↓ ↓	↓	↓	1		X	7.5-8'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Mark Beckett	[illegible] APPL INC	12/9/05	3:30 pm	LAB COURIER	
					Method of Shipment: COURIER
					Airbill No.:
					Total No. of Containers: 5
	[illegible]	12/10/05	8:00		

Total No. of Coolers Shipped: 1
Lab SDG: L9287
Cooler Temp.: 0.5°C

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/10/05

Coolers: Number of Coolers: 1

(YES) NO Were coolers and samples screened for radioactivity?

(YES) NO Were custody seals on outside of cooler? How many? 1 Date on seal? NA

Name on seal? torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

YES (NO) Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO (NA) Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap samples

(YES) NO NA For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB250392 Correction factor: 0

Cooler temp(s): 1) 0.5° 2) 3) 4) 5) 6) 7) 8)

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

(YES) NO Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

(YES) NO Did all container labels agree with custody papers?

Sample Containers:

YES (NO) Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

YES (NO) Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

YES NO (NA) Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO (NA) Were correct preservatives added to the samples?

YES NO (NA) Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO (NA) Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies:

Signature of personnel receiving samples: Libby Anderson Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

APPL - Analysis Request Form 49289

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda 00035 AOC23/EBS Parcel 121,23,
PO #: CTO 0077
Chain of Custody (Y/N): Y # See ARF comments
RAD Screen (Y/N): Y pH (Y/N): Y
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/10/05 Time: 08:00
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): SEE CRF
Color: VOA/BLUEPUR/ORGGRN
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson
QC Report Type: DVP4/EDD/CA
Due Date: 12/24/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
******NO TICs required ******
COC #23278, 23279, 23280, 2328, 23367, 23371

Sample Distribution:
GC: 5-$80BT, 7-$87UW, 5-$PCBW, 6-$SIMW, 5-$TPUW
Extractions: 7-_SEP004, 6-_SEP004S, 5-_SEP011, 5-SEP025
VOA: 6-$86UW, 6-$GAUW
Metals: 6-$HG-D, 6-$MT2F
Wetlab: 5-$1601

Charges:

Invoice To:

	Client ID		APPL ID	Sampled		Analyses Requested
1	C077G123	SPKMS/MS	AX31799W	12/09/05	08:00	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW -- MS/MSD FOR SVOCS
2	C077G139	X-SPK	AX31800W	12/09/05	09:00	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW
3	C077G124	X-SPK	AX31801W	12/09/05	08:30	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW
4	C077G118	SPKMS/MS	AX31802W	12/09/05	10:30	$1601, $80BT, $86UW, $87UW, $GAUW, $HG-D, $MT2F, $PCBW, $SIMW, $TPUW -- MS/MSD FOR TDS

5	C077G119	XSPK	AX31803W	12/09/05	10:30	$87UW $GAUW
6	C077JB12	XSPK	AX31804W	12/09/05	14:00	$86UW
	C077R010	XSPK	AX31806W	12/09/05	13:30	$1601 $80B1 $86UW $87UW $GAUW $HGID $MT2F $RGBW $SIMW $TRUW
8	C077G125	XSPK	AX31806W	12/09/05	08:30	$HGID $MT2F $SIMW
9	C077G140	XSPK	AX31807W	12/09/05	09:00	$87UW

AOC 25/EBS Parcel 121, 123, 124 VOLATILES

CLEAN

CHAIN-OF-CUSTODY RECORD

23281

Site Name: Alameda 00035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): M. LEDDY
Signature(s): [signature]

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: 6.30 VOCs/8260B; 6.15 TPH-gas/8015-M; 7.18 TPH-ext/8015B-M; 7.3 SVOCs/8270C PAHs; 7.25 PAHs/8270C SIM; 8.3 Pest/PCBs/8081A/8082; 9.2 Metals/6010/7000; 1.5D VOCs/8260B; 1.15 TPH-gas 8015-M

Preservation (4°C): HCl; HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G123	12/9/05 800	A23SB19	WATER	5		01→03; 10, 11	
C077G139	900	A23SB30	↓	5		01→03; 10, 11	
C077G124	830	A23SB20	WATER	5		01→03; 10, 11	
C077G118	1030	A23SB14		5		01→03; 10, 11	
C077G119	↓	↓		2		10, 11	
C077TB12	1400	FQC		2		01, 02	trip blank
C077R010	1330	FQC	↓	5		01→03; 10, 11	Rinsate
C077S391	1000	A23SB14	SOIL	13		01→03; 10→18; 20→	MS/MSD TPH-gas 1-2'
C077S392	1015			7		01→03; 10→12; 20→	3-4'
C077S393	1030	↓	↓	7		01→03; 10→12; 20→; 21	MS/MSD pest/PCB 4.5-5'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
[signature] Bechtel	[signature] APPL Inc	12/9/05	3:30 pm	Courier to LAB
	[signature]	12/10/05	8:00	

Comments/Instructions:

Method of Shipment: COURIER
Total No. of Coolers Shipped: 1
Airbill No.:
Total No. of Containers: 46
Lab SDG: 49287/49289
Cooler Temp.: 5°C

AOC 23/EBS Parcel 124

CLEAN

CHAIN-OF-CUSTODY RECORD

23367

Site Name: Alameda DOD 35
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): M LEDDY
Signature(s):

Pay Items/ Analyses Required: 1.15 TPH-gcs (8015); 2.18 TPH-dro (8015); 2.3 SVOCs (8270C); 2.25 PAHs (8270C SIM); 3.3 PCBs (8082); 4.2 Metals (6010B/7000); 10.39 TDS; 5.96 DECANT AT LAB **

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Preservation (4°C): HCl; None

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G123	12/9/05 800	A23SB19	WATER	14		20, 21; 30, 31, 33, 35, 36a; 40, 41; 50, 51; 60; 70; X	MS/MSD SVOCs

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Buchholz/Bechtel	[illegible]/APPL Inc	12/9/05	3:30 pm	COURIER TO LAB	* field filtered TPHs. ** DECANT ALL UNPRES. SAMPLES, EXCEPT TDS, AT LAB
					Method of Shipment: COURIER; Total No. of Coolers Shipped: 1
					Airbill No.:
					Total No. of Containers: 14; Lab SDG: 49289
	Chris Thorn	12-10-05	800		Cooler Temp.: 3.0°C

BECHTEL **CLEAN**

CHAIN-OF-CUSTODY RECORD

23371

Site Name: Alameda DD035
CTO Number: DD77
Site Contact/Supervisor: Johansen

Sampler(s): M. LEDDY
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: TPH-D 8015B/M (3.18); SVOCs 8270C no PAHs (2.13); PAHs 8270C SIM (3.25); Pest/PCBs 8081A/8082 (3.3); Metals 6010C/7000 (4.2); TDS 160.1 (5.36); DISPOSAL AT LAB (3.90)

Preservation (4°C): HNO3

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077R010	12/9/05 1330	FRC	WATER	10		20 21 / 30 31 / 40 41 / 50 51 / 60 / 70 / X	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Bec	APPL/FRC	12/9/05	1830	COMPLETED LAB	*FILTERED & PRES. IN FIELD & DEPANT ALL UNPRES. SAMPLES EXCEPT TDS, ~~INFIELD~~ AT LAB
					Method of Shipment: / Airbill No.: / Total No. of Coolers Shipped: 1
					Total No. of Containers: 10 / Lab SDG: 49289
	Anne Mora	12-10-05	800		Cooler Temp: 4.6°C

AOC 23 / EBS Parcel 121

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

#23280

Site Name: Alameda OOD35
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): M. LEDDY
Signature(s): [signature]

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required:
1.15 TPH-gas/8015-M
2.18 TPH-ce/8015B-M
3.3 SVOCs/8270C
2.25 PAHs/8270C SIM (PAHs)
3.3 Pest/PCBs/8081A/8082
4.3 Metals/6010B/7000 (*)
5.38 TDS/160.1
5.90 DECANT AT LAB (**)

Preservation (4°C): HCl; HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)											Remarks (e.g., MS, MSD)
C077G118	12/9/05 1230	A23SB14	WATER	12			20 21	30 31	40 41	50 51	60	70 72	X				MS/MSD for TDS
C077G119	↓	↓	↓	2				30 31					X				dup

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
M Leddy Bechtel	[signature] / APPL Inc	12/9/05	3:30 pm	LAB COURIER
	Anne Mora	12-10-05	800	

Comments/Instructions: *Field Filter metals
**DECANT ALL UNPRES. SAMPLES, EXCEPT TDS AT LAB

Method of Shipment: COURIER
Total No. of Coolers Shipped: 1
Airbill No.:
Total No. of Containers: 14
Lab SDG: 49289
Cooler Temp.: 4.0°C

AOC 23/ EBS Parcel 121

CLEAN

CHAIN-OF-CUSTODY RECORD

23278

Site Name: Alameda 00035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): M LEDDY
Signature(s):

Pay Items/ Analyses Required

1.15 TPH-gas 8015M
2.18 TPH-D 8015B-M
2.3 SVOCs 8270C PAHs
2.25 PAHs 8270C SIM
3.3 Pest/PCBs 8081B/8082A
4.2 Metals 6010B
5.38 TDS 160.1
5.90 DECANT AT LAB

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Preservation (4°C): HCl | HNO3

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0776129	12/9/05 830	A23SB20	WATER	10		20 21; 30 31; 40 41; 50 51; CC; X	
C0776125	↓	↓	↓	3		40 41; CC; X	dup

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Bechtel	APPL Fresno	12/9/05	3:30 pm	COURIER TO LAB	field filter metals & DECANT ALL UNPRES SAMPLES, EXCEPT TDS AT LAB
					Method of Shipment: COURIER
					Airbill No.:
					Total No. of Containers: 13
		12-10-05	800		Total No. of Coolers Shipped: 1
					Lab SDG: 49289
					Cooler Temp.: 3.0°C

AOC 23/EBS Parcel 121

CLEAN

CHAIN-OF-CUSTODY RECORD

*23279

Site Name: Alameda 00035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): M. LEDDY
Signature(s):

Pay Items/ Analyses Required

1.15 STPH-gas/BTEX/MTBE
2.13 STPH-diesel/BTEX/MTBE
2.3 VOCs/8260B
2.25 PAHs/8270C SIM
3.3 Pest/PCBs/8081A/8082
4.2 Metals/6010B
5.38 TDS/160.1
5.90 DELANT ATLAB

Analytical Laboratory Name: APP
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Preservation (4°C): HCl, HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077139	12/9/05 900	A23SB330	WATER	10		20 21, 30 31, 40 41, 50 51, 60, 70, X	
C077140	↓	↓	↓	2		30 31, X	dup

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Mylle Beck		12/9/05	3:50 pm	COURIER TO LAB	*Field filter metals **DELANT ALL UNPRES SAMPLES, EXCEPT TDS AT LAB
					Method of Shipment: COURIER
					Airbill No.:
		12-10-05	800		Total No. of Containers: 12

Total No. of Coolers Shipped: 1
Lab SDG: 19289
Cooler Temp.: 4.0°C

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/10/05

Coolers: Number of Coolers: 6

(YES) NO Were coolers and samples screened for radioactivity?

(YES) NO Were custody seals on outside of cooler? How many? 6 Date on seal? NA

Name on seal? torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

YES (NO) Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO (NA) Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap samples

(YES) NO NA For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB250392 Correction factor: 0

Cooler temp(s): 1) 0.5° 2) 3.0° 3) 4.0° 4) 4.0° 5) 3.0° 6) 4.0° 7) 8)

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

(YES) NO Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

(YES) NO Did all container labels agree with custody papers?

Sample Containers:

YES (NO) Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

YES (NO) Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

(YES) NO NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea: AX31804 W01

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

(YES) NO NA Were correct preservatives added to the samples?

(YES) NO NA Was the pH taken of all non-VOA preserved samples and written on the sample container?

(YES) NO NA Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies:

Signature of personnel receiving samples: Libby Anderson Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

APPL - Analysis Request Form 49301

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda 00035 AOC 12, 18
PO #: CTO 0077
Chain of Custody (Y/N): Y # See ARF comments
RAD Screen (Y/N): Y pH (Y/N): N
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/13/05 Time: 08:00
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): 2.0°C
Color: VOA/BLUE
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson DA
QC Report Type: DVP4/EDD/CA
Due Date: 12/27/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
******NO TICs required ******
COC #23156, 23168, 23246, 23337, 23372

Sample Distribution: Charges: Invoice To:
C: 12-$80BTS, 12-$87US, 12-$PCBS, 12-$SIMB, 12-$TPUS
Extractions: 12-_SON002, 12-_SON004, 12-_SON009, 12-_SON009S
VOA: 12-$86US, 12-$GAUS
Metals: 12-$HG-S, 11-$MTL3, 28-$MTL3(Pb)
Wetlab: 39-MOIST

	Client ID		APPL ID	Sampled		Analyses Requested
1	C077S301	X-SPK	AX31897S	12/12/05	11:25	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
2	C077S302	SPKMS/MS	AX31898S	12/12/05	11:25	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR SVOC
3	C077S303	X-SPK	AX31899S	12/12/05	11:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
4	C077S228	X-SPK	AX31900S	12/12/05	12:40	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3(Pb), $PCBS, $SIMB, $TPUS, MOIST

5	C077S305	SPKMS/MS	AX31901S	12/12/05	12:45	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR TPH-GAS
6	C077S306	X-SPK	AX31902S	12/12/05	12:50	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
7	C077S307	X-SPK	AX31903S	12/12/05	12:55	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
8	C077S308	X-SPK	AX31904S	12/12/05	13:00	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
9	C077S309	X-SPK	AX31905S	12/12/05	13:05	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
10	C077S310	X-SPK	AX31906S	12/12/05	13:20	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
11	C077S311	X-SPK	AX31907S	12/12/05	13:25	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST
12	C077S312	SPKMS/MS	AX31908S	12/12/05	13:30	$80BTS, $86US, $87US, $GAUS, $HG-S, $MTL3, $PCBS, $SIMB, $TPUS, MOIST -- MS/MSD FOR PEST/PCB/METALS
13	C077S211		AX31909S	12/12/05	08:35	$MTL3(Pb), MOIST
14	C077S212		AX31910S	12/12/05	08:40	$MTL3(Pb), MOIST
15	C077S229		AX31911S	12/12/05	08:45	$MTL3(Pb), MOIST
16	C077S207		AX31912S	12/12/05	08:30	$MTL3(Pb), MOIST
17	C077S208		AX31913S	12/12/05	08:35	$MTL3(Pb), MOIST
18	C077S227		AX31914S	12/12/05	08:40	$MTL3(Pb), MOIST
19	C077S205		AX31915S	12/12/05	09:20	$MTL3(Pb), MOIST
20	C077S206		AX31916S	12/12/05	09:25	$MTL3(Pb), MOIST
21	C077S226		AX31917S	12/12/05	09:30	$MTL3(Pb), MOIST
22	C077S191		AX31918S	12/12/05	09:30	$MTL3(Pb), MOIST
23	C077S192		AX31919S	12/12/05	09:35	$MTL3(Pb), MOIST
24	C077S219		AX31920S	12/12/05	09:40	$MTL3(Pb), MOIST
25	C077S217		AX31921S	12/12/05	09:50	$MTL3(Pb), MOIST
26	C077S218		AX31922S	12/12/05	09:55	$MTL3(Pb), MOIST

27	C077S232	AX31923S	12/12/05	10:00	$MTL3(Pb), MOIST
28	C077S203	AX31924S	12/12/05	10:00	$MTL3(Pb), MOIST
29	C077S204	AX31925S	12/12/05	10:05	$MTL3(Pb), MOIST
30	C077S225	AX31926S	12/12/05	10:10	$MTL3(Pb), MOIST
31	C077S213	AX31927S	12/12/05	10:30	$MTL3(Pb), MOIST
32	C077S214	AX31928S	12/12/05	10:35	$MTL3(Pb), MOIST
33	C077S230	AX31929S	12/12/05	10:40	$MTL3(Pb), MOIST
34	C077S215	AX31930S	12/12/05	13:30	$MTL3(Pb), MOIST
35	C077S216	AX31931S	12/12/05	13:35	$MTL3(Pb), MOIST
36	C077S231	AX31932S	12/12/05	13:40	$MTL3(Pb), MOIST
37	C077S209	AX31933S	12/12/05	14:00	$MTL3(Pb), MOIST
38	C077S210	AX31934S	12/12/05	14:05	$MTL3(Pb), MOIST
39	C077S228	AX31935S	12/12/05	14:10	$MTL3(Pb), MOIST

Main Identity

From: "Kuzmack, Toni" <amkuzmac@bechtel.com>
To: "Diane Anderson" <danderson@applinc.com>
Cc: "Urizar, Lara" <llurizar@bechtel.com>; "Mchugh, Donald" <dmchugh1@bechtel.com>
Sent: Wednesday, December 14, 2005 9:31 AM
Attach: DOC051214.pdf
Subject: FW: ARF 12/14/2005 09:50

On COC 23337 (which is attached), the sample labeled as C077S231 from station A12SB12 at 1040, should be really be C077S230. Please correct the COC you have as well as any containers received.

Thanks!

-----Original Message-----
From: Diane Anderson [mailto:danderson@applinc.com]
Sent: Wednesday, December 14, 2005 9:03 AM
To: Kuzmack, Toni
Subject: Fw: ARF 12/14/2005 09:50

----- Original Message -----
From: "APPL, Inc." <pdf@applinc.com>
To: "Diane Anderson" <danderson@applinc.com>
Sent: Wednesday, December 14, 2005 9:50 AM
Subject: ARF 12/14/2005 09:50

> Scanned from toshiba-e720.
> Diane Anderson
> Diane Ander_E-MAIL
> Date: 12/14/2005 09:50
> Pages:1
> Resolution:150x150 DPI
> ----------
>

AOC 18
CLEAN

CHAIN-OF-CUSTODY RECORD

23246

1/3

Site Name: ALAMEDA 00035
CTO Number: 000 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yee, M. Waterman, R. Goldberg
Signature(s): GY, MW, RG

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

6.2D VOCs 8260B
6.15 TPH-gas 8015B-M
7.15 SVOCs 8270C (PAHs)
7.30 PAH-SIM 8270C
9.3 PCBs 8082
9.2 Metals (5) 6010B
1.5D VOCs 8260B
7.18 TPH-ff 8015B-M

Preservation (4°C)
7.3
6.5
1.5

TAT (in days)
2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTT5301	12/12/05 1125	A18SB01	Soil	7		01 02 03 10 11 12 20 → 20	1-2'
COTT5302	1125	↓		7		01 02 03 10 11 12 20 → 20	2.5-4' MS/MSD for SVOCs
COTT5303	1130	↓		7		01 02 03 10 11 12 20 → 20	5-6'
COTT5304	1240	A18SB02		7		01 02 03 10 11 12 20 → 20	1-2'
COTT5305	1245	↓		13		01 02 03 10 → 18 20 → 20	3-4' MS/MSD for TPH-gas
COTT5306	1250	↓		7		01 02 03 10 11 12 20 → 20	6-7'
COTT5307	1255	A18SB03		7		01 02 03 10 11 12 20 → 20	1-2'
COTT5308	1300	↓		7		01 02 03 10 11 12 20 → 20	3-4'
COTT5309	1305	↓		7		01 02 03 10 11 12 20 → 20	6-7'
COTT5310	↓ 1320	A18SB04	↓	7		01 02 03 10 11 12 20 → 20	1-2'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yee/Bechtel	[illegible]/STL Inc	12/12/05	1700	Lab Courier
		12/13/05	0800	

Comments/Instructions:

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 76
Total No. of Coolers Shipped: 1
Lab SDG: 49301
Cooler Temp: 2.0°C

AOC 18
CLEAN

2/3

CHAIN-OF-CUSTODY RECORD

23156

Site Name: ALAMEDA 00035
CTO Number: 077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G.Yee, M.Waterman, R.Goldberg
Signature(s): GY, MW, RG

Pay Items/ Analyses Required

6.2D VOCs 8260B
6.5D TPH-g/BTEX 8260B
7.7D SVOCs 8270C (SIM)
7.2D PAHs 8270C (SIM)
8.3 Title 22 Metals 6010B/7000
9.2 Metals 6010B/7000
1.5D VOCs 8260B
7.1B TPH-d/ 8015B-M

Preservation (4°C): 7.3 6H, HCl

TAT (in days): 2 | 7 | (14) | 30

Analytical Laboratory Name: APPL WEST
Analytical Laboratory Address: 4203 SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number:

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0T5311	12/12/05 1325	A18SB04	Soil	7		01 02 03 10 11 12 20 → 20	3-4'
C0T5312	↓ 1330	↓	↓	7		01 02 03 10 11 12 20 → 20	6.5-8' MS/MSD for 6.2D/6.5D/7.7D/7.2D/8.3/9.2 tests; FCRs; metals

GY

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Gary Yee/Bechtel	[signature] TSK	12/12/05	1700	Lab Courier	
					Method of Shipment: Lab Courier; Total No. of Coolers Shipped: 1
					Airbill No.:
					Total No. of Containers: 14; Lab SDG: 49301
		12/13/05	0800		Cooler Temp: 2.0°C

AJCTL

CLEAN

CHAIN-OF-CUSTODY RECORD

23337

Site Name: Alameda Site 35
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): JB ML MD
Signature(s): MP

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av, Fresno CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775231 SS	12/12/05 1040	A12SB12	Soil	1		20	6.5-7
C0775215	1330	A12SB13					1.5-2
C0775216	1335	↓					3-3.5
C0775231	1340	↓					5.5-6
C0775209	1400	A12SB10					1-1.5
C0775210	1405	↓					2.5-3
C0775228	1410	↓					4.5-5
							(ML)

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
[illegible] Bechtel	[illegible] APPL Inc	12/12/05	1700	Ship to Lab
		12/13/05	0800	

Comments/Instructions:

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 7
Total No. of Coolers Shipped: 1
Lab SDG: 49301
Cooler Temp.: 2.0°C

BECHTEL CLEAN ADC12

CHAIN-OF-CUSTODY RECORD

23372

Site Name: Alameda ODD35
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): JB, MP, ML
Signature(s): JB MP MP

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203W. Swift Av, Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: 9.6 ICP LEAD

Preservation (4°C)

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775192	12/12/05 0935	A12SB01	SOIL	1		20	3.5-4'
C0775219	0940	↓				20	7.5-8'
C0775217	0950	A12SB14				20	1.5-2'
C0775218	0955	↓				20	3.5-4'
C0775232	1000	↓				20	7-8'
C0775203	1000	A12SB07				20	1-1.5'
C0775204	1005	↓				20	3.5-4'
C0775225	1010	↓				20	4-4.5'
C0775213	1030	A12SB12				20	1.5-2'
C0775214	1035	↓	↓	↓		20	3.5-4'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
D. McHugh/Bechtel	[illegible]/APPL	12/12/05	1700	Ship to lab	
					Method of Shipment: Courier; Total No. of Coolers Shipped: 1
					Airbill No.: NA
					Total No. of Containers: 10; Lab SDG: 49301
	[illegible]	12/13/05	0800		Cooler Temp.: 2.0°C

CLEAN

CHAIN-OF-CUSTODY RECORD

23168

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, GY, ML, MP
Signature(s): JB GY ML MP

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE. FRESNO CA 93722
Field Logbook/Page Number: ADC 12

Pay Items/ Analyses Required: 9.0 ICP LEAD

Preservation (4°C)

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775211	12/12/05 0835	A12SB11	SOIL	1		20	1-1.5'
C0775212	0840	↓	↓	↓		↓	3.5-4'
C0775229	0845	↓	↓	↓		↓	5-5.5'
C0775207	0830	A12SB09	↓	↓		↓	1.5-2
C0775208	0835	↓	↓	↓		↓	3-4'
C0775227	0840	↓	↓	↓		↓	7.5-8
C0775205	0920	A12SB08	↓	↓		↓	.5-1
C0775206	0925	↓	↓	↓		↓	2.5-3
C0775226	0930	↓	↓	↓		↓	4.5-5
C0775191	↓ 0930	A12SB01	↓	↓		↓	1.5-2

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. Mehnert/Bechtel	[illegible]/APPL INC	12/12/05	1700	Ship to Lab
	[illegible]	12/13/05	0800	

Comments/Instructions:

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 10

Total No. of Coolers Shipped: 1
Lab SDG: 4930
Cooler Temp.: 2.0°C

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COOLER RECEIPT FORM

Project: Alameda Date Received: 12/13/05

Coolers: Number of Coolers: 1

(YES) NO Were coolers and samples screened for radioactivity?

(YES) NO Were custody seals on outside of cooler? How many? 1 Date on seal? NA

Name on seal? torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

YES (NO) Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO (NA) Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap + samples

(YES) NO NA For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB250392 Correction factor: 0

Cooler temp(s): 1) 2.0° 2) 3) 4) 5) 6) 7) 8)

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

(YES) NO Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

(YES) NO Did all container labels agree with custody papers?

Sample Containers:

YES (NO) Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

YES (NO) Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

YES NO (NA) Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO (NA) Were correct preservatives added to the samples?

YES NO (NA) Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO (NA) Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies:

Signature of personnel receiving samples: Libby Anderson Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

APPL - Analysis Request Form 49303

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda 00035 AOC 18
PO #: CTO 0077
Chain of Custody (Y/N): Y # See ARF comments
RAD Screen (Y/N): Y pH (Y/N): Y
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/13/05 Time: 08:00
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): 2.0°C3.0°C3.0°C3.5°C
Color: VOA/BROWN/ORGGRN
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson
QC Report Type: DVP4/EDD/CA
Due Date: 12/27/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
*** NO TICs required ***
COC #23244, 23245, 23317, 23321

Sample Distribution: Charges: Invoice To:
C) 3-$80BT, 3-$87UW, 3-$PCBW, 3-$SIMW, 3-$TPUW
fractions: 3- SEP004, 3- SEP004S, 3- SEP011, 3- SEP025
VOA: 4-$86UW, 4-$GAUW
Metals: 3-$HG, 3-$MTL1
Wetlab: 3-$1601

	Client ID		APPL ID	Sampled		Analyses Requested
1	C077G071	X-SPK	AX31940W	12/12/05	12:45	$1601, $80BT, $86UW, $87UW, $GAUW, $HG, $MTL1, $PCBW, $SIMW, $TPUW
2	C077G072		AX31941W	12/12/05	12:45	$GAUW
3	C077G073	SPKMS/MS	AX31942W	12/12/05	13:40	$1601, $80BT, $86UW, $87UW, $GAUW, $HG, $MTL1, $PCBW, $SIMW, $TPUW -- MS/MSD PEST/PCB
4	C077TB13		AX31943W	12/12/05	15:15	$86UW
5	C077R011	X-SPK	AX31944W	12/12/05	15:30	$1601, $80BT, $86UW, $87UW, $GAUW, $HG, $MTL1, $PCBW, $SIMW, $TPUW

AOC 18
CLEAN

CHAIN-OF-CUSTODY RECORD

23245

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): M. Swank, G. Yao
Signature(s): Gary Yao, Mark Swank

Pay Items/ Analyses Required: 1.15 TAL-VOAs/8015-M; 2.18 TPH/8015B-M; 2.3 SVOCs/8270C; 2.3 PAHs/8270 SIM; 3.3 Pest/PCBs/8081A/8082; 4.2 Metals/6010B/7000; 6.38 TDS/160.1

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV FRESNO CA 93722
Field Logbook/Page Number:

Preservation (4°C): HCl, HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0776073	12/12/05 1340	A18SB02	Water	~~12~~ 14 GY		20 21, 30 31, 40 41, 50 51 52 53 54 55, 60, 70	MS/MSD for Pest./PCBs 5-10'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	M. Li/APPL Inc	12/12/05	1700	Lab Courier
[signature]		12/13/05	6x cw	

Comments/Instructions:

Method of Shipment: Lab Courier
Total No. of Coolers Shipped: 1
Airbill No.:
Total No. of Containers: 14
Lab SDG: 49363
Cooler Temp: 3.0°C

ADC 18
CLEAN

CHAIN-OF-CUSTODY RECORD

23317

Site Name: Alameda DOD35
CTO Number: DD77
Site Contact/Supervisor: Johnsen

Sampler(s): G. Yee, M. Swank
Signature(s): Gary Yee, Mark Swank

Pay Items/ Analyses Required: 1.1 TPH-gas (8015M), 2.1 TPH-ext (8015M), 2.2 TPH-ext (8015M (Lead)), 2.3 SVOCs (8270C), 2.4 PAHs (8270C), 2.5 PAHs (8270C SIM), 3.1 Pest/PCBs (8081A/8082), 4.2 Metals (6010B), 5.3 TDS (160.1)

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno CA 93722
Field Logbook/Page Number: _____

Preservation (4°C): HCl, HNO3

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0T1G071	12/12/05 1245	A16SB01	water	10		20 21, 30 31, 40 41, 50 51, 60, 70	5-10'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Gary Yee / Bechtel	[illegible] / APPL INC	12/12/05	1700	Lab Courier	
		12/13/05	0600		

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 10
Total No. of Coolers Shipped: 1
Lab SDG: 49303
Cooler Temp.: 3.0°C

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BECHTEL **CLEAN**

CHAIN-OF-CUSTODY RECORD

23321

Site Name: Alameda Site 35
CTO Number: 0077
Site Contact/Supervisor: E. Johansen

Sampler(s): JB, GY, ML.
Signature(s): JB, GY, ML

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Ave, Fresno 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: 1.1 HF; 2.1B 8015-M TPH-D; 2.3 8270 SVOCs; 2.25 8260 GCMS BTEX; 3.3 Pest/PCBs; 4.2 Metals (6010B/7000); 5.3B 160.1 TDS; 1.50 VOCs 8260B

Preservation (4°C): HCl; HNO3

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
0077RØ11	12/12/05 1530	FQC	Water	10		20 41 30 31 40 41 50 51 60 70	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
D. McHugh/Bechtel	[illegible]/STL Inc	12/12/05	1700	Ship to lab	
					Method of Shipment: Courier; Total No. of Coolers Shipped: 1
					Airbill No.: NA
					Total No. of Containers: 10; Lab SDG: 49303
		12/13/05	0800		Cooler Temp.: 3.5°C

AOC 18
CLEAN

CHAIN-OF-CUSTODY RECORD

23244

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): M. Siwek, G. Yee
Signature(s): Gary Yee, Mark Siwek

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: 1,5 TAH-qms/8015 M; 2,3 BTEX/8021B; 2,3 SVOCs/8270C (SIM); 2,3 PAHs/8270C (SIM); 2,3 PCBs/8082; 4,2 Metals/6010B; 6,3 TDS/160.1; 1,5 VOCs/8260B

Preservation (4°C): HCl; HNO3; HCl

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTTG071	12/2/05 1245	A18SB01	water	5		10 11 01 02 03	5-10'
COTTG072	↓ ↓	↓	↓	2		10 11	Dup. 5-10'
COTTG073	↓ 1340	A18SB02	↓	5		10 11 01 02 03	5-10'
COTTTB13	12/2/05 1515	FQC	Water	2		01 02	Trip Blank
COTTR011	↓ 1530	FQC	↓	5		10 11 01 02 03	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yee/Bechtel	[illegible]	12/2/05	1700	Lab Courier
		12/13/05	0800	

Comments/Instructions:

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 19
Total No. of Coolers Shipped: 1
Lab SDG: 49303
Cooler Temp.: 2.0°C

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/13/05

Coolers: Number of Coolers: 4

YES NO Were coolers and samples screened for radioactivity?

(YES) NO Were custody seals on outside of cooler? How many? 4 Date on seal? NA

Name on seal? torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

YES (NO) Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO (NA) Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap + sample

(YES) NO NA For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB250392 Correction factor: 0

Cooler temp(s): 1) 2.0° 2) 3.0° 3) 3.0° 4) 3.5° 5) 6) 7) 8)

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

(YES) NO Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

(YES) NO Did all container labels agree with custody papers?

Sample Containers:

YES (NO) Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

YES (NO) Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

(YES) NO NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea: AX31943 W01 W02

Smaller than a pea:

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

(YES) NO NA Were correct preservatives added to the samples?

(YES) NO NA Was the pH taken of all non-VOA preserved samples and written on the sample container?

(YES) NO NA Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies:

Signature of personnel receiving samples: Libby Anderson Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

APPL - Analysis Request Form 49310

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda 00035 AOC 11,15,17,20,21
PO #: CTO 0077
Chain of Custody (Y/N): Y # See ARF comments
RAD Screen (Y/N): Y pH (Y/N): N
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/14/05 Time: 08:00
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): 2.5°C 2.0°C
Color: VOA/YELLPUR
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson DA
QC Report Type: DVP4/EDD/CA
Due Date: 12/28/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
***** NO TICs required *****

COC #23159,23160,23235,23236,23240,23241,23248

Sample Distribution:
GC: 12-$80BTS, 12-$87US, 12-$PCBS, 21-$SIMB, 23-$US
Extractions: 12-_SON002, 12-_SON009, 21-_SON009S, 23-SON004
VOA: 40-$86US, 6-$GAUS
Metals: 33-$HG-S, 33-$MTL3
Wetlab: 50-MOIST, 9-$79US

Charges:

Invoice To:

	Client ID		APPL ID	Sampled		Analyses Requested
1	C077S177	X-SPK	AX31989S	12/13/05	13:00	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
2	C077S178	X-SPK	AX31990S	12/13/05	13:05	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
3	C077S179	X-SPK	AX31991S	12/13/05	13:10	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
4	C077S180	X-SPK	AX31992S	12/13/05	14:00	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
	C077S181	X-SPK	AX31993S	12/13/05	14:05	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST

6.	C077S182	X-SPK	AX31994S	12/13/05	14:10	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
7.	C077S174	SPKMS/MS	AX31995S	12/13/05	14:30	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST -- MS/MSD FOR VO
8.	C077S175	X-SPK	AX31996S	12/13/05	14:35	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
9.	C077S176	SPKMS/MS	AX31997S	12/13/05	14:40	$80BTS, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST -- MS/MSD FOR PAHS
10.	C077S261	X-SPK	AX31998S	12/13/05	11:30	$SIMB, MOIST
11.	C077S646	X-SPK	AX31999S	12/13/05	11:35	$SIMB, MOIST
12.	C077S263	X-SPK	AX32000S	12/13/05	11:40	$SIMB, MOIST
13.	C077S171	X-SPK	AX32001S	12/13/05	15:20	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
14.	C077S172	SPKMS/MS	AX32002S	12/13/05	15:25	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST -- MS/MSD FOR METALS
15.	C077S173	X-SPK	AX32003S	12/13/05	15:30	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
16.	C077S621	X-SPK	AX32004S	12/13/05	08:30	$86US, $TPUS, MOIST
17.	C077S622	X-SPK	AX32005S	12/13/05	08:40	$86US, $TPUS, MOIST
18.	C077S264	X-SPK	AX32006S	12/13/05	09:30	$SIMB, MOIST
19.	C077S265	X-SPK	AX32007S	12/13/05	09:35	$SIMB, MOIST
20.	C077S266	X-SPK	AX32008S	12/13/05	09:40	$SIMB, MOIST
21.	C077S267	SPKMS/MS	AX32009S	12/13/05	10:00	$SIMB, MOIST
22.	C077S268	X-SPK	AX32010S	12/13/05	10:05	$SIMB, MOIST
23.	C077S269	X-SPK	AX32011S	12/13/05	10:10	$SIMB, MOIST
24.	C077S287	X-SPK	AX32012S	12/13/05	08:25	$79US, $86US, $HG-S, $MTL3, $TPUS, MOIST
25.	C077S288	X-SPK	AX32013S	12/13/05	08:30	$79US, $86US, $HG-S, $MTL3, $TPUS, MOIST
26.	C077S289	X-SPK	AX32014S	12/13/05	08:35	$79US, $86US, $HG-S, $MTL3, $TPUS, MOIST

27	C077S284	X-SPK	AX32015S	12/13/05	09:00	$79US, $86US, $HG-S, $MTL3, $TPUS, MOIST
28	C077S285	SPKMS/MS	AX32016S	12/13/05	09:05	$79US, $86US, $HG-S, $MTL3, $TPUS, MOIST -- MS/MSD FOR TPH-FF
29	C077S286	X-SPK	AX32017S	12/13/05	09:10	$79US, $86US, $HG-S, $MTL3, $TPUS, MOIST
30	C077S281	X-SPK	AX32018S	12/13/05	09:45	$79US, $86US, $HG-S, $MTL3, $TPUS, MOIST
31	C077S282	X-SPK	AX32019S	12/13/05	09:50	$79US, $86US, $HG-S, $MTL3, $TPUS, MOIST
32	C077S283	SPKMS/MS	AX32020S	12/13/05	09:55	$79US, $86US, $HG-S, $MTL3, $TPUS, MOIST -- MS/MSD FOR VOC
33	C077S321	X-SPK	AX32021S	12/13/05	11:00	$86US, $HG-S, $MTL3, $TPUS, MOIST
34	C077S322	X-SPK	AX32022S	12/13/05	11:05	$86US, $HG-S, $MTL3, $TPUS, MOIST
35	C077S323	X-SPK	AX32023S	12/13/05	11:10	$86US, $HG-S, $MTL3, $TPUS, MOIST
36	C077S324	X-SPK	AX32024S	12/13/05	11:35	$86US, $HG-S, $MTL3, $TPUS, MOIST
37	C077S325	SPKMS/MS	AX32025S	12/13/05	11:40	$86US, $HG-S, $MTL3, $TPUS, MOIST -- MS/MSD FOR TPH-FF/METALS
38	C077S326	X-SPK	AX32026S	12/13/05	11:45	$86US, $HG-S, $MTL3, $TPUS, MOIST
39	C077S344	X-SPK	AX32027S	12/13/05	13:00	$86US, MOIST
40	C077S345	X-SPK	AX32028S	12/13/05	13:05	$86US, MOIST
41	C077S346	X-SPK	AX32029S	12/13/05	13:10	$86US, MOIST
42	C077S341	X-SPK	AX32030S	12/13/05	13:30	$86US, MOIST
43	C077S342	X-SPK	AX32031S	12/13/05	13:35	$86US, MOIST
44	C077S343	X-SPK	AX32032S	12/13/05	13:40	$86US, MOIST
45	C077S541	X-SPK	AX32033S	12/13/05	14:25	$86US, $GAUS, $HG-S, $MTL3, $TPUS, MOIST
46	C077S542	SPKMS/MS	AX32034S	12/13/05	14:30	$86US, $GAUS, $HG-S, $MTL3, $TPUS, MOIST -- MS/MSD FOR TPH-FF/METALS
47	C077S543	X-SPK	AX32035S	12/13/05	14:35	$86US, $GAUS, $HG-S, $MTL3, $TPUS, MOIST
	C077S544	X-SPK	AX32036S	12/13/05	15:15	$86US, $GAUS, $HG-S, $MTL3, $TPUS, MOIST

49	C077S645	X-SPK	AX32037S	12/13/05 15:20	$86US $GAUS $HG-S $MTL3 $TPUS MOIST	
50	C077S646	X-SPK	AX32038S	12/13/05 15:25	$86US $GAUS $HG-S $MTL3 $TPUS MOIST	

AOC 11
CLEAN

CHAIN-OF-CUSTODY RECORD

23236

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, ML, MP
Signature(s): JB ML MP

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV, FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: 6:LD 8260B VOCs; 7:3 8270C SVOCs (no PAHs); 7.25 8270C SIM PAHs; 8.3 8081A/8082 PEST/PCB; 9.2 6010B/7000 TAL METALS; 1.560 8015B VOCs

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775177	12/13/05 1300	A11SB03	SOIL	4		01 02 03 20 →	1-2'
C0775178	1305	↓		4		01 02 03 20 →	2.5-4'
C0775179	1310	↓		4		01 02 03 20 →	6.5-8'
C0775180	1400	A11SB04		4		01 02 03 20 →	0.1-1.1'
C0775181	1405	↓		4		01 02 03 20 →	3-4'
C0775182	1410	↓		4		01 02 03 20 →	6-7'
C0775174	1430	A11SB02		4		01 02 03 20 →	1-2'
C0775174	1430	↓		6		04,05 06,07 08,09	1-2' MS/MSD
C0775175	1435	↓		4		01 02 03 20 →	3-4'
C0775176	1440	↓		~~03~~ 05		20 20 20 21 20	4.5-6' MS/MSD for [illegible]

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
D. McHugh/Bechtel	[signature]/APPL Inc.	12/13/05	1700	Ship to lab	
				Method of Shipment: Courier	Total No. of Coolers Shipped: 1
				Airbill No.: NA	
				Total No. of Containers: 43	Lab SDG:
	[signature]	12/14/05	0800		Cooler Temp.:

Acc II
CLEAN

CHAIN-OF-CUSTODY RECORD

23235

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, ML, MP
Signature(s): JB, ML, MP

Analytical Laboratory Name: AOPL
Analytical Laboratory Address: 4203 W SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

6.20	7.257	7.3	8.3	1.2	1.150
8260B VOCs	PNTOC SIM PAHs	PNTOC SVOCs (no PAHs)	8081A/8082 PEST/PCB	6010B/7000 TAL METALS	8260B VOCs

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775261	12/13/05 1130	A15SB01	SOIL	1		20	1.5-2'
C0775262	1135	↓	↓	↓		20	2-2.5'
C0775263	1140	↓	↓	↓		20	6.5-7'
C0775171	1520	A11SB01		4		01 02 03 20	.75-1.75'
C0775172	1525	↓		4		01 02 03 20	2.5-4 MS/MSD for metals
C0775173	1530	↓	↓	4		01 02 03 20	7-8
C0776053	1430	A11SB02	Water	3		01 02 03	5-10
C0776063	1255	A17SB03		3		01 02 03	5-10
C0776062	1330	A17SB02		3		01 02 03	5-10'
C0776061	1345	A17SB01	↓	3		01 02 03	5-10'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
D. McHugh/Bechtel	[illegible]/APPL INC.	12/13/0	1700	Ship to Lab	
					Method of Shipment: Courier
					Airbill No.: NA
					Total No. of Containers: 26
		12/14/05	0800		

Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

AOC 15
CLEAN

volatiles

CHAIN-OF-CUSTODY RECORD

23240

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, ML, MS, MP
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV, FRESNO CA 93722
Field Logbook/Page Number: AOC 15

Pay Items/ Analyses Required: 7.25 8270C SIM PAH's; 6.20 VOC's 8260B; 2.0 TPH-CA 8015B-M; 1.50 VOC's 8260B

Preservation (4°C): HCL

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775621	12/13/05 0830	S152SB01	SOIL	4		01 02 03 20	1-2
C0775622	0840	↓	↓	4		01 02 03 20	3-4
C077G241	0900	S152SB01	Water	3		01 02 03	3.5-8.5'
~~C077G~~ no							
C0775264	12/13/05 0930	A155B02	SOIL	1		20	1.5-2
C0775265	0935	↓	↓	1		20	2.5-3.5'
C0775266	0940	↓	↓	1		20	5-6
C0775267	1000	A155B03	↓	1		20	1-2' MS/MSD
C0775268	1005	↓	↓	1		20	2.5-3'
C0775269	1010	↓	↓	1		20	5.5-6'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
D McHugh/ Bechtel	[illegible]	12/13/05	1700	Ship to Lab	
					Method of Shipment: Courier; Total No. of Coolers Shipped: 1
					Airbill No.: NA
					Total No. of Containers: 17; Lab SDG:
		12/14/05	0900		Cooler Temp.:

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AOC 17

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23241

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yee, M. Waterman, D. Kha
Signature(s): Gary Yee, M. Waterman

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: AOC 17

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0T75287	12/13/05 825	A17SB03	SOIL	4		01 02 03 20 →	1-2'
C0T75288	830	↓		4		01 02 03 20 →	3-4'
C0T75289	835	↓		4		01 02 03 20 →	4-5'
C0T75284	900	A17SB02		4		01 02 03 20 →	1-2'
C0T75285	905	↓		4		01 02 03 20 →	2.5-4' MS/MSD for TPH-4F
C0T75286	910	↓		4		01 02 03 20 →	4-5
C0T75281	945	A17SB01		4		01 02 03 20 →	6.5-2'
C0T75282	950	↓		4		01 02 03 20 →	2.5-4'
C0T75283	955	↓	↓	10		01 02 09 20 →	4-5' MS/MSD for VOCs

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yee/Bechtel	[illegible] Inc.	12/13/05	1700	Lab Courier
		12/14/05	0800	

Comments/Instructions: *SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 42
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

AOC 20

CLEAN

CHAIN-OF-CUSTODY RECORD

23248

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yao, M. Waterman, D. Khan
Signature(s): Gary Yao

Pay Items/ Analyses Required

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV FRESNO CA 93722
Field Logbook/Page Number: AOC 20

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTT5321	12/13/05 1100	A20SB01	SOIL	4		01 02 03 20 →	1-2'
COTT5322	1105	↓	↓	4		01 02 03 20 →	2-3'
COTT5323	1110	↓	↓	4		01 02 03 20 →	4-5'
COTT5324	1135	A20SB02	↓	4		01 02 03 20 →	1-2'
COTT5325	1140	↓	↓	4		01 02 03 20 →	25-4' MS/MSD for TPH-ff & metals
COTT5326	↓ 1145	↓	↓	4		01 02 03 20 →	4-5'

Preservation (4°C): HCl

6.20	7.18	9.2	1.50
8260B VOCs	8015B-M TPH-ff*	6010B/7000 TAL METALS	8260B VOCs

TAT (in days): 2 | 7 | (14) | 30

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	APPL INC	12/13/05	1700	Lab Courier
		12/14/05	0800	

Comments/Instructions: *SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 24
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

AOC 21
CLEAN

CHAIN-OF-CUSTODY RECORD

23159

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yeo, M. Waterman
Signature(s): Gary Yeo M.W.

Pay Items/ Analyses Required: 8260B VOCs; 8260B VOCs

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number: AOC 21

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0TT5344	12/13/05 1300	A21SB02	SOIL	4		01 02 03 04	1.5-2'
C0TT5345	1305	↓	↓	4		01 02 03 04	2-2.5'
C0TT5346	1310	↓	↓	4		01 02 03 04	6-6.5'
C0TT5341	1330	A21SB01	↓	4		01 02 03 04	1.5-2'
C0TT5342	1335	↓	↓	4		01 02 03 04	3-3.5'
C0TT5343	1340	↓	↓	4		01 02 03 04	5-5.5'

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Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Gary Yeo/Bechtel	[signature]/APPL FAC	12/13/05	1700	Lab Courier	Short pieces of liners included for lab's moisture measurements.
					Method of Shipment: Lab Courier / Total No. of Coolers Shipped: 1
					Airbill No.:
					Total No. of Containers: 24 / Lab SDG:
		12/14/05	0900		Cooler Temp.:

Data Gap 205

CLEAN

CHAIN-OF-CUSTODY RECORD

23160

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yee, M. Waterman
Signature(s): Gary Yee, MW

Pay Items/ Analyses Required *

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number:
EBS PARCEL 205

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775541	12/13/05 1425	D205SB01	SOIL	7		01 02 03 / 10 11 12 / 20 →	1.5-2'
C0775542	1430	D205SB01	SOIL	7		01 02 03 / 10 11 12 / 20 →	2-3.5' MS/MSD for TPH-DRO metals
C0775543	1435	D205SB01	SOIL	7		01 02 03 / 10 11 12 / 20 →	7-8'
C0775544	1515	D205SB02	Soil	7		01 02 03 / 10 11 12 / 20 →	1-2'
C0775545	1520	↓	↓	7		01 02 03 / 10 11 12 / 20 →	2-3'
C0775546	✓ 1525	↓	↓	7		01 02 03 / 10 11 12 / 20 →	7-8'

Preservation (4°C)

6.2.0 8260B VOCs
6.15 8015M TPH-gas
7.18 8015M TPH-fuel-fing
9.2 6010B TAL Metals

TAT (in days): 2 | 7 | (14) | 30

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yee / Bechtel	[signature] / ARC Inc	12/13/05	1700	Lab Courier
		12/14/05	0900	

Comments/Instructions:

* SILICA-GEL CLEANUP

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 42
Total No. of Coolers Shipped:
Lab SDG:
Cooler Temp.:

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COOLER RECEIPT FORM

Project: Alameda Date Received: 12/14/05

Coolers: Number of Coolers: 2

YES NO Were coolers and samples screened for radioactivity?

(YES) NO Were custody seals on outside of cooler? How many? 2 Date on seal? NA

Name on seal? torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

YES (NO) Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO (NA) Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap samples

(YES) NO NA For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB250392 Correction factor: 0

Cooler temp(s): 1) 2.5° 2) 2.0° 3) 4) 5) 6) 7) 8)

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

(YES) NO Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

(YES) NO 12/14/05 Did all container labels agree with custody papers?

Sample Containers:

YES (NO) Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

YES (NO) Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

YES NO (NA) Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO (NA) Were correct preservatives added to the samples?

YES NO (NA) Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO (NA) Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies: Extra soil sleeve for AX32030 and AX32027 did not come with Client ID and had the same depth (1.5-2) written on containers. Two EXTRA VOA vial containers for COPPER2

Signature of personnel receiving samples: Libby Cinderson Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

APPL - Analysis Request Form 49311

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda 00035 AOC 11,15,.17,21,152
PO #: CTO 0077
Chain of Custody (Y/N): Y # See ARF comments
RAD Screen (Y/N): Y pH (Y/N): Y
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/14/05 Time: 08:00
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): 2°2.5°2.5°3°3°4°
Color: VOA/BLUGRN/ORGGRN
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson
QC Report Type: DVP4/EDD/CA
Due Date: 12/28/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS!
PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
***** NO TICs required *****
Extra sample vial sent for C077RO12; dispose per client 2 VOA vial.
COC # 23158,23171,23179,23209,23235,23237,23238,23240,23242,23304

Sample Distribution:
GC: 2-$80BT, 3-$87UW, 2-$PCBW, 2-$SIMW, 5-$TPUW
Extractions: 3-_SEP004, 2-_SEP004S, 2-_SEP025, 5-_SEP011
VOA: 11-$86UW
Metals: 6-$HG-D, 6-$MT2F
Wetlab: 10-$1601, 5-$719U

Charges:

Invoice To:

	Client ID		APPL ID	Sampled		Analyses Requested
1	C077G053	X-SPK	AX32039W	12/13/05	14:30	$1601, $80BT, $86UW, $87UW, $HG-D, $MT2F, $PCBW, $SIMW
2	C077G063	X-SPK	AX32040W	12/13/05	12:55	$1601, $719U, $86UW, $HG-D, $MT2F, $TPUW
3	C077G062	X-SPK	AX32041W	12/13/05	13:30	$1601, $719U, $86UW, $HG-D, $MT2F, $TPUW
4	C077G061	X-SPK	AX32042W	12/13/05	13:45	$1601, $719U, $86UW, $HG-D, $MT2F, $TPUW
5	C077G091	MS/MSD	AX32043W	12/13/05	14:35	$1601, $86UW

6	C077G092		AX32044W	12/13/05	15:00	$1601, $86UW	
7	C077G093		AX32045W	12/13/05	15:00	$1601, $86UW	
8	C077TB14		AX62046W	12/13/05	16:30	$86UW	
9	C077G241		AX32047W	12/13/05	09:00	$1601, $86UW, $TRUW	
10	C077TB15		AX32048W	12/13/05	16:30	$86UW	
11	C077R012	X-SPK	AX32049W	12/13/05	16:00	$1601, $719U, $80BT, $86UW, $87UW, $HG-D, $MT2F, $PCBW, $SIMW, $TRUW	
12	C077G064		AX32050W	12/13/05	12:55	$1601, $719U, $HG-D, $MT2F	
13	C077G054	X-SPK	AX32051W	12/13/05	14:30	$87UW	

Acc 11

CLEAN

CHAIN-OF-CUSTODY RECORD

23235

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, ML, MP
Signature(s): JB, ML, MP

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: 8260B VOCs (struck); 7.05 ... SIM PAHs (struck); 7.0 8270C SVOCs (struck); [illegible] (struck); 7.12 [illegible] (struck); 1.50 8260B VOCs

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
~~C0775201~~	12/13/05 1130	A15SBØ1	SOIL	1		20	1.5-2'
~~C0775202~~	1135	↓		↓		20	2-2.5'
~~C0775203~~	1140	↓		↓		20	6.5-7'
~~C0775171~~	1520	A11SBØ1		4		01 03; 30 →	.75-1.75'
~~C0776172~~	1525	↓		4		01 03; 20 →	2.5-4 MS/MSD for metals
~~C0776~~173	1530	↓	↓	4		01 03; 20 →	7-8
1 C0776053	1430	A11SBØ2	Water	3		01 03	5-10'
2 C0776063	1255	A17SBØ3	↓	3		01 03	5-10'
3 C0776062	1330	A17SBØ2		3		01 03	5-10'
4 C0776061	1345	A17SBØ1	↓	3		01 03	5-10'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh/Bechtel	[signature]/APPL Inc.	12/13/0	1700	Ship to Lab
[signature]		12/14/05	0800	

Comments/Instructions:

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 26
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

AOC 15

Volatiles

CLEAN

CHAIN-OF-CUSTODY RECORD

23240

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, ML, MS, MP
Signature(s): JB ML MS MP

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV, FRESNO CA 93722
Field Logbook/Page Number: AOC 15

Pay Items/ Analyses Required: 1,50 VOCs 8260B; 1,50 VOCs 8260B; 1,50 VOCs 8260B

Preservation (4°C): HCL

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
~~C0[illegible]~~	12/13/05 0830	S152SB01	SOIL	4		20	1-2
~~C0[illegible]~~	0840	↓	↓	4		20	3-4
9 C0276241	0900	S152SB01	Water	3		02	3.5-8.5'
~~C0[illegible]~~							
~~C0[illegible]~~	12/13/05 0838	A155B02	SOIL	1		20	1.5-2
~~C0[illegible]~~	0935	↓	↓	1		20	2.5-3.5'
~~C0[illegible]~~	0940	↓	↓	1		20	5-6
~~C0[illegible]~~	1000	A155B03	↓	1		20	1-2' MS/MSD
~~C0[illegible]~~	1005	↓	↓	1		20	2.5-3'
~~C0[illegible]~~	1010	↓	↓	1		20	5.5-6'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D Mehaffey / Bechtel	[illegible] / APPL FAX	12/13/05	1700	Ship to Lab
		12/14/05	0800	

Comments/Instructions:

Method of Shipment: Courier
Airbill No.: NA
Total No. of Coolers Shipped: 1
Total No. of Containers: 17
Lab SDG:
Cooler Temp:

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AOC 17

BECHTEL **CLEAN**

CHAIN-OF-CUSTODY RECORD

23171

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): OK, ML, MS
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV FRESNO CA 93722
Field Logbook/Page Number: AOC 17

Pay Items/ Analyses Required

2.1B	4.2	5.3B	6.2	4.11
8015B-M TPH-D *	6010B/7000 TAL METALS **	160.1 TDS	DISSOLVED AT LAB ***	7196A HEXAVALENT CHROM ***

Preservation (4°C): HNO3

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G061	12/13/05 1345	A17SB01	WATER	6		20,21,22 60 70 X 80	
C077G062	12/13/05 1330	A17SB02		6		20,21,22 60 70 X 80	

MW

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Don McHugh Bechtel	APPL Inc.	12/13/05	1700	Ship to LAB
		12/14/05	0800	

Comments/Instructions:
* DEGANT AT LAB; SILICA-GEL CLEANUP, IF NEEDED
** FILTERED AND PRESERVED IN FIELD
*** FILTERED IN FIELD, 24 HR. HOLD TIME

Method of Shipment: COURIER
Airbill No.:
Total No. of Containers: 12
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

AOC 21

CLEAN

CHAIN-OF-CUSTODY RECORD

23158

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): O. Khan, G. Yao
Signature(s): [signature]

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number: AOC 21

Pay Items/ Analyses Required: 5.3B | 160.1 TDS

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTTG091	12/13/05 1435	A21SB01	WATER	2		70 71	5-10' MS/MSD
COTTG092	1500	A21SB02		1		70	5-10'
COTTG093	1500			1		70	5-10' Dup

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	[signature]/APPL TW	12/13/05	1700	Lab Courier
		12/14/05	0800	

Comments/Instructions:

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 4
Total No. of Coolers Shipped:
Lab SDG:
Cooler Temp.:

SWMU 152

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23209

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): M. LEDDY, M. SKAHAN
Signature(s): [signature]

Pay Items/ Analyses Required: 8015B-M TPH-D *; 1664.1 TPS; DECANT AT LAB; 2.1B; 5.3B; 5.9

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SHULTAN. FRESNO CA 93722
Field Logbook/Page Number: SWMU 152

Preservation (4°C)

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
0077G241	12/13/05 900	SWMU152SB01	WATER	4		70 X	

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
[signature] Bechtel	[signature] Apple Fax	12/13/05		Ship to LAB
		12/14/05	0800	

Comments/Instructions: * DECANT AT LAB, SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: COURIER
Airbill No.:
Total No. of Containers: 4
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

AOC 21

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23179

Site Name: ALAMEDA 00035
CTO Number: 0079
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yao, O. Khan
Signature(s): Gary Yao

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV FRESNO CA 93722
Field Logbook/Page Number: AOC 21

Pay Items/ Analyses Required: 1,5 8260B VOCs

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTTG091	12/13/05 1435	A21SB01	Water	8		01 02 04 → 09	MS/MSD 5-10'
COTTG092	1500	A21SB02		3		01 02 03	5-10'
COTTG093	1500	↓		3		01 02 03	5-10' Dup
COTTTB14	1630	FQC		2		01 02	Trip Blank

GC

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	[illegible] FAX	12/13/05	1700	Lab Courier
		12/14/05	0800	

Comments/Instructions:

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 16
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

AOC 11
CLEAN

CHAIN-OF-CUSTODY RECORD

23237

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB MP VM NS
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

Preservation (4°C)	2.3	2.25	2.3	4.2	5.3B	5.9	1.50	1.15
	BETOC SVOCs (NO PAH)	BETOC SIM PAHs	DCBA/AROCL PEST/PCB	GOLDBERG METALS	160.1 TDS	DECANT AT LAB *	VOCs 8260B	TPH-g-A
HNO3								
HCL								
H2SO4								

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077TB15	12/13/05 1630	FQC	WATER	2		01 02	TRIP
C077RB12	1600	FQC	↓	5		01 02 03	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
D. McHugh / Bechtel	[illegible] / APPL Inc	12/13/05	1700	ship to lab	* FILTERED & PRESERVED IN FIELD ** DECANT SVOCs, PAH, PEST/PCB SAMPLES AT LAB
					Method of Shipment: Courier; Total No. of Coolers Shipped: 1
					Airbill No.: NA
					Total No. of Containers: 2; Lab SDG:
		12/14/05	0800		Cooler Temp.:

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AOC 11

CLEAN

CHAIN-OF-CUSTODY RECORD

23238

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): M. SWANK
Signature(s): MARK SWANK

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
CQ776053	12/13; 1430	AB1SB02	WATER	8		30 31 / 46 41 / 50 51 / 70 / 60 / X	
CQ776054	12/13; 1430	A11SB02	↓	2		30 31 / X	DUPLICATE

Preservation (4°C): HNO3

TAT (in days): 2 | 7 | (14) | 30

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McClung/Bechtel	[illegible]/APPL INC	12/13/05	1700	Ship to lab
		12/14/05	0800	

Comments/Instructions:
* FILTERED AND PRESERVED IN FIELD
** DECANT SVOC, PAH & PEST/PCB SAMPLES AT LAB

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 10
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

AOC 17
CLEAN

CHAIN-OF-CUSTODY RECORD

23242

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): OK MS MM
Signature(s): OK MS MM

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV FRESNO CA 93722
Field Logbook/Page Number: AOC 17

Pay Items/ Analyses Required

2.18	4.2	5.38	5.9	4.11
8015B-M TPH-D *	6010B/7000 TAL METALS **	160.1 TDS	DECANT AT LAB	TRIVALENT Hex CHROM ***

Preservation (4°C): HNO3

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0773063	12/13/05 1255	A17SB03	WATER	6		20 22 60 70 X 80	
C0773064	↓	↓		3		60 70 X 80	dup

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Dan McClure Bechtel	Matt Lippe Jax.	12/13/05	1200	Ship to LAB
		12/14/05	0800	

Comments/Instructions:
* DECANT AT LAB, SILICA-GEL CLEANUP IF NEEDED
** FILTERED AND PRESERVED IN FIELD
*** FILTERED IN FIELD, 24 HR HOLD TIME

Method of Shipment: Courier
Airbill No.:
Total No. of Containers: 9
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

BECHTEL **CLEAN**

CHAIN-OF-CUSTODY RECORD

23304

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: HANSEN

Sampler(s): OK MS MP
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE
Field Logbook/Page Number: FRESNO CA 93722

Pay Items/ Analyses Required

Preservation (4°C)

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0077R012	12/13/05 1600	FB	WATER	11		20 21 40 41 50 51 60 70 80 X	ER

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Dan McHugh Bechtel	[illegible] APPL Inc	12/13/05	1600	Shipto LAB	24 hr TAT
					Method of Shipment: COURIER — Total No. of Coolers Shipped: 1
					Airbill No.: none
					Total No. of Containers: 11 — Lab SDG:
		12/14/05	0800		Cooler Temp.:

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/14/05

Coolers: Number of Coolers: 6

(YES) NO Were coolers and samples screened for radioactivity?

(YES) NO Were custody seals on outside of cooler? How many? 6 Date on seal? NA

Name on seal? torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

YES (NO) Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO (NA) Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap + samples

(YES) NO NA For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: #B250392 Correction factor: 0

Cooler temp(s): 1) 2.0° 2) 2.5° 3) 2.5° 4) 3.0° 5) 3.0° 6) 4.0° 7) 8)

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

(YES) NO Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

(YES) NO Did all container labels agree with custody papers?

Sample Containers:

YES (NO) Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

YES (NO) Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

YES (NO) NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

(YES) NO NA Were correct preservatives added to the samples?

(YES) NO NA Was the pH taken of all non-VOA preserved samples and written on the sample container?

(YES) NO NA Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies: EXTRA SAMPLE VIAL SENT FOR C077012 (DISPOSE PER CLIENT) 2 VOA VIAL

Signature of personnel receiving samples: Libby Anderson Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

APPL - Analysis Request Form 49319

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda 00035 AOC 1,3,13,24
PO #: CTO 0077
Chain of Custody (Y/N): Y # See ARF comments
RAD Screen (Y/N): Y pH (Y/N): N
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/15/05 Time: 08:00
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): 2.0°C 2.0°C
Color: VOA/YELLPURPLE
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson
QC Report Type: DVP4/EDD/CA
Due Date: 12/29/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
****** NO TICs required ******
COC #23153,23170,23214,23215,23216,23217,23318

Extra encore containers received for C077SO10. As per client run MS/MSD for encores.

Sample Distribution: Charges: Invoice To:
GC: 12-$TPUS, 29-$8081S, 2-$SIMB
Extractions: 12- SON004, 29- SON002, 2- SON009S
VOA: 12-$86US
Metals: 3-$HG-S, 3-$MTL3
Wetlab: 41-MOIST

	Client ID		APPL ID	Sampled		Analyses Requested
1	C077S001	X-SPK	AX32135S	12/14/05	08:30	$86US, $TPUS, MOIST
2	C077S002	X-SPK	AX32136S	12/14/05	08:40	$86US, $TPUS, MOIST
3	C077S463	X-SPK	AX32137S	12/14/05	09:00	$86US, $TPUS, MOIST
4	C077S004	X-SPK	AX32138S	12/14/05	09:20	$86US, $TPUS, MOIST
5	C077S005	X-SPK	AX32139S	12/14/05	09:30	$86US, $TPUS, MOIST
6	C077S006	X-SPK	AX32140S	12/14/05	09:40	$86US, $TPUS, MOIST
7	C077S007	X-SPK	AX32141S	12/14/05	10:00	$86US, $TPUS, MOIST

8	C077S008	X-SPK	AX32142S 12/14/05	10:10	$86US, $TPUS, MOIST
9	C077S010	SPKMS/MS	AX32143S 12/14/05	10:20	$86US, $TPUS, MOIST -- MS/MSD FOR VOC
10	C077S041		AX32144S 12/14/05	12:30	$8081S, MOIST
11	C077S042	X-SPK	AX32145S 12/14/05	12:35	$8081S, MOIST
12	C077S053		AX32146S 12/14/05	12:50	$8081S, MOIST
13	C077S054		AX32147S 12/14/05	12:55	$8081S, MOIST
14	C077S055		AX32148S 12/14/05	13:00	$8081S, MOIST
15	C077S047		AX32149S 12/14/05	13:10	$8081S, MOIST
16	C077S048	MS/MSD	AX32150S 12/14/05	13:15	$8081S, MOIST -- MS/MSD FOR PEST
17	C077S049		AX32151S 12/14/05	13:20	$8081S, MOIST
18	C077S050		AX32152S 12/14/05	13:50	$8081S, MOIST
19	C077S051		AX32153S 12/14/05	13:55	$8081S, MOIST
20	C077S052		AX32154S 12/14/05	14:00	$8081S, MOIST
21	C077S043		AX32155S 12/14/05	14:30	$8081S, MOIST
22	C077S044		AX32156S 12/14/05	14:35	$8081S, MOIST
23	C077S045		AX32157S 12/14/05	14:40	$8081S, MOIST
24	C077S046		AX32158S 12/14/05	14:45	$8081S, MOIST
25	C077S241		AX32159S 12/14/05	09:55	$8081S, MOIST
26	C077S242		AX32160S 12/14/05	09:55	$8081S, MOIST
27	C077S243		AX32161S 12/14/05	10:15	$8081S, MOIST
28	C077S244		AX32162S 12/14/05	10:15	$8081S, MOIST
29	C077S245		AX32163S 12/14/05	10:35	$8081S, MOIST
30	C077S246		AX32164S 12/14/05	10:35	$8081S, MOIST
31	C077S253		AX32165S 12/14/05	13:00	$8081S, $SIMB, MOIST
32	C077S254		AX32166S 12/14/05	13:00	$8081S, $SIMB, MOIST
33	C077S251		AX32167S 12/14/05	13:10	$8081S, MOIST

34 C077S252 AX32168S 12/14/05 13:10 $8081S MOIST

35 C077S249 AX32169S 12/14/05 13:30 $8081S MOIST

36 C077S250 AX32170S 12/14/05 13:30 $8081S MOIST

37 C077S247 AX32171S 12/14/05 13:45 $8081S MOIST

38 C077S248 AX32172S 12/14/05 13:45 $8081S MOIST

39 C077S461 XSPK AX32173S 12/14/05 09:10 $86US $HG-S $MTL3 $TPUS MOIST

40 C077S462 XSPK AX32174S 12/14/05 09:15 $86US $HG-S $MTL3 $TPUS MOIST

41 C077S463 XSPK AX32175S 12/14/05 09:30 $86US $HG-S $MTL3 $TPUS MOIST

Main Identity

From: "Kuzmack, Toni" <amkuzmac@bechtel.com>
To: "Diane Anderson" <danderson@applinc.com>
Cc: "Urizar, Lara" <llurizar@bechtel.com>; "Mchugh, Donald" <dmchugh1@bechtel.com>
Sent: Thursday, December 15, 2005 10:50 AM
Attach: ARF.pdf
Subject: FW: COC 12/15/2005 10:33

The comments for sample C077S010 should read "MS/MSD for VOC's" not fuel fingerprinting according to the field team. Not sure why two acetate sleeves were sent.

Lara: I confirmed with Don that this is the info on his site matrix.

-----Original Message-----
From: APPL, Inc. [mailto:pdf@applinc.com]
Sent: Thursday, December 15, 2005 10:34 AM
To: Sue Bonds; Kuzmack, Toni
Subject: COC 12/15/2005 10:33

Scanned from toshiba-e720.
Bechtel
Amy Kuzmac_E-MAIL
Date: 12/15/2005 10:33
Pages:1
Resolution:150x150 DPI

AOC 1

Volatiles

CLEAN

CHAIN-OF-CUSTODY RECORD

23216

Site Name: ALAMEDA - 00035
CTO Number: 0077
Site Contact/Supervisor: JOHNSEN

Sampler(s): JB, JD, MW
Signature(s): JB JD MW

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: AOC 1

Pay Items/ Analyses Required: 6.2D 8260B VOCs; 7.1B 8015B-M TPH-DRO *; 1.5 8260B VOCs

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0776051	12/14/05 0800	A11SB01	Water	3		01 02 03	7-12'
C0775001	0830	A01SB01	Soil	4		01 02 03 20	1-2'
C0775002	0840	↓	↓	4		01 02 03 20	7-8
~~C0775003~~	~~0850~~	~~↓~~		~~4~~		~~01 02 03 20~~	~~11-12~~
C0775009	0900	A01SB01	Soil	4		01 02 03 20	3-4'
C0775004	0920	A01SB02	↓	4		01 02 03 20	1-2'
C0775005	0930	↓		4		01 02 03 20	3-4'
C0775006	0940	↓		4		01 02 03 20	11-12'
C0775007	1000	A01SB03		4		01 02 03 20	1-2'
C0775008	1010	↓	↓	4		01 02 03 20	3-4'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh / Bechtel	APPL INC	12/14/05	1700	Ship to Lab
		12/15/05	0800	

Comments/Instructions: * SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 35
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

AOC 1

CLEAN

Vol. files

CHAIN-OF-CUSTODY RECORD

23217

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s):
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: AOC 1

Pay Items/ Analyses Required

Preservation (4°C)	8260B VOCs	8260B VOCs	8015M-TPH-D*	VOCs 8260B
HCL	1.5	6x20	7x18	1.5
HCL				

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077S010	12/14/05 1020	A01SB03	Soil	5		01 02 03 20 21	10.5-12' MS/MSD for TPH
C077TB17	1230	FQC	Water	2		01 02	TRIP

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. Mehrigh/Bechtel	[signature]/APPL Inc.	12/14/05	1700	Ship to lab

Comments/Instructions: * Silica gel cleanup, if needed

Method of Shipment: Courier
Airbill No.: Na
Total No. of Containers: 7
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

AOC 3

CLEAN

CHAIN-OF-CUSTODY RECORD

23215

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, MW, JD
Signature(s): JB MW JD

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203W SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: Soil Pest | 8015A

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775041	12/14/05 1230	A035B01	Soil	1		20	1.5-2
C0775042	1235	↓	↓	1		20	3.5-4
C0775053	1250	A035B06		1		20	1.5-2
C0775054	1255	↓		1		20	3.5-4
C0775055	1300	↓		1		20	5.5-6
C0775047	1310	A035B04		1		20	1.5-2
C0775048	1315	↓		1		20	3-4 MS/MSD
C0775049	1320	↓		1		20	6.5-7
C0775050	1350	A035B05		1		20	1.5-2
C0775051	1355	↓	↓	1		20	3.5-4

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
D. McVeigh / Bechtel	APPL FAX	12/14/05	1700	Ship to lab	
					Method of Shipment: Courier; Total No. of Coolers Shipped: 1
					Airbill No.: NA
					Total No. of Containers: 10; Lab SDG:
		12/15/05	0900		Cooler Temp.:

AOC 3

CLEAN

CHAIN-OF-CUSTODY RECORD

23214

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, JD, MW
Signature(s): JB JD MW

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: 8260 Perf. | SOSHA

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775052	12/14/05 1400	A035B05	Soil	1		20	7.5-8
C0775043	1430	A035B02		1		20	1.5-2
C0775044	1435	A035B02		1		20	3.5-4
C0775045	1440	A035B03		1		20	1.5-2
C0775046	1445	↓		1		20	3.5-4

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
D. McHugh/Bechtel	[illegible]/FedEx	12/14/05	1700	Ship to Lab	
					Method of Shipment: Courier
					Airbill No.: NA
		12/15/05	0800		Total No. of Containers: 5

Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

AOC 13

CLEAN

CHAIN-OF-CUSTODY RECORD

23170

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): ML, MP
Signature(s): [signature]

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number: AOC 13

Pay Items/ Analyses Required: 8021B, 8260B, 8270C SIM PAH, 7.25, 8.13, PESTICIDES

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775241	12/14/05 955	A13SB01	SOIL	1		20	1-1.5'
C0775242	955	A13SB01		1		20	2.5-3'
C0775243	1015	A13SB02		1		20	1.5-2'
C0775244	1015	A13SB02		1		20	3.5-4'
C0775245	1035	A13SB03		1		20	0.5-1
C0775246	1035	A13SB03		1		20	2-2.5
[illegible]	1255	A13SB07		1		20 (ML)	(MS)
[illegible]	1255	A13SB07		1		20 (ML)	(MSD)
C0775253	12/14/05 1300	A13SB07	SOIL	1		20 →	1.5-2'
C0775254	1300	A13SB07		1		20 →	3.5-4'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Wm Jeddy Bechtel	[illegible]	12/14/05	1700	Ship to LAB	
					Method of Shipment: COURIER; Total No. of Coolers Shipped: 1
					Airbill No.: NONE
					Total No. of Containers: 8; Lab SDG:
		12/15/05	0800		Cooler Temp.:

AOC 13

CLEAN

CHAIN-OF-CUSTODY RECORD

23153

Site Name: ALAMEDA 00035
CTO Number: 077
Site Contact/Supervisor: JOHNSEN

Sampler(s): KWK MP
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number: AOC 13

Pay Items/ Analyses Required: 8.13 PESTICIDES 7.25 8270C SIM PAH

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
CP775251	12/14/05 1310	A13SB06	SOIL	1		20	1-1.5'
CP775252	1310	↓		1		20	3.-3.5'
CP775249	1330	A13SB05		1		20	0.5-1'
CP775250	1330	↓		1		20	2-2.5'
CP775247	1345	A13SB04		1		20	1.5-2'
CP775248	1345	↓		1		20	3.5-4'

ML

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Kimberly Beckett	FedEx	12/14/05	1700	Ship to LAB
		12/15/05	0800	

Comments/Instructions:

Method of Shipment: COURIER
Airbill No.:
Total No. of Containers: 6
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

AOC 24
CLEAN

volatiles

CHAIN-OF-CUSTODY RECORD

23318

Site Name: Alameda ODD35
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): ML, MP, OK
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Ave. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: 6.2 8260B; 7.18 TPH-g/BTEX; 9.2 Metals 6010B; 15 8260B; 14.5 TPH-g 8015M

Preservation (4°C): HCl, HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775461	12/8/05 910	A25SB01	Soil	4		01,02,03 20 →	1-2'
C0775462	915	↓	↓	4		01,02,03 20 →	3-4'
C0775463	920	↓	↓	4		01,02,03 20 →	5-6'
C0776161	1100	↓	Water	3			
C0776201	0945	D20SSB01		5		01,02,03 10 11	5-10'
C0776201	0945	↓		6		01,02,03,04,05,06	MS/MSD
C0776003	1235	A01SB03		3		01,02,03	7-12'
C0776001	1045	A01SB01		3		01,02,03	7-12'
C0776081	0840	A20SB01		3		01,02,03	5-10
C0776082	0840	↓		3		01,02,03	5-10' DUP

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
D. McHugh / Bechtel	APPL Inc.	12/14/05	1700	Ship to lab	
					Method of Shipment: Courier; Total No. of Coolers Shipped: 1
					Airbill No.: na
					Total No. of Containers: 38; Lab SDG:
		12/15/05	0800		Cooler Temp.:

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/15/05

Coolers: Number of Coolers: 2

(YES) NO Were coolers and samples screened for radioactivity?

(YES) NO Were custody seals on outside of cooler? How many? 2 Date on seal? NA

Name on seal? torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

YES (NO) Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO (NA) Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap samples

(YES) NO NA For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB# 250392 Correction factor: 0

Cooler temp(s): 1) 2.0° 2) 2.0° 3) 4) 5) 6) 7) 8)

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

(YES) NO Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

(YES) NO Did all container labels agree with custody papers?

Sample Containers:

YES (NO) Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

YES (NO) Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

YES NO (NA) Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO (NA) Were correct preservatives added to the samples?

YES NO (NA) Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO (NA) Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies: Extra encore containers received for C077501O as per client run MS/MSD for encores. See attached email.

Signature of personnel receiving samples: Libby Cadena Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

APPL - Analysis Request Form 49320

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda
PO #: CTO 0077
Chain of Custody (Y/N): Y # TOO MANY
RAD Screen (Y/N): Y pH (Y/N): Y
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/15/05 Time: 08:00
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): SEE CRF
Color: VOA/PNKPUR/ORGGRN
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson
QC Report Type: DVP4/EDD/CA
Due Date: 12/29/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for met als and wet lab. Do not report undiluted val
****** NO TICs required ******

Sample Distribution: Charges: Invoice To:
GC: 10-$TPUW, 3-$80BT, 2-$87UW, 3-$PCBW, 2-$SIMW
Extractions: 10-_SEP011, 2-_SEP004, 2-_SEP004S, 3-_SEP025
VOA: 12-$86UW, 3-$GAUW
Metals: 5-$HG, 6-$MTL1, 1-$MTL3
Wetlab: 11-$1601

	Client ID		APPL ID	Sampled		Analyses Requested
1.	C077TB17	X-SPK	AX32176W	12/14/05	12:30	$86UW
2.	C077G161	X-SPK	AX32177W	12/14/05	11:00	$1601, $86UW, $HG, $MTL1, $TPUW MT2F
3.	C077G201	SPKMS/MS	AX32178W	12/14/05	09:45	$1601, $86UW, $GAUW, $HG, $MTL3, $TPUW MT2F
4.	C077G003	X-SPK	AX32179W	12/14/05	12:35	$1601, $86UW, $TPUW
5.	C077G001	X-SPK	AX32180W	12/14/05	10:45	$1601, $86UW, $TPUW
6.	C077G081	SPKMS/MS	AX32181W	12/14/05	08:40	$1601, $86UW, $MTL1, $TPUW #HG-D #MT2F

metals
metals

7.	C077G082	X-SPK	AX32182W	12/14/05	08:40	$86UW
8.	C077G051	X-SPK	AX32183W	12/14/05	08:00	$1601, $80BT, $86UW, $87UW, $HG, $MTL1, $PCBW, $SIMW
9.	C077G083	X-SPK	AX32184W	12/14/05	08:15	$86UW
10.	C077G002	X-SPK	AX32185W	12/14/05	11:15	$86UW
11.	C077G202	SPKMS/MS	AX32186W	12/14/05	09:30	$1601, $86UW, $GAUW, $HG, $MTL1, $TPUW
12.	C077R013	X-SPK	AX32187W	12/14/05	14:30	$1601, $80BT, $86UW, $87UW, $GAUW, $HG, $MTL1, $PCBW, $SIMW, $TPUW
13.	C077G084	X-SPK	AX32188W	12/14/05	08:15	$1601, $TPUW
14.	C077G083	X-SPK	AX32189W	12/14/05	08:15	$1601, $MTL1, $TPUW
15.	C077G002	X-SPK	AX32190W	12/14/05	11:15	$1601, $TPUW
16.	C077G052	X-SPK	AX32191W	12/14/05	08:00	$80BT, $PCBW

AOC 24
CLEAN

Volatiles

CHAIN-OF-CUSTODY RECORD

23318

Site Name: Alameda ODD35
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): ML, MP, OK
Signature(s): [signatures]

Pay Items/ Analyses Required: 6.2 VOCs/8260B; 7.18 TPH-E/8015M; 9.2 Metals/6010B; 1.5 SVOCs/8260B; 1.15 TPH-g 8015M

Preservation (4°C): HCl, HCL

TAT (in days): 2 7 (14) 30

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Ave. Fresno, CA 93722
Field Logbook/Page Number:

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)			Remarks (e.g., MS, MSD)
C0775461	12/14/05 910	A24SB01	Soil	4		01, 02, 03	20 →		1-2'
C0775462	915	↓	↓	4		01, 02, 03	20 →		3-4'
C0775463	930	↓	↓	4		01, 02, 03	20 →		5-6'
C077G161	1100	↓	Water	3					
C077G201	0945	D205SB01		5				01, 02, 03, 10, 11	5-10'
C077G201	0945	↓		6				04, 05, 06, 07, 08, 09	MS/MSD
C077G003	1235	A01SB03		3				01, 02, 03	7-12'
C077G001	1045	A01SB01		3				01, 02, 03	7-12'
C077G081	0840	A20SB01		3				01, 02, 03	5-10
C077G082	0840	↓		3				01, 02, 03	5-10' DUP

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. Mehigan / Bechtel	[signature] / APPL Inc	12/14/05	1700	Ship to lab
	[signature]	12/15/05	0800	

Comments/Instructions:

Method of Shipment: Courier
Airbill No.: na
Total No. of Containers: 38
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp:

AOC 20

CLEAN

CHAIN-OF-CUSTODY RECORD

23249

Site Name: ALAMEDA 00085
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, JD
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV FRESNO CA 93722
Field Logbook/Page Number: AOC 20

Pay Items/ Analyses Required

	2.18	4.12	5.28	5.9
	8015B-M TPH-D**	6010B/7000 TAL METALS*	NO MERCURY	160.1 TDS
Preservation (4°C)	HNO3			DECANT AT LAB

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G081	12/14/05 0840	A20SB01	WATER	6		20 21 32 60 61 70	5-10' MS/MSD for Metals
C077G084	0815	A20SB02	↓	4		20 21 22 70	5-10 Dup
C077G083	0815	A20SB02	↓	5		20 21 32 60 70	5-10'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
D. McHugh/Bechtel	APPL INC.	12/14/0	1700	Ship to lab	*FILTERED AND PRESERVED IN FIELD **DECANT AT LAB, SILICA-GEL CLEANUP, IF NEEDED
					Method of Shipment: Courier; Total No. of Coolers Shipped: 1
					Airbill No.: na
					Total No. of Containers: 15; Lab SDG:
		12/15/05	0800		Cooler Temp.:

BECHTEL **CLEAN**

CHAIN-OF-CUSTODY RECORD

23322

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JD, MS, ML
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

Preservation (4°C)	2.18 8015-M TPH-P*	2.3 8270C SVOCs	3.25 8270C SIM PAH	3.3 8081A/8082 Pesticides	4.2 6010B/7000 Metals**	6.38 Wet. Chem. TDS	6.90 Decant at lab***
HNO3							

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTTR013	12/14/05 14:30	FQC	WATER	10		20 21, 30 31, 40 41, 50 51, 60, 70, X	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
BEI	APPL INC.	12/14/05	1700	Shipping

Comments/Instructions:
* SILICA GEL CLEANUP, IF NEEDED
** FILTERED AND PRES. IN FIELD
*** DECANT ALL UNPRES. SAMPLES, EXCEPT TDS AT LAB.

Method of Shipment: Courier
Airbill No.: None
Total No. of Containers: 10
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

AOC 24

CLEAN

CHAIN-OF-CUSTODY RECORD

23319

Site Name: Alameda 00035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): ML DK
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: 2.18 TPH-GC/BTEX; 4.2 Metals 6010B; 5.38 TDS/160.1

Preservation (4°C): HNO3

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
00776161	12/14/05	A24SB01	water	7		20 21 68 69 70	ms/msd metals

ML

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Bechtel	Apex Inc.	12/14/05	1700	Ship to LAB	*Field filtered **DEVANT AT LAB
					Method of Shipment: Courier / Total No. of Coolers Shipped: 1
					Airbill No.:
					Total No. of Containers: 7 / Lab SDG:
		12/15/05	0800		Cooler Temp.:

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AOC [redacted] 11

CLEAN

CHAIN-OF-CUSTODY RECORD

23239

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, MS
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV, FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

	8270C SVOCs (NO PAH)	8270C SIM PAHs	8081A/8082 PEST/PCB	6010B/7000 METALS*	160.1 TDS	DECANT AT LAB**	TPH-d# 8015B-M
	2.3	0.725	3.2	4.2	5.3B	5Q	2.1B

Preservation (4°C): #HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G063	12/13/05 1235	A11SB03	WATER			60 20 27	
C077G064	1235	↓				60	dup
C077G051	12/14/05 0800	A11SB01	water	8		30 31 40 41 50 51 60 70	7-12'
C077G052	↓ 0800	↓	↓	2		50 51	dup 7-12'
C077G201	↓ 0945	D205SB01	↓	2		60 61	MS/MSD

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh/Bechtel	[redacted]	12/14/05	1700	Ship to lab
		12/15/05	08W	

Comments/Instructions:
* FILTERED AND PRESERVED IN FIELD
** DECANT SVOC, PAH & PEST/PCB SAMPLES AT LAB

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 12
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

Data Gap 205

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23161

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, OK
Signature(s): JB OK

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number:
EBS PARCEL 205

Pay Items/ Analyses Required

Preservation (4°C)	1.5	1.15	2.18	4.2	5.38	5.10
	8260B VOCs	8015-M TPH-gas	8015B-M TPH-fuel Surr.	6010B/7000 TAL Metals **	160.1 TDS	Percent of Lake **
HCl						
HCl						
HNO_3						

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
0077G201	12/14/05 0945	D205SB01	WATER	4		20 21 70 X	5-10 MS/MSD

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
D. McHugh / Bechtel	[illegible] / APPL Inc.	12/14/05	1700	Ship to Lab	** All unpreserved samples except TDS ** FIELD FILTERED * SILICA GEL CLEANUP
					Method of Shipment: Courier
					Airbill No.: NA
		12/15/05	0800		Total No. of Containers: 4

Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

AOC 1

CLEAN

CHAIN-OF-CUSTODY RECORD

23157

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, MS
Signature(s): JB MS

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4208 W SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number: AOC 1

Pay Items/ Analyses Required: 2.18 8015B-M TPH-D*; 5.38 160.1 TDS; 59 DISSANT @ LAB**; 150 VOCs 8260B

Preservation (4°C): HCL

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G003	12/14/05 1235	A01SB03	WATER	4		20 21 22 70 X	7-12' MS/MSD TPH
C077G001	1045	A01SB01	↓	↓		20 21 22 70 X	7-12
C077G002	1115	A01SB02	↓	↓		20 21 22 70 X	7-12'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh / Bechtel	[signature]	12/14/05	1700	Ship to lab
		12/15/05	0800	

Comments/Instructions:
* SILICA-GEL CLEANUP, IF NEEDED
** ALL UNPRESERVED SAMPLES, EXCEPT TDS

Method of Shipment: Courier
Airbill No.: Na
Total No. of Containers: 12
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

AOC 23 EBS 126

CLEAN

CHAIN-OF-CUSTODY RECORD

23284

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, JD, DC
Signature(s): JB JD DC

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4703 W SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required

Preservation (4°C): HNO3 | HCl | HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G202	12/14/05 0930	D20SSB12	WATER	6		29/32 60/61 70 X	7-12' MS/MSD for metals

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McVeigh / Bechtel	APPL Inc.	12/14/05	1700	Ship to lab
		12/15/05	0800	

Comments/Instructions:
** FILTERED & PRESERVED IN FIELD
* Silica gel Cleanup
** all unpreserved samples except TDS

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 6
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler temp.:

~~ACE 3~~ CLEAN

volatives

CHAIN-OF-CUSTODY RECORD

23287

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, MW
Signature(s): JB MW

Pay Items/ Analyses Required: 313 PEST/8081A; 150 VOCs 8260B; 115 TPH-g 8015M

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number:

Preservation (4°C): HCL, HCL

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G083	12/14/05 0815	A020SB02	water	3		01 02 03	5-10'
C077G002	1115	A015B02		3		01 02 03	7-12
C077G202	0930	D205SB02		~~3~~ 5		01 02 03 10 11	5-10'
C077G202	0930	↓		6		04 05 06 07 08 09	5-10' MS/MSD
C077R013	1430	FRC		5		01 02 03 10 11	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh/ Bechtel	[signature] / APPL INC	12/14/05	1700	Ship to lab
		12/15/05	0820	

Comments/Instructions: Extract and hold

Method of Shipment: Courier
Airbill No.: na
Total No. of Containers: 22
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

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AOC 1 — Volatiles

CLEAN

CHAIN-OF-CUSTODY RECORD

23216

Site Name: ALAMEDA -00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, JD, MW
Signature(s): JB JD MW

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: AOC 1

Pay Items/ Analyses Required: 6.20 8260B VOCs; 7.18 8015B-M TPH-GP *; 1.5 8260B VOCs

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0776051	12/14/05 0800	A1SB01	Water	3		01 02 03	7-12'
C0775001	0830	A01SB01	Soil	4		01 02 03 20	1-2'
C0775002	0840	↓	↓	4		01 02 03 20	7-8
~~C0775003~~	~~0850~~	↓		4		01 02 03 20	~~11-12~~
C0775009	0900	A01SB01	Soil	4		01 02 03 20	3-4'
C0775004	0920	A01SB02		4		01 02 03 20	1-2'
C0775005	0930	↓		4		01 02 03 20	3-4'
C0775006	0940	↓		4		01 02 03 20	11-12'
C0775007	1000	A01SB03		4		01 02 03 20	1-2'
C0775008	1010	↓	↓	4		01 02 03 20	3-4'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh / Bechtel	APPL Inc.	12/14/05	1700	Ship to Lab
		12/15/05	0800	

Comments/Instructions: * SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: Courier
Airbill No.: NA
Total No. of Containers: 35
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp:

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COOLER RECEIPT FORM

Project: Alameda Date Received: 12/15/05

Coolers: Number of Coolers: 6

YES NO Were coolers and samples screened for radioactivity?

YES NO Were custody seals on outside of cooler? How many? 6 Date on seal? NA

Name on seal? torn while removing

YES NO NA Were custody seals unbroken and intact at the time of arrival?

YES NO Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO NA Was the shipping slip scanned into the database?

YES NO NA If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): bubble wrap wet ice + samples

YES NO NA For hand delivered samples was sufficient ice present to start the cooling process?

YES NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB250392 Correction factor: 0

Cooler temp(s): 1) 2.0° 2) 2.0° 3) 3.0' 4) 2.0° 5) 3.5° 6) 3.5° 7) 8)

Chain of custody:

YES NO Was a chain of custody received?

YES NO Were the custody papers signed in the appropriate places?

YES NO Was the project identifiable from custody papers?

YES NO Did the chain of custody include date and time of sampling?

YES NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

YES NO Were container labels in good condition?

YES NO Was the client ID on the label?

YES NO Was the date of sampling on the label?

YES NO Was the time of sampling on the label?

YES NO Did all container labels agree with custody papers?

Sample Containers:

YES NO Were all containers sealed in separate bags?

YES NO Did all containers arrive unbroken?

YES NO Was there any leakage from samples?

YES NO Were any of the lids cracked or broken?

YES NO Were correct containers used for the tests indicated?

YES NO Was a sufficient amount of sample sent for tests indicated?

YES NO NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

YES NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO NA Were correct preservatives added to the samples?

YES NO NA Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO NA Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies: One extra container received for C077G082.
Missing one container for C077G081.

Signature of personnel receiving samples: Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (initials):

APPL - Analysis Request Form 49367

Client: **Bechtel National/Navy Clean**
Address: **1230 Columbia St. Ste 400**
San Diego, CA 92101
Attn: **Toni Kuzmack**
Phone: **619-744-3056** Fax: **619-687-8787**
Job: **Alameda**
PO #: **CTO 0077**
Chain of Custody (Y/N): **Y** **# 23192**
RAD Screen (Y/N): **Y** pH (Y/N): **N**
Turn Around Type: **14 DAYS**

Received by: **CM**
Date Received: **12/16/05** Time: **08:00**
Delivered by: **NA**
Shuttle Custody Seals (Y/N): **N**
Chest Temp(s): **NA**
Color: **SUB**
Samples Chilled until Placed in Refrig/Freezer: **Y**
Project Manager: **Diane Anderson** DA
QC Report Type: **DVP4/EDD/CA**
Due Date: **12/30/05**

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
*** *NO TICs required* ***

Low level Hg subbed to Brooks Rand

Sample Distribution: Charges: Invoice To:
Other: 7-SUB

	Client ID		APPL ID	Sampled		Analyses Requested
1.	C077G201	X-SPK	AX32619W	12/14/05	09:45	SUB
2.	C077G083	X-SPK	AX32620W	12/14/05	08:15	SUB
3.	C077G081	SPKMS/MS	AX32621W	12/14/05	08:40	SUB
4.	C077G202	X-SPK	AX32622W	12/14/05	09:30	SUB
5.	C077G011	X-SPK	AX32623W	12/14/05	09:30	SUB
6.	C077G012	X-SPK	AX32624W	12/14/05	09:30	SUB
	C077G013	X-SPK	AX32625W	12/14/05	10:30	SUB

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

2319c

Site Name: ALAMEDA 00095
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, GT, ML
Signature(s): JB GT ML

Analytical Laboratory Name: BROOKS RAND LLC
Analytical Laboratory Address: 3958 6TH AVE NW, SEATTLE WA 98107
Field Logbook/Page Number: A0020

Pay Items/ Analyses Required: 4:30 WI-EPA 1631 Low-level Hg *

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G201	12/14/05 0945	D205SB01 ✓	WATER	1		90	5-10'
C077G083	0815	A205B02 ✓		1		90	5-10' (Spare)
C077G081	0840	A205B01 ✓✓		(3)		90 91 92	5-10' MS/MSD
C077G202	0930	D205SB02 ✓		1		90	5-10'
C077G011	12/15/05 0930	A025B01 ✓		1		90	7-12'
C077G012	0930	A025B01 ✓		1		90	7-12' (field duplicate)
C077G013	↓ 1030	A025B02 ✓		1		90	7-12'

Partition comments

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. Mehrgh/Bechtel		12/15/05	1600	Ship to Lab
	Carolyn Rand/BRL	12/16/05	8:10	

Comments/Instructions: * FILTERED IN FIELD

Method of Shipment: Fed Ex
Airbill No.: 8413 8787 6226
Total No. of Containers: 9
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp: 5.4

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APPL - Analysis Request Form 49342

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda
PO #: CTO 0077
Chain of Custody (Y/N): Y # TOO MANY
RAD Screen (Y/N): Y pH (Y/N): N
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/16/05 Time: 08:00
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): 2.5°C 3.0°C
Color: VOA/YELLOWPURPLE
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson
QC Report Type: DVP4/EDD/CA
Due Date: 12/30/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for met als and wet lab. Do not report undiluted val
****** NO TICs required ******

Sample Distribution: Charges: Invoice To:
SVOA: 24-$80BTS, 24-$87US, 36-$PCBS, 24-$SIMB, 12-$80BS
Extractions: 36-_SON002, 24-_SON009, 24-_SON009S
VOA: 24-$86US
Metals: 24-$HG-S, 24-$MTL3, 12-$MTL3(Pb)
Wetlab: 48-MOIST

	Client ID		APPL ID	Sampled	Analyses Requested
1.	C077S021	X-SPK	AX32311S	12/15/05 09:15	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
2.	C077S022	X-SPK	AX32312S	12/15/05 09:20	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
3.	C077S023	SPKMS/MS	AX32313S	12/15/05 09:25	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST -- MS/MSD FOR PAHS
4.	C077S024	X-SPK	AX32314S	12/15/05 09:45	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
	C077S025	X-SPK	AX32315S	12/15/05 09:50	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST

6.	C077S026	X-SPK	AX32316S	12/15/05	09:55	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
7.	C077S027	X-SPK	AX32317S	12/15/05	10:30	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
8.	C077S028	X-SPK	AX32318S	12/15/05	10:35	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
9.	C077S029	X-SPK	AX32319S	12/15/05	10:40	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
10.	C077S030	X-SPK	AX32320S	12/15/05	10:45	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
11.	C077S031	SPKMS/MS	AX32321S	12/15/05	10:50	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST -- MS/MSD FOR METAL
12.	C077S032	X-SPK	AX32322S	12/15/05	10:55	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
13.	C077S074	X-SPK	AX32323S	12/15/05	13:25	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
14.	C077S075	X-SPK	AX32324S	12/15/05	13:30	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
15.	C077S076	X-SPK	AX32325S	12/15/05	13:35	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
16.	C077S071	X-SPK	AX32326S	12/15/05	14:00	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
17.	C077S072	X-SPK	AX32327S	12/15/05	14:05	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
18.	C077S073	X-SPK	AX32328S	12/15/05	14:10	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
19.	C077S077	X-SPK	AX32329S	12/15/05	14:35	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
20.	C077S078	X-SPK	AX32330S	12/15/05	14:40	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
21.	C077S079	SPKMS/MS	AX32331S	12/15/05	14:45	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST -- MS/MSD FOR PEST/PCBS
22.	C077S080	SPKMS/MS	AX32332S	12/15/05	15:00	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST -- MS/MSD FOR PAHS/SVOCS

23. C077S081	X-SPK	AX32333S	12/15/05	15:05	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
24. C077S082	X-SPK	AX32334S	12/15/05	15:10	$80BTS, $86US, $87US, $HG-S, $MTL3, $PCBS, $SIMB, MOIST
25. C077S091	X-SPK	AX32335S	12/15/05	08:30	$80BS, $PCBS, MOIST
26. C077S092	X-SPK	AX32336S	12/15/05	08:55	$80BS, $PCBS, MOIST
27. C077S093	X-SPK	AX32337S	12/15/05	08:40	$80BS, $PCBS, MOIST
28. C077S094	X-SPK	AX32338S	12/15/05	08:45	$80BS, $PCBS, MOIST
29. C077S095	X-SPK	AX32339S	12/15/05	08:50	$80BS, $PCBS, MOIST
30. C077S096	X-SPK	AX32340S	12/15/05	08:55	$80BS, $PCBS, MOIST
31. C077S097	X-SPK	AX32341S	12/15/05	09:10	$80BS, $PCBS, MOIST
32. C077S098	X-SPK	AX32342S	12/15/05	09:15	$80BS, $PCBS, MOIST
33. C077S100	X-SPK	AX32343S	12/15/05	09:25	$80BS, $PCBS, MOIST
34. C077S99	X-SPK	AX32344S	12/15/05	09:20	$80BS, $PCBS, MOIST
35. C077S101	X-SPK	AX32345S	12/15/05	09:50	$80BS, $PCBS, MOIST
36. C077S102	X-SPK	AX32346S	12/15/05	09:55	$80BS, $PCBS, MOIST
37. C077S151	X-SPK	AX32347S	12/15/05	15:50	$MTL3(Pb), MOIST
38. C077S152	X-SPK	AX32348S	12/15/05	15:55	$MTL3(Pb), MOIST
39. C077S153	X-SPK	AX32349S	12/15/05	16:00	$MTL3(Pb), MOIST
40. C077S157	X-SPK	AX32350S	12/15/05	12:50	$MTL3(Pb), MOIST
41. C077S158	SPKMS/MS	AX32351S	12/15/05	12:40	$MTL3(Pb), MOIST
42. C077S159	X-SPK	AX32352S	12/15/05	12:50	$MTL3(Pb), MOIST
43. C077S163	X-SPK	AX32353S	12/15/05	13:30	$MTL3(Pb), MOIST
44. C077S164	X-SPK	AX32354S	12/15/05	13:40	$MTL3(Pb), MOIST
45. C077S165	X-SPK	AX32355S	12/15/05	13:50	$MTL3(Pb), MOIST
46. C077S154	X-SPK	AX32356S	12/15/05	15:30	$MTL3(Pb), MOIST
47. C077S155	X-SPK	AX32357S	12/15/05	15:35	$MTL3(Pb), MOIST

48. C077S156 X-SPK AX32358S 12/15/05 15:40 $MTL3(Pb), MOIST

AOC 5

CLEAN

CHAIN-OF-CUSTODY RECORD

23227

Site Name: ALAMEDA 00035
CTO Number: 077
Site Contact/Supervisor: JOHANSEN

Sampler(s): GY, MW, MS, JLD
Signature(s): Gary Yao, Mark Switzer, JLD

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV, FRESNO CA 93722
Field Logbook/Page Number: AOC 5

Pay Items/ Analyses Required

8260B VOCs	8270C SVOCs	8270C SIM PAHs	8081A/8082 PEST/PCBs	6010B/7000 TAL METALS	8260B VOCs
6.20	7.3	7.25	8.3	9.2	15

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTTS081	12/15/05 1505	ADSSB04	SOIL	4		01 02 03 20 →	3-4'
COTTS082	↓ 1510	↓	↓	↓		01 02 03 20 →	7-8'

GY

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	[illegible]	12/15/05	1700	Lab Courier
		12/16/05	0840	

Comments/Instructions:

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 8
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

AOC 5

CLEAN

CHAIN-OF-CUSTODY RECORD

23226

Site Name: ALAMEDA 00035
CTO Number: 077
Site Contact/Supervisor: JOHANSEN

Sampler(s): GY, MW, MS, JD
Signature(s): Gary Yoo, Mark Sumida
M I T

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV FRESNO, CA 93722
Field Logbook/Page Number: AOC 5

Pay Items/ Analyses Required: 6.20 8260B VOCs; 7.13 8270C SVOCs; 7.25 8270C SIM PAHs; 8.3 8081A/8082 PEST/PCB; 9.2 6010B/7000 TAL METALS; 1.5 8260B VOCs

Preservation (4°C): HCl

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0TTS074	12/5/05 1325	A05SB02	SOIL	4		02 03 20 →	1-2'
C0TTS075	1330	↓				01 02 03 20 →	3-4'
C0TTS076	1335	↓				01 02 03 20 →	7-8'
C0TTS071	1400	A05SB01				01 02 03 20 →	1-2'
C0TTS072	1405	↓				01 02 03 20 →	3-4'
C0TTS073	1410	↓				01 02 03 20 →	7-8'
C0TTS077	1435	A05SB03				01 02 03 20 →	1-2'
C0TTS078	1440	↓				01 02 03 20 →	3-4'
C0TTS079	1445	↓				01 02 03 20 →	6.5-8' MS/MSD for TPH-D/PCBs
C0TTS080	↓ 1500	A05SB04	↓	↓		01 02 03 20 →	0.5-2' MS/MSD for TPH-D & SVOCs

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Gary Yoo/Bechtel	[illegible]	12/15/05	1700	Lab Courier	
					Method of Shipment: Lab Courier; Total No. of Coolers Shipped: 1
					Airbill No.:
					Total No. of Containers: 40; Lab SDG:
		12/16/05	0800		Cooler Temp.:

AOC 6

CLEAN

CHAIN-OF-CUSTODY RECORD

23223

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, MP, DE, ML
Signature(s): JB, MP, DE, ML

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: AOC 6

Pay Items/ Analyses Required: B18, 8082, TCLP

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775091	12/15/05 0830	A06SB01	SOIL	1		20	1.5-2
C0775092	0835	↓		1		20	3.5-4
C0775093	0840	A06SB02		1		20	1-1.5
C0775094	0845	↓		1		20	2.5-3
C0775095	0850	A06SB03		1		20	.5-1
C0775096	0855	↓		1		20	2-2.5
C0775097	0910	A06SB04		1		20	1.5-2
C0775098	0915	↓		1		20	3.5-4
C0775100	0925	A06SB05		1		20	~~1.5-2~~ 3.5-4
C0775099	↓ 0920	↓	↓	1		20	~~3.5-4~~ 1.5-2

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh/Bechtel	[illegible]	12/15/05	1700	Ship to lab
		12/16/05	0800	

Comments/Instructions:

Method of Shipment: Courier
Airbill No.: na
Total No. of Containers: 10
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

AOC 6

CLEAN

CHAIN-OF-CUSTODY RECORD

23224

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHNSEN

Sampler(s): JB, DK, MH, MP
Signature(s): JB, DK, MJe

Analytical Laboratory Name: ADL
Analytical Laboratory Address: 4203 W. SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: AOC 6

Pay Items/ Analyses Required: B,18 8082 PCBs

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775101	12/15/05 0950	A06SB06	SOIL	1		20	-5-1
F0775102	0955	↓	↓	1		20	2-2.5

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
D. Mihugh / Bechtel	[signature]	12/15/05	1700	Ship to Lab	
					Method of Shipment: Courier; Total No. of Coolers Shipped: 1
					Airbill No.: NA
					Total No. of Containers: 2; Lab SDG:
	[signature]	12/16/05	0800		Cooler Temp.:

AOC 10
CLEAN

CHAIN-OF-CUSTODY RECORD

23165

Site Name: ALAMEDA 000 35
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, ML, MP
Signature(s): JB ML MP

Pay Items/ Analyses Required: 9.6 ICP LEAD

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number: AOC 10

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775157	12/15/05 1250	A10SB03	SOIL	1		20	1.5-2
C0775158	1240	↓	↓	1		20	3-4 MS/MSD
C0775159	1250	↓	↓	1		20	7.5-8
C0775163	1330	A10SB05	↓	1		20	1-1.5
C0775164	1340	↓	↓	1		20	2.5-3
C0775165	1350	↓	↓	1		20	4.5-5
C0775154	1530	A10SB02	↓	1		20	1-1.5
C0775155	1535	↓	↓	1		20	2.5-3
C0775156	1540	↓	↓	1		20	5.5-6

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
D. McHugh/Bechtel	[signature]	12/15/05	1600	Ship to Lab
	[signature]	12/16/05	0800	

Comments/Instructions:

Method of Shipment: Courier
Airbill No.: na
Total No. of Containers: 9
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

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AOC 2
CLEAN

CHAIN-OF-CUSTODY RECORD

23218

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): GY, MW, MS, JD
Signature(s): Gary Yee
Mark Swank, MS

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number: AOC 2

Pay Items/ Analyses Required: 6.20 8260B VOCs; 7.3 8270C SVOCs; 7.25 8270C SIM PAHs; 8.3 8081A/8082 PEST/PCB; 9.2 6010B/7000 TAL METALS; 1.5 8260B VOCs

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTTS021	12/15/05 915	A02SB01	Soil	4		01 02 03 20	1-2'
COTTS022	920	↓	↓	↓		01 02 03 20	3-4'
COTTS023	925	↓	↓	↓		01 02 03 20	6.5-8' MS/MSD for PAHs
COTTS024	945	A02SB02	↓	↓		01 02 03 20	1.5-2'
COTTS025	950	↓	↓	↓		01 02 03 20	3.5-4'
COTTS026	955	↓	↓	↓		01 02 03 20	7-8'
COTTS027	1030	A02SB03	↓	↓		01 02 03 20	1.2-2'
COTTS028	1035	↓	↓	↓		01 02 03 20	2.5-4'
COTTS029	1040	↓	↓	↓		01 02 03 20	7-8'
COTTS030	↓ 1045	A02SB04	↓	↓		01 02 03 20	1.5-2'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Gary Yee / Bechtel	[signature] TAL	12/15/05	1700	Lab Courier	
					Method of Shipment: Lab Courier / Total No. of Coolers Shipped: 1
					Airbill No.:
					Total No. of Containers: 40 / Lab SDG:
	[signature]	12/16/05	0800		Cooler Temp.:

AOC 2
CLEAN

CHAIN-OF-CUSTODY RECORD

23219

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): GY, MW, MS, JD
Signature(s): Gary Yao, Mark Sprouse, ML

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: AOC 2

Pay Items/ Analyses Required

6010	8260B VOCs	8270C SVOCs	8270C SIM PAHs	8081A/8082 PCB/PCBs	6010B/7000 TAL METALS	8260B VOCs
6.0	7.3	1.25	8.3	9.2	1.5	

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTTS031	12/5/05 1050	A02SB04	SOIL	4		01 02 03 20	2.5-4' MS/MSD for metals
COTTS032	1055	↓	↓	↓		01 02 03 20	7-8'
COTTG011	930	A02SB01	Water	3		01 02 03	7-12'
COTTG013	1030	A02SB02	↓	3		01 02 03	7-12'
COTTTB17	↓ 1345	FQC	Water	2		01 02	Trip Blank
COTTR014	12/5/05 1345	FQC	↓	3		01 02 03	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	[signature]	12/5/05	1700	Lab Courier
		12/12/05	0800	

Comments/Instructions:

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 19
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

GY

GY

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AOC 10

BECHTEL **CLEAN**

CHAIN-OF-CUSTODY RECORD

23166

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): JB, ML, MP, DM
Signature(s): JB MJ MP NL

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4703 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number: AOC 10

Pay Items/ Analyses Required: 9.10 ICP LEAD; Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775151	12/15/05 1550	A10SB01	SOIL	1		20	1.5-2
C0775152	1555	↓	↓	1		20	3.5-4
C0775153	1600	↓	↓	1		20	7.5-8

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
D. McHugh/ Bechtel	[signature] TDS	12/15/05	1630	Ship to lab	
					Method of Shipment: Courier; Total No. of Coolers Shipped: 1
					Airbill No.: na
	[signature]	12/16/05	0800		Total No. of Containers: 3; Lab SDG:
					Cooler Temp.:

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/16/05

Coolers: Number of Coolers: 2

(YES) NO Were coolers and samples screened for radioactivity?

(YES) NO Were custody seals on outside of cooler? How many? 2 Date on seal? NA

Name on seal? torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

YES (NO) Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers:1) 2) 3)

YES NO (NA) Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap + samples

(YES) NO NA For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB250392 Correction factor: 0

Cooler temp(s): 1) 2.5° 2) 3.0° 3) 4) 5) 6) 7) 8)

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

(YES) NO Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

YES (NO) Did all container labels agree with custody papers?

Sample Containers:

YES (NO) Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

YES (NO) Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

YES NO (NA) Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO (NA) Were correct preservatives added to the samples?

YES NO (NA) Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO (NA) Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies: Two soil sleeves tabs labeled as C0775151, went off collection times.

Signature of personnel receiving samples: Libby Anderson Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

APPL - Analysis Request Form 49343

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda
PO #: CTO 0077
Chain of Custody (Y/N): Y # 23219,222,221
RAD Screen (Y/N): Y pH (Y/N): Y
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/16/05 Time: 08:00
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): 2.0° 3.0° 3.0°
Color: VOA/PUR/ORGRN
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson
QC Report Type: DVP4/EDD/CA
Due Date: 12/30/05

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for met als and wet lab. Do not report undiluted val
****** NO TICs required ******

Sample Distribution: Charges: Invoice To:
GC: 3-$80BT, 3-$87UW, 3-$PCBW, 4-$SIMW
Extractions: 3- SEP004, 4- SEP004S, 3- SEP025
VOA: 4-$86UW
Metals: 3-$MTL1
Wetlab: 3-$1601

	Client ID		APPL ID	Sampled		Analyses Requested
1.	C077G011	X-SPK	AX32359W	12/15/05	09:30	$1601, $80BT, $86UW, $87UW, $MTL1, $PCBW, $SIMW
2.	C077G013	X-SPK	AX32360W	12/15/05	10:30	$1601, $80BT, $86UW, $87UW, $MTL1, $PCBW, $SIMW
3.	C077TB17	X-SPK	AX32361W	12/15/05	13:45	$86UW
4.	C077R014	X-SPK	AX32362W	12/15/05	13:45	$1601, $80BT, $86UW, $87UW, $MTL1, $PCBW, $SIMW
5.	C077G014	X-SPK	AX32363W	12/15/05	10:30	$SIMW

AOC 2
CLEAN

CHAIN-OF-CUSTODY RECORD

23219

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): GY, MW, MS, JD
Signature(s): Gary Yao, Mark Sprouse, ML

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: AOC 2

Pay Items/ Analyses Required

6120	8260B VOCs	8270C SVOCs	8270C SIM PAHs	8081A/8082 PEST/PCB	6010B/7000 TAL METALS	8260B VOCs
7.3		1.25	8.3	9.2	1.5	

Preservation (4°C) — HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTTS031	12/5/05 1050	A02SB04	SOIL	4		01 02 03 20	2.5-4' MS/MSD for metals
COTTS032	1055	↓	↓	↓		01 02 03 20	7-8'
COTTG011	930	A02SB01	Water	3		01 02 03	7-12'
COTTG013	1030	A02SB02	↓	3		01 02 03	7-12'
COTTTB17	↓ 1345	FQC	Water	2		01 02	Trip Blank
COTTR014	12/5/05 1345	FQC	↓	3		01 02 03	Rinsate

GY

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	[signature]	12/5/05	1700	Lab Courier
		12/16/05	0800	

Comments/Instructions:

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 19
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

GY

AOC 2

CLEAN

CHAIN-OF-CUSTODY RECORD

23221

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JO HANSEN

Sampler(s): G. Yao, M. Swank
Signature(s): Gary Yao, Mark Swank

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV FRESNO CA 93722
Field Logbook/Page Number: AOC 2

Pay Items/ Analyses Required

2.13	2.25	3.3	4.2	5.39	5.9
8260C SVOCs	8270C SIM PAHs	8081A/8082 PEST/PCB	6010B/7000 TAL METALS* NO Hg	160.1 TDS	DECANT AT LAB**

Preservation (4°C): HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)										Remarks (e.g., MS, MSD)
						30 31	40 41	50 51	60	70	X					
COTTG011	12/15/05 930	AOC2SB01	WATER	8												7-12
~~COTTG012~~	GY															
COTTR014	12/15/05 1315	FQC	Water	4		30 31	40 41									Rinsate
																GY

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Gary Yao/Bechtel	[signature]	12/15/05	1700	Lab Courier	* METALS FILTERED AND PRESERVED IN FIELD ** ALL UNPRESERVED SAMPLES, EXCEPT TDS
					Method of Shipment: Lab Courier / Total No. of Coolers Shipped: 1
					Airbill No.:
					Total No. of Containers: 8 12 GY / Lab SDG:
	[signature]	12/16/05	0820		Cooler Temp.:

AOC 2

CLEAN

CHAIN-OF-CUSTODY RECORD

23222

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yao, M. Sweat
Signature(s): Gary Yao

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV FRESNO CA 93722
Field Logbook/Page Number: AOC 2

Pay Items/ Analyses Required

2.3 8270C SVOCS	2.25 8270C SIM PAHs	3.3 8081A/8082 PEST/PCB	4.2 6010B/7000 TAL METALS * NO Hg	5.28 160.1 TDS	5.9 DECANT AT LAB **

Preservation (4°C): HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTTG013	12/15/05 1030	A025B02	WATER	8		30 31, 40 41, 50 51, 60, 70, X	7-12'
COTTG014	↓ 1030	↓	↓	2		40 41	7-12' Dup.
COTTR014	12/15/05 1345	FQC	Water	4		50 51, 60, 70	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	[signature]	12/15/05	1700	Lab Courier
		12/16/05	0800	

Comments/Instructions:
* METALS FILTERED AND PRESERVED IN FIELD
** ALL UNPRESERVED CONTAINERS, EXCEPT TDS

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: ~~10~~ 14 GY
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/16/05

Coolers: Number of Coolers: 3

YES NO Were coolers and samples screened for radioactivity?

YES NO Were custody seals on outside of cooler? How many? 3 Date on seal? NA

Name on seal? torn while removing

YES NO NA Were custody seals unbroken and intact at the time of arrival?

YES NO Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO NA Was the shipping slip scanned into the database?

YES NO NA If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble Wrap samples

YES NO NA For hand delivered samples was sufficient ice present to start the cooling process?

YES NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB250392 Correction factor: 0

Cooler temp(s): 1) 2.0° 2) 3.0° 3) 3.0° 4) 5) 6) 7) 8)

Chain of custody:

YES NO Was a chain of custody received?

YES NO Were the custody papers signed in the appropriate places?

YES NO Was the project identifiable from custody papers?

YES NO Did the chain of custody include date and time of sampling?

YES NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

YES NO Were container labels in good condition?

YES NO Was the client ID on the label?

YES NO Was the date of sampling on the label?

YES NO Was the time of sampling on the label?

YES NO Did all container labels agree with custody papers?

Sample Containers:

YES NO Were all containers sealed in separate bags?

YES NO Did all containers arrive unbroken?

YES NO Was there any leakage from samples?

YES NO Were any of the lids cracked or broken?

YES NO Were correct containers used for the tests indicated?

YES NO Was a sufficient amount of sample sent for tests indicated?

YES NO NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea: AX32361 W02

Preservation & Hold time:

YES NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO NA Were correct preservatives added to the samples?

YES NO NA Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO NA Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies:

Signature of personnel receiving samples: Libby Anderson Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (initials):

APPL - Analysis Request Form 49363

Client: **Bechtel National/Navy Clean**
Address: **1230 Columbia St. Ste 400**
San Diego, CA 92101
Attn: **Toni Kuzmack**
Phone: **619-744-3056** Fax: **619-687-8787**
Job: **Alameda 00035**
PO #: **CTO 0077**
Chain of Custody (Y/N): **Y** # **SEE COMMENTS**
RAD Screen (Y/N): **Y** pH (Y/N): **N**
Turn Around Type: **14 DAYS**

Received by: **RBP**
Date Received: **12/17/05** Time: **13:10**
Delivered by: **APPL COURIER**
Shuttle Custody Seals (Y/N): **Y**
Chest Temp(s): **2.0°C**
Color: **VOA/PURPLE**
Samples Chilled until Placed in Refrig/Freezer: **Y**
Project Manager: **Diane Anderson**
QC Report Type: **DVP4/EDD/CA**
Due Date: **12/31/05**

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
*** *NO TICs required* ***
COC #23202, 23205, 23207, 23212, 23232, 23233, 23330

Sample Distribution: Charges: Invoice To:

GC: 12-$80BTS, 10-$TPUS
Extractions: 12- SON002, 10- SON004
VOA: 8-$86US
Metals: 3-$MTL3(Pb), 2-$MTL3, 2-$HG-S
Wetlab: 23-MOIST

	Client ID	APPL ID	Sampled	Analyses Requested
1.	C077S140	AX32530S	12/16/05 08:20	$80BTS, MOIST -- Pesticides only
2.	C077S141	AX32531S	12/16/05 08:25	$80BTS, $TPUS, MOIST -- Pesticides only
3.	C077S142	AX32532S	12/16/05 08:30	$80BTS, $TPUS, MOIST -- Pesticides only
4.	C077S137	AX32533S	12/16/05 09:00	$80BTS, MOIST -- Pesticides only
5.	C077S138	AX32534S	12/16/05 09:05	$80BTS, MOIST -- Pesticides only
6.	C077S139	AX32535S	12/16/05 09:10	$80BTS, MOIST -- Pesticides only
	C077S131	AX32536S	12/16/05 09:55	$80BTS, MOIST -- Pesticides only

8.	C077S132		AX32537S	12/16/05	10:00	$80BTS, MOIST -- Pesticides only
9.	C077S133		AX32538S	12/16/05	10:05	$80BTS, MOIST -- Pesticides only
10.	C077S134		AX32539S	12/16/05	10:30	$80BTS, MOIST -- Pesticides only
11.	C077S135		AX32540S	12/16/05	10:35	$80BTS, MOIST -- Pesticides only
12.	C077S136	ms/msd	AX32541S	12/16/05	10:45	$80BTS, MOIST -- Pesticides only
13.	C077S160		AX32542S	12/16/05	09:10	$MTL3(Pb), MOIST
14.	C077S161		AX32543S	12/16/05	09:10	$MTL3(Pb), MOIST
15.	C077S162		AX32544S	12/16/05	09:10	$MTL3(Pb), MOIST
16.	C077S561		AX32545S	12/16/05	13:05	$86US, $TPUS, MOIST
17.	C077S562	ms/msd	AX32546S	12/16/05	13:05	$86US, $TPUS, MOIST -- ms/msd on TPH-FF only
18.	C077S581	ms/msd	AX32547S	12/16/05	13:45	$86US, $HG-S, $MTL3, $TPUS, MOIST -- ms/msd on VOCs only
19.	C077S582		AX32548S	12/16/05	13:45	$86US, $HG-S, $MTL3, $TPUS, MOIST
20.	C077S601		AX32549S	12/16/05	14:40	$86US, $TPUS, MOIST
21.	C077S602	ms/msd	AX32550S	12/16/05	14:40	$86US, $TPUS, MOIST -- ms/msd on TPH-F only
22.	C077S661		AX32551S	12/16/05	11:10	$86US, $TPUS, MOIST
23.	C077S662		AX32552S	12/16/05	11:10	$86US, $TPUS, MOIST

AOC 9
CLEAN

CHAIN-OF-CUSTODY RECORD

Purple
49363
64

23233

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yao, J. Dean, M. Wehrman
Signature(s): Gary Yao

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV FRESNO CA 93722
Field Logbook/Page Number: AOC 9

Pay Items/ Analyses Required: 8.13 EDB/1,2 DCP; 7.18 8015B-M TPH-D*; Preservation (4°C)

TAT (in days): 2 | 7 | 14 | 30

	Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
1	C0775140	12/6/05 820	A095B04	SOIL	1		20	1.5-2'
2	C0775141	825	↓	↓	↓		20→	3.5-4'
3	C0775142	830	↓	↓	↓		20→	7.5-8'
4	C0775137	900	A095B03	↓	↓		20	1.5-2'
5	C0775138	905	↓	↓	↓		20	3.5-4'
6	C0775139	910	↓	↓	↓		20	7.5-8'
7	C0775131	955	A095B01	↓	↓		20	1.5-2'
8	C0775132	1000	↓	↓	↓		20	3.5-4'
9	C0775133	1005	↓	↓	↓		20	7.5-8'
10	C0775134	1230	A095B02	↓	↓		20	1.5-2'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	[illegible]/APPL Inc	12/6/05	1700	Lab Courier

Comments/Instructions: *SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 10
Total No. of Coolers Shipped: 1
Lab SDG: 49363
Cooler Temp.: 2.0°C

AOC 9

CLEAN

CHAIN-OF-CUSTODY RECORD

23232

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G Yao, J. Dean, M. Watanabe
Signature(s): Gary Yao

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV, FRESNO CA 93722
Field Logbook/Page Number: AOC 9

Preservation (4°C)

Key Items/ Analyses Required: 8.13 6010A PCBs; 7.18 8260B-TO TPH as *

TAT (in days): 2 | 7 | (14) | 30

	Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
11	C0TT5135	12/16/05 1035	A095B02	SOIL	1		20	3.5-4'
12	C0TT5136	↓ 1045	↓	↓	↓		20	7-8' MS/MSD

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	[illegible] Inc	12/16/05	1700	Lab Courier

Comments/Instructions: * SILICA-GEL CLEAN UP, IF NEEDED

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 2
Total No. of Coolers Shipped: 1
Lab SDG: 49363
Cooler Temp.: 2.0°C

CLEAN AOC10

CHAIN-OF-CUSTODY RECORD

23330

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): ML, MP
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 1203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number: AOC 16

Pay Items/ Analyses Required: 9.6 ICP LEAD; Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

	Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
13	C0775160	12/16/05 910	A10SB04	SOIL	1		20	0.5-1'
14	C0775161	910			1		20	3.5-4'
15	C0775162	910			1		20	7-7.5'

ML

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Jeddy Bechtel		12/16/05	1700	Ship to LAB

Comments/Instructions:

Method of Shipment: COURIER
Airbill No.:
Total No. of Containers: 3
Total No. of Coolers Shipped:
Lab SDG: 49363
Cooler Temp.: 2.0°C

SWMU 016

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23205

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): MY, JD, MP, GY
Signature(s): MY JD MP GY

Pay Items/ Analyses Required: 6.20 8260B VOCs; 7.18 8015B M TPH-E*; ~~9.2 6010B/7000 METALS~~; 1.50 8260B VOCs

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: SWMU 16

Preservation (4°C): HCl

TAT (in days): 2 7 (14) 30

	Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
16	C0775561	12/16/05 1305	S016SB01	SOIL	4		01-03, 20	
17	C0775562	↓ ↓	↓	↓	4		01-03, 20	MS/MSD TPH-E 2.5-4'
	C077GU16	↓ 1330	↓	water	3		01-03	5-10'
	C077R015	↓ 1400	FQC	WATER	3		01-03	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
[signature] Bechtel	[signature] APPL Inc	12/16/05	1700	Ship to LAB

Comments/Instructions: *SILICA GEL CLEANUP, IF NEEDED

Method of Shipment: COURIER
Total No. of Coolers Shipped: 1
Airbill No.:
Total No. of Containers: 14
Lab SDG: 49363
Cooler Temp.: 2.0°C

WMU 017

CLEAN

CHAIN-OF-CUSTODY RECORD

23202

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): ML, JD, MP, MS
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: SWMU 17

Pay Items/ Analyses Required: 6260 8260B VOCs; 7.18 8015B-M TEH-#*; 9.2 8015B/8020 MTBE/BTEX; 1550 8260B VOCs

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

	Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
18	C0775581	12/16/05 1345	SB17SB01	SOIL	4		01→04; 20→	1-2' MS/MSD VOCs
19	C0775582	↓ ↓	↓	↓	4		01→03; 20→	3-4'
	C07TG221	↓ 1430	↓	WATER	3		01→03	
	C07TG222	↓	↓	↓	3		01→03	dup

ML

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Jacobs Bechtel	Fed Ex/APPL Inc	12/16/05	1700	Ship to LAB

Comments/Instructions: * SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: COURIER
Airbill No.:
Total No. of Containers: 14
Total No. of Coolers Shipped: 1
Lab SDG: 49363
Cooler Temp.: 2.0°C

SWMU 039
CLEAN

CHAIN-OF-CUSTODY RECORD

23207

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): ML OK MS
Signature(s):

Pay Items/ Analyses Required: 6.00 8260B VOCs; 7.18 8015B-M TPH-X *; 9.2 ~~[illegible]~~; 1.50 8260B VOCs

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: SWMU 39

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

	Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
20	C077S601	12/16/05 1440	S039SB301	SOIL	4		01-03 20	1-2'
21	C077S602	↓	↓	↓	4		01-03 20	2.5-4' ms/msd TPH-G
	C077G231	1510	↓	WATER	3		01-03	5-10'
	C077TB18	12/16/05 1500	FQC	WATER	2		01-02	TRIP BLANK

ML

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Bechtel	APPL INC	12/16/05	1750	Ship to LAB

Comments/Instructions: * SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: COURIER
Total No. of Coolers Shipped: 1
Airbill No.:
Total No. of Containers: 13
Lab SDG: 49365
Cooler Temp.: 2.0°C

(WMU 392 (

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23212

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): ML, JD, MP
Signature(s): [signatures]

Analytical Laboratory Name: ADPL
Analytical Laboratory Address: 4203 W SWIFT AV FRESNO CA 93722
Field Logbook/Page Number: SWMU 392

Pay Items/ Analyses Required: 8260B VOCs; 8015B Gasoline; Silica-Gel TPH-D *; 8260B VOCs; 1,5D 8260B VOCs (ML)

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

	Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
22	C0773(d01	12/16/05 1110	S392SB01	SOIL	4		01→03, 20	1 - 2'
23	C0773(d02	↓ ↓	↓	↓	4		01→03, 20	3 - 4'
	C0773261	↓ 1300	S392SB01	WATER	3		01→03	7 - 12'

(ML)

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Mfelling Bechtel	[signature] TWC	12/16/05	1700	Ship to LAB	* SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: COURIER
Airbill No.:
Total No. of Containers: 8 (ML) 11
Total No. of Coolers Shipped: 1
Lab SDG: 49363
Cooler Temp.: 2.0°C

SWMU 392

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23212

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): MG, JD, MP
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV FRESNO CA 93722
Field Logbook/Page Number: SWMU 392

Pay Items/ Analyses Required

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775(d01	12/16/05 1110	S392SB01	SOIL	4		01->03, 20	1 - 2'
C0775(d02	↓ ↓	↓	↓	4		01->03, 20	3 - 4'
~~C0776261~~	↓ 1300	S392SB01	WATER	3		01->03	7 - 12'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Mfelday Bechtel	TSG	12/16/05	1700	Ship to LAB	* SILICA GEL CLEANUP, IF NEEDED
	APPL	12/17/05	13:30		

Method of Shipment: COURIER
Airbill No.:
Total No. of Containers: 11
Total No. of Coolers Shipped: 1
Lab SDG: 49363
Cooler Temp.: 2.0°C

SWMU 039

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23207

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): ML OK MS
Signature(s): [signatures]

Pay Items/ Analyses Required: 6.00 8260B VOCS; 7.18 8015B-M TPH-X *; 9.2 [struck through]; 1.50 8260B VOCS

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: SWMU 39

Preservation (4°C): HCl

TAT (in days): 2 7 (14) 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)											Remarks (e.g., MS, MSD)
C077S601	12/16/05 1440	S039SB01	SOIL	4		01-03	20										1-2'
C077S602	↓	↓	↓	4		01-03	20										2.5-4' MS/MSD TPH
C077G231	1510	↓	WATER	3						01-03							5-10'
C077TB18	12/16/05 1500	FQC	WATER	2						01, 02							TRIP BLANK

ML

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
[signature] Bechtel	[signature] APPL INC	12/16/05	1750	Ship to LAB
	[signature] APPL	12/17/05	13:30	

Comments/Instructions: * SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: COURIER
Total No. of Coolers Shipped: 1
Airbill No.:
Total No. of Containers: 13
Lab SDG: 49363
Cooler Temp.: 2.0°C

SWMU 017

CLEAN

CHAIN-OF-CUSTODY RECORD

23202

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): ML, JD, MP, MS
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: SWMU 17

Pay Items/ Analyses Required

6.20 8260B VOCs
7.18 8015B-M TEH-#*
9.2 6010B/7000 METALS
1.50 8260B VOCs

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775581	12/16/05 1345	S017SB01	SOIL	4		01->09, 20->	1-2' MS/MSD VOCs
C0775582	↓	↓	↓	4		01->03, 20->	3-4'
C077G221	1430		WATER	3		01->03	
C077G222			↓	3		01->03	dup

ML

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Bechtel	FedEx/APPL Inc.	12/16/05	1700	Shipping
	APPL	12/17/05	13:30	

Comments/Instructions: * SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: COURIER
Airbill No.:
Total No. of Containers: 14
Total No. of Coolers Shipped: 1
Lab SDG: 49363
Cooler Temp.: 2.0°C

SWMU 016

CLEAN

CHAIN-OF-CUSTODY RECORD

23205

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): MG, JD, MP, GY
Signature(s): MG ★ MP GY

Pay Items/ Analyses Required

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: SWMU 16

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775561	12/14/05 1305	SO16SB01	SOIL	4		01 03 20	
C0775562	↓ ↓	↓	↓	4		01 03 20	MS/MSD 2.5-4' TPH-E
C0776211	1330		Water	3		01 03	5-10'
C0776015	1400	FBC	WATER	3		01 03	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Bechtel	APPL	12/16/05	1750	Ship to LAB
	APPL	12/17/05	13:30	

Comments/Instructions: *SILICA GEL CLEANUP, IF NEEDED

Method of Shipment: COURIER
Airbill No.:
Total No. of Containers: 14
Total No. of Coolers Shipped: 1
Lab SDG: 49363
Cooler Temp.: 2.0°C

BECHTEL **CLEAN** AOC10

CHAIN-OF-CUSTODY RECORD

23330

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): ML, MP
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number: AOC 10

Pay Items/ Analyses Required: 9.6 ICP LEAD; Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775160	12/16/05 910	A10SB04	SOIL	1		20	0.5-1'
C0775161	910			1		20	3.5-4'
C0775162	910			1		20	7-7.5'
							ML

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
ML Eddy Bechtel	ML Kemmerer Inc.	12/16/05	1700	Ship to LAB
	CAA APPL	12/17/05	13:30	

Comments/Instructions:

Method of Shipment: COURIER
Airbill No.:
Total No. of Containers: 3
Total No. of Coolers Shipped:
Lab SDG: 49363
Cooler Temp.: 20°C

AOC 9

CLEAN

CHAIN-OF-CUSTODY RECORD

23232

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yao, J. Dean, M. Walter
Signature(s): Gary Yao

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV, FRESNO CA 93722
Field Logbook/Page Number: AOC 9

Key Items/ Analyses Required: 9.13 8081A PCBT; 7.18 8015B-M TPHd *

Preservation (4°C)

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTT5135	12/16/05 1035	A095B02	SOIL	1		20	3.5-4'
COTT5136	↓ 1045	↓	↓	↓		20	7-8' MS/MSD

GY

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	APPL INC	12/16/05	1700	Lab Courier
	APPL	12/17/05	13:30	

Comments/Instructions: * SILICA-GEL CLEAN UP, IF NEEDED

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 2
Total No. of Coolers Shipped: 1
Lab SDG: 49363
Cooler Temp.: 2.0°C

AOC 9
CLEAN

CHAIN-OF-CUSTODY RECORD

23233

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yao, J. Dean, M. Waterman
Signature(s): Gary Yao

Pay Items/ Analyses Required: 8.13 SOBLA TEST; 7.18 8015B-M TPH-D*; Preservation (4°C)

TAT (in days): 2 | 7 | 14 | 30

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV FRESNO CA 93722
Field Logbook/Page Number: AOC 9

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0775140	12/6/05 820	A095B04	SOIL	1		20	1.5-2'
C0775141	825	↓	↓	↓		20→	3.5-4'
C0775142	830	↓	↓	↓		20→	7.5-8'
C0775137	900	A095B03	↓	↓		20	1.5-2'
C0775138	905	↓	↓	↓		20	3.5-4'
C0775139	910	↓	↓	↓		20	7.5-8'
C0775131	955	A095B01	↓	↓		20	1.5-2'
C0775132	1000	↓	↓	↓		20	3.5-4'
C0775133	1005	↓	↓	↓		20	7.5-8'
C0775134	1030	A095B02	↓	↓		20	1.5-2'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao / Bechtel	APPL Inc	12/6/05	1700	Lab Courier
	APPL	12/7/05	13:30	

Comments/Instructions: *SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 10
Total No. of Coolers Shipped: 1
Lab SDG: 49363
Cooler Temp.: 2.0°C

COOLER RECEIPT FORM

Project: Alameda 00035 Date Received: 12/17/05

Coolers: Number of Coolers: 1

YES NO Were coolers and samples screened for radioactivity?

YES NO Were custody seals on outside of cooler? How many? NA Date on seal? NA

Name on seal? NA

YES NO NA Were custody seals unbroken and intact at the time of arrival?

YES NO Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO NA Was the shipping slip scanned into the database?

YES NO NA If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): SAMPLES & WET ICE

YES NO NA For hand delivered samples was sufficient ice present to start the cooling process?

YES NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB250392 Correction factor: NA

Cooler temp(s): 1) 2.0° 2) 3) 4) 5) 6) 7) 8)

Chain of custody:

YES NO Was a chain of custody received?

YES NO Were the custody papers signed in the appropriate places?

YES NO Was the project identifiable from custody papers?

YES NO Did the chain of custody include date and time of sampling?

YES NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

YES NO Were container labels in good condition?

YES NO Was the client ID on the label?

YES NO Was the date of sampling on the label?

YES NO Was the time of sampling on the label?

YES NO Did all container labels agree with custody papers?

Sample Containers:

YES NO Were all containers sealed in separate bags?

YES NO Did all containers arrive unbroken?

YES NO Was there any leakage from samples?

YES NO Were any of the lids cracked or broken?

YES NO Were correct containers used for the tests indicated?

YES NO Was a sufficient amount of sample sent for tests indicated?

YES NO NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

YES NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO NA Were correct preservatives added to the samples?

YES NO NA Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO NA Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies:

Signature of personnel receiving samples: Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

APPL - Analysis Request Form 49364

Client: **Bechtel National/Navy Clean**
Address: **1230 Columbia St. Ste 400**
San Diego, CA 92101
Attn: **Toni Kuzmack**
Phone: **619-744-3056** Fax: **619-687-8787**
Job: **Alameda 00035**
PO #: **CTO 0077**
Chain of Custody (Y/N): **Y** # **SEE COMMENTS**
RAD Screen (Y/N): **Y** pH (Y/N): **Y**
Turn Around Type: **14 DAYS**

Received by: **RBP**
Date Received: **12/17/05** Time: **13:10**
Delivered by: **APPL COURIER**
Shuttle Custody Seals (Y/N): **Y**
Chest Temp(s): **2° 2.5° 2.5° 2.0° 3°**
Color: **VOA/PURPLE/ORGRN**
Samples Chilled until Placed in Refrig/Freezer: **Y**
Project Manager: **Diane Anderson** TA
QC Report Type: **DVP4/EDD/CA**
Due Date: **12/31/05**

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
****** NO TICs required ******

COC #23228,23229,23193,23205,23204,23202,23213,23212,23207,23331,23316,23203,23206

Sample Distribution:
GC: 2-$80BT, 1-$87UW, 1-$PCBW, 1-$SIMW, 7-$TPUW
Extractions: 5-_SEP025, 1-_SEP004, 1-_SEP004S, 5-_SEP011
VOA: 9-$86UW
Metals: 4-$HG-D, 4-$MT2F
Wetlab: 8-$1601
Other: 3-HOLD

Charges:

Invoice To:

	Client ID		APPL ID	Sampled		Analyses Requested
1.	C077G021		AX32633W	12/16/05	09:30	HOLD -- Extract and hold L.L. Pest only
2.	C077G023		AX32634W	12/16/05	10:00	HOLD -- Extract and hold L.L. Pest only
3.	C077G025		AX32635W	12/16/05	09:00	HOLD -- Extract and hold L.L. Pest only
4.	C077G031	x-spk	AX32636W	12/16/05	08:35	$1601, $80BT, $86UW, $87UW, $HG-D, $MT2F, $PCBW, $SIMW
5.	C077G032		AX32637W	12/16/05	08:35	$HG-D, $MT2F
6.	C077G033		AX32638W	12/16/05	07:55	$1601, $86UW, $HG-D, $MT2F

7.	C077G041	ms/msd	AX32639W	12/16/05	10:30	$1601, $TPUW -- MS/MSD FOR TDS, TPH-FF
8.	C077R015		AX32640W	12/16/05	14:00	$80BT, $86UW, $HG-D, $MT2F, $TPUW -- low-level Pesticides only
9.	C077G211		AX32641W	12/16/05	13:30	$1601, $86UW, $TPUW
10.	C077G212		AX32642W	12/16/05	13:30	$1601, $TPUW
11.	C077G221		AX32643W	12/16/05	14:30	$1601, $86UW, $TPUW
12.	C077G222		AX32644W	12/16/05	14:30	$86UW
13.	C077G261		AX32645W	12/16/05	12:45	$1601, $86UW, $TPUW
14.	C077G231		AX32646W	12/16/05	15:10	$1601, $86UW, $TPUW
15.	C077TB18		AX32647W	12/16/05	15:00	$86UW

BECHTEL CLEAN

AOC 3

CHAIN-OF-CUSTODY RECORD

23331

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): ML, OK
Signature(s):

Pay Items/ Analyses Required: Low-level Pesticides

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number:

Preservation (4°C)

TAT (In days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G021	12/16/05 930	A03SB04	WATER	5		53 54	9-14'
C077G023	1000	A03SB05	↓	5		53 54	9-14'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Mfally Bechtel	APPL	12/16/05		Ship to LAB	EXTRACT AND HOLD
	APPL	12/16/05	13:00		

Method of Shipment: COURIER
Airbill No.:
Total No. of Containers: 10
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

AOC 3
CLEAN

CHAIN-OF-CUSTODY RECORD

23316

Site Name: Alameda DD235
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): ML, OK
Signature(s):

Pay Items/ Analyses Required
ML Track 1 SOSA low-level pesticides

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number:

Preservation (4°C)

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
~~C0775~~			~~water~~				ML
C0776025	12/16/05 900	AD35B016	WATER	5		50, 54	7-12'
							ML

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Jeffrey Bechtel	[illegible] TAL Inc.	12/16/05	1700	Ship to LAB	Extract and hold
	APPL	12/17/05	13:15		

Method of Shipment: COURIER
Airbill No.:
Total No. of Containers: 5
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

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AOC 5
CLEAN

CHAIN-OF-CUSTODY RECORD

23228

Site Name: ALAMEDA 00035
CTO Number: 077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yao, M. Swank
Signature(s): Gary Yao
Mark Swank

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV, FRESNO CA 93722
Field Logbook/Page Number: AOC 5

Pay Items/ Analyses Required

2.3	2.05	3.13	4.2	5.38	5.9
8270C SVOCs	8270C SIM PAHs	8081A/8082 Pest/PCB	6010B/7000 Tot. Metals *	160.1 TDS	DECANT AT LAB **

Preservation (4°C): HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0TTG031	12/16/05 835	A05SB01	WATER	8		30 31 40 41 50 51 60 70 X	2-12'
C0TTG032	835	A05SB01	WATER	1		60	2-12' Dup
C0TTG033	755	A05SB02	WATER	2		60 70	2-12'

GY

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	APPL	12/16/05	1700	Lab Courier
	APPL	12/17/05	13:15	

Comments/Instructions:
*METALS FILTERED AND PRESERVED IN FIELD
**DECANT ALL UNPRESERVED SAMPLES, EXCEPT TDS

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 11
Total No. of Coolers Shipped:
Lab SDG:
Cooler Temp.:

AOC 5

CLEAN

CHAIN-OF-CUSTODY RECORD

23229

Site Name: ALAMEDA 00035
CTO Number: 077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yao, M. Sudak
Signature(s): Gary Yao

Pay Items/ Analyses Required

8270C SVOCS	8270C SIM	8081A/8082 PEST/PCB	6010B/7000 TAL METALS*	160.1 TDS	DECANT AT LAB**	VOCs 8260B
2.3	2.25	3.3	4.2	5.30	5.9	1.50

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV FRESNO CA 93722
Field Logbook/Page Number: AOC 5

Preservation (4°C): HNO3 | HCl

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0TTG081	12/16/05 835	A055B01	WATER	3		01 02 03	2-12'
C0TTG083	↓ 755	A055B02	↓	3		01 02 03	2-12'

ML

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao / Bechtel	[illegible]/APPL Fresno	12/16/05	1700	Lab Courier
	APPL	12/17/05	13:15	

Comments/Instructions:
* METALS FILTERED AND PRESERVED IN FIELD
** DECANT ALL UNPRESERVED SAMPLES, EXCEPT TDS

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 6
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

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AOC 9
CLEAN

CHAIN-OF-CUSTODY RECORD

23193

Site Name: ALAMEDA 0035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yee, D. Khan
Signature(s): Gary Yee

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number: AOC 9

Pay Items/ Analyses Required: 8015B-M TPH-D/MO 2.18; TDS 5.39; DECANT AT LAB 5.9; 8081A Restricted 3.3; TAL Metals 6010B/7000 4.2

Preservation (4°C): HNO3

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0TT604	12/16/05 1030	A09SB04	WATER	9		20 25 / 70 72 X / 50 51 60	9-12' MS/MSD
C0TTR015	↓ 1400	FQC	↓	5		20 21	for TPH-D & TDS Rinsate

GY

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yee/Bechtel	APPL Inc.	12/16/05	1700	Lab Courier
	APPL	12/17/05	13:15	

Comments/Instructions: * DECANT AT LAB, SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 9 | 4 | 6
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

WMU 016

CLEAN

CHAIN-OF-CUSTODY RECORD

23205

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): MG, JD, MP, GY
Signature(s): [signatures]

Pay Items/ Analyses Required: 6.20 8260B VOCs; 7.18 8015B M TPH-E *; 9.2 ~~6010B/7000 METALS~~; 1.50 8260B VOCs

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV, FRESNO CA 93722
Field Logbook/Page Number: SWMU 16

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

	Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
16	C0775S61	12/16/05 1305	S016SB01	SOIL	4		01, 02, 03 / 20	
17	C0775S62	↓ ↓	↓	↓	4		01, 02, 03 / 20	MS/MSD 2.3.4? TPH-E?
9	C077GZ18	↓ 1330	↓	1330 water	3		01-03	5-10'
8	C077R015	↓ 1900	RQC	WATER	3		01-03	Rinsate

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
[signature] Bechtel	[signature] APPL Inc.	12/16/05	1750	Ship to LAB

Comments/Instructions: *SILICA GEL CLEANUP, IF NEEDED

Method of Shipment: COURIER

Total No. of Coolers Shipped: 1

Airbill No.:

Total No. of Containers: 14

Lab SDG:

Cooler Temp.:

SWMU D16

CLEAN

CHAIN-OF-CUSTODY RECORD

23204

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): ML CK
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV/FRESNO CA 93722
Field Logbook/Page Number: SWMU 16

Pay Items/ Analyses Required: 2,18 8015B-M TPH-D *; 5,22 1602 TDS; 5,9 DECANT AT LAB

Preservation (4°C)

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077G211	12/16/05 1330	S016SB01	WATER	4		20,21 X 70	
C077G212				3		20,21 X	dup
							mL

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
		12/16/05	1700	Shipped LAB	* DECANT AT LAB, SILICA GEL CLEANUP, IF NEEDED
	APPL	12/17/05	13:15		

Method of Shipment: Courier
Airbill No.:
Total No. of Containers: 7
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

WMU 017

CLEAN

CHAIN-OF-CUSTODY RECORD

23202

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHNSEN

Sampler(s): ML, JD, MP, MS
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: SWMU 17

Pay Items/ Analyses Required

6.20 8260B VOCs	7.18 5015B-M TPH-GF-*	9.2 6010B/7000 METALS	150 8260B VOCs

Preservation (4°C): HCl

TAT (in days): 2 | 7 | (14) | 30

	Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
18	C0775581	12/1/05 1345	SB17SB01	SOIL	4		01-04 20 →	1-2' MS/MSD VOCs
19	C0775582	↓	↓	↓	4		01-03 20 →	3-4'
11	C077G24	1430		WATER	3		01-03	
12	C077G22			↓	3		01-03	dup

ML

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Holday Bechtel	APPL Inc.	12/16/05	1700	Ship to LAB	* SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: COURIER
Airbill No.:
Total No. of Containers: 14
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

SWMU 392

CLEAN

CHAIN-OF-CUSTODY RECORD

23213

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): ML, OK
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: SWMU 392

Pay Items/ Analyses Required: 8260B VOCs +5 | 8015B-M TPH-gas* 2.18 | DECANT AT LAB 5.9 | TDS 160.1 5.38

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0776201	~~12/16/05 1245~~	S392SB01	WATER				MS
C0776201	12/16/05 1245	S392SB01	WATER	4		20 22 X 70	
							MSD

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Bechtel	APPL	12/16/05	1750	Ship to LAB	** DECANT AT LAB, SILICA-GEL CLEANUP, IF NEEDED
	APPL	12/17/05	13:15		

Method of Shipment: COURIER
Airbill No.:
Total No. of Containers: 4
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

WMU 392

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23212

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): ML, JD, MP
Signature(s):

Analytical Laboratory Name: ADPL
Analytical Laboratory Address: 4203 W SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: SWMU 392

Pay Items/ Analyses Required

Preservation (4°C): HCl

TAT (In days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
22 CØ77S1d01	12/1/05 1110	S392SBD1	SOIL	4		01→03, 20	1 - 2'
23 CØ77S1d02	↓ ↓	↓	↓	4		01→03, 20	3 - 4'
24 CØ77S1d01	↓ 1300	S392SBD1	WATER	3		01→03	7 - 12'

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Mfellag Bechtel	[illegible] TWC	12/1/05	1700	Ship to LAB	* SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: COURIER
Airbill No.:
Total No. of Containers: 8 11
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

SWMU 039
CLEAN

CHAIN-OF-CUSTODY RECORD

23207

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): ML OK MS
Signature(s): OK ML

Pay Items/ Analyses Required: 6.00 8260B VOCs; 1.18 8015B-M TPH-* ; 9.2 6010/7000 METALS; 1.50 8260B VOCs

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: SWMU 39

Preservation (4°C): HCl

TAT (in days): 2 7 (14) 30

	Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
20	C077S601	12/16/05 1440	S0295B01	SOIL	4		01-03 20	1-2'
21	C077S602	↓	↓	↓	4		01-03 20	2.5-4' ms/msd TPH
14	C077G201	1510	↓	WATER	3		01-03	5-10'
15	C077TB18	12/16/05 1500	FQC	WATER	2		01-02	TRIP BLANK

ML

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
[signature] Bechtel	[signature] APPL INC	12/16/05	1700	Ship to LAB

Comments/Instructions: * SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: COURIER
Total No. of Coolers Shipped: 1
Airbill No.:
Total No. of Containers: 13
Lab SDG:
Cooler Temp.:

SWMU ~~DTF~~ 039

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23203

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): ML MS
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number: SWMU 17

Pay Items/ Analyses Required: 2.1B 8015B-M TPH-P* | 5.2B Metal TDS | 5.9 DECANT AT LAB

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0776231	12/16/05 1500	S039SB01	WATER	4		30→21 70 X	

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Bechtel	APPL	12/16/05 12/17/05	1700 13:15	Ship to LAB	* DECANT AT LAB, SILICA GEL CLEANUP, IF NEEDED

Method of Shipment: COURIER
Airbill No.:
Total No. of Containers: 4
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

SWMU ~~034~~ 017

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23206

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): OK WL
Signature(s): [signature]

Pay Items/ Analyses Required: 2.18 8015B-M TPH-IE *; 5.348 160.1 TDS; 5.9 DECANT AT LAB

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W SWIFT AV, FRESNO CA 93722
Field Logbook/Page Number: SWMU 39

Preservation (4°C)

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)			Remarks (e.g., MS, MSD)
C077G221	12/16/05 1430	S017SB01	WATER	4		20→22	70	X	

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
[signature] Bechtel	[signature] / APPL-IOC	12/16/05	1700	Ship to LAB
	[signature] APPL	12/17/05	13:15	

Comments/Instructions: * DECANT AT LAB, SILICA GEL CLEANUP, IF NEEDED

Method of Shipment: COURIER
Total No. of Coolers Shipped: 1
Airbill No.:
Total No. of Containers: 4
Lab SDG:
Cooler Temp.:

COOLER RECEIPT FORM

Project: Alameda 00035 Date Received: 12-17-05

Coolers: Number of Coolers: 5

YES NO Were coolers and samples screened for radioactivity?

YES NO Were custody seals on outside of cooler? How many? 10 Date on seal? 12-16-05

Name on seal? torn upon opening

YES NO NA Were custody seals unbroken and intact at the time of arrival?

YES NO Did the cooler come with a shipping slip (air bill, etc.)? Carrier name: APPL, Fne

Shipping slip numbers: 1) _____ 2) _____ 3) _____

YES NO NA Was the shipping slip scanned into the database?

YES NO NA If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): Wrap & wetice

YES NO NA For hand delivered samples was sufficient ice present to start the cooling process?

YES NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: HB 250392 Correction factor: 0

Cooler temp(s): 1) 2.0C 2) 2.5C 3) 2.5C 4) 2.0C 5) 3.0 6) _____ 7) _____ 8) _____

Chain of custody:

YES NO Was a chain of custody received?

YES NO Were the custody papers signed in the appropriate places?

YES NO Was the project identifiable from custody papers?

YES NO Did the chain of custody include date and time of sampling?

YES NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

YES NO Were container labels in good condition?

YES NO Was the client ID on the label?

YES NO Was the date of sampling on the label?

YES NO Was the time of sampling on the label?

YES NO Did all container labels agree with custody papers?

Sample Containers:

YES NO Were all containers sealed in separate bags?

YES NO Did all containers arrive unbroken?

YES NO Was there any leakage from samples?

YES NO Were any of the lids cracked or broken?

YES NO Were correct containers used for the tests indicated?

YES NO Was a sufficient amount of sample sent for tests indicated?

YES NO NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea: _____

Smaller than a pea: _____

Preservation & Hold time:

YES NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO NA Were correct preservatives added to the samples?

YES NO NA Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO NA Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate: _____

Deficiencies: _____

Signature of personnel receiving samples: [signature] Second reviewer: _____

Signature of project manager notified: _____ Date and Time of notification: _____

Name of client notified: _____ Date and Time of notification: _____

Information given to client: _____

_____ by whom (Initials): _____

APPL - Analysis Request Form 49373

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda 00035
PO #: CTO 0077
Chain of Custody (Y/N): Y # 23211,152,320
RAD Screen (Y/N): Y pH (Y/N): Y
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/20/05 Time: 08:00
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): 2.0°C
Color: VOA FRIG/PURPLE
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson DA
QC Report Type: DVP4/EDD/CA
Due Date: 01/03/06

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted value in the EDDs!!
***!!! NO TICs required ***

Cancel analysis for sample C077CB01 per email.

Sample Distribution:
GC: 2-$TPUS
Extractions: 2- SON004
VOA: 2-$86US
Metals: 9-$HG-S, 9-$MTL3, 1-$MTL3(Pb)
Wetlab: 12-MOIST
Other: 1-CANCEL

Charges:

Invoice To:

	Client ID		APPL ID	Sampled	Analyses Requested
1	C077S641	MS/MSD	AX32692S	12/19/05 08:00	$86US, $TPUS, MOIST -- MS/MSD FOR VOC
2	C077S642		AX32693S	12/19/05 08:05	$86US, $TPUS, MOIST
3	C077S481		AX32694S	12/19/05 09:20	$HG-S, $MTL3, MOIST
4	C077S482		AX32695S	12/19/05 09:25	$HG-S, $MTL3, MOIST
5	C077S483		AX32696S	12/19/05 09:30	$HG-S, $MTL3, MOIST
6	C077S484		AX32697S	12/19/05 09:40	$HG-S, $MTL3, MOIST
7	C077S485		AX32698S	12/19/05 09:45	$HG-S, $MTL3, MOIST

8. C077S486 AX32699S 12/19/05 09:50 $HGS;$MTL3;MOIST

9. C077S487 AX32700S 12/19/05 09:55 $HGS;$MTL3;MOIST

10. C077S488 AX32701S 12/19/05 10:00 $HGS;$MTL3;MOIST

11. C077S489 AX32702S 12/19/05 10:05 $HGS;$MTL3;MOIST

12. C077CB01 AX32703S 12/19/05 13:00 CANCEL

13. C077CB02 AX32704S 12/19/05 13:00 $MTL3(P5);MOIST

SWMU 173

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23211

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yao, M. Waterman
Signature(s): Gary Yao, M. [signature]

Pay Items/Analyses Required: 6.00 8260B VOCS; 7.1B 8015B-M TPH-E *; ~~9.2 6010B/7000 METALS~~; 1.50 8260B VOCS

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV FRESNO CA 93722
Field Logbook/Page Number: SWMU 173

Preservation (4°C): HCl

TAT (in days): 2 7 (14) 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)			Remarks (e.g., MS, MSD)
C0T7S641	12/19/05 800	S173SB01	SOIL	10		01-09	20		1-2' MS/MSD for VOCS
C0T7S642	↓ 805	↓	↓	4		01 02 03	20		3-4'
C0T7G251	↓ 840	S173SB01	Water	3				01 02 03	5-10'
C0T7TB19	12/19/05 930	FQC	↓	2				01 02	Trip Blank
C0T7R016	↓ 1145	FQC	Water	3				01 02 03	Rinsate-Soil

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao / Bechtel	[signature] / APPL Inc	12/19/05	1700	Lab Courier
[signature]		12/20/05	0800	

Comments/Instructions: * SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: Lab Courier
Total No. of Coolers Shipped: 1
Airbill No.:
Total No. of Containers:
Lab SDG:
Cooler Temp:

AOC 25

CLEAN

CHAIN-OF-CUSTODY RECORD

23152

Site Name: ALAMEDA 00035
CTO Number: 077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yao, M. Waterman
Signature(s): Gary Yao,

Pay Items/ Analyses Required: 9.2 6010B/7000 METALS; 1.15 8015M/TPH-gas

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number: AOC 25

Preservation (4°C): HCl

TAT (in days): 2 7 (14) 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)		Remarks (e.g., MS, MSD)
C0T7S481	12/19/05 920	A25SB01	SOIL	1		20		1-1.5'
C0T7S482	925	↓				20		2-2.5'
C0T7S483	930	↓				20		7.5-8'
C0T7S484	940	A25SB02				20		1.5-2'
C0T7S485	945	↓				20		3.5-4'
C0T7S486	950	↓				20		7.5-8'
C0T7S487	955	A25SB03				20		1.5-2'
C0T7S488	1000	↓				20		3.5-4'
C0T7S489	↓ 1005	↓	↓	↓		20		6.5-7'
C0T1G174	12/19/05 1255	A25SB04	Water	6	GY	01-4/0	01-7/06	MS/MSD for TPH-gas

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	[signature]/APPL Inc	12/19/05	1700	Lab Courier
	[signature]	12/20/05	0840	

Comments/Instructions:

Method of Shipment: Lab Courier
Total No. of Coolers Shipped: 1
Airbill No.:
Total No. of Containers: ~~9~~ 15 GY
Lab SDG: 49373
Cooler Temp: 2.0°C

BECHTEL **CLEAN**

CHAIN-OF-CUSTODY RECORD

23320

Site Name: Alameda/DD035
CTO Number: 0077
Site Contact/Supervisor: Johansen

Sampler(s): G. Yee, M. Waterman
Signature(s): Gary Yee
M Waterman

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. Swift Av. Fresno, CA 93722
Field Logbook/Page Number: _____

Pay Items/ Analyses Required: 8260 Lead/TCP

Preservation (4°C)

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C077CB01	12/19/05 1300	TG	Soil	1		20	DTW=6.15' DTS=11.00'
C077CB02	↓ 1330	3G	↓	↓		20	DTW=4.62' DTS=8.92'

Archive for 1 year

GW

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yee/Bechtel	[illegible]	12/19/05	1700	Lab Courier
		12/20/05	0830	

Comments/Instructions:

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 2

Total No. of Coolers Shipped: 1
Lab SDG: 49373
Cooler Temp.: 2.0°C

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/20/05

Coolers: Number of Coolers: 1

(YES) NO Were coolers and samples screened for radioactivity?

(YES) NO Were custody seals on outside of cooler? How many? 1 Date on seal? N/A

Name on seal? torn while removing

(YES) NO NA Were custody seals unbroken and intact at the time of arrival?

YES (NO) Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO (NA) Was the shipping slip scanned into the database?

YES NO (NA) If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap + samples

(YES) NO NA For hand delivered samples was sufficient ice present to start the cooling process?

(YES) NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: #B250392 Correction factor: 0

Cooler temp(s): 1) 2.0° 2) 3) 4) 5) 6) 7) 8)

Chain of custody:

(YES) NO Was a chain of custody received?

(YES) NO Were the custody papers signed in the appropriate places?

(YES) NO Was the project identifiable from custody papers?

(YES) NO Did the chain of custody include date and time of sampling?

(YES) NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

(YES) NO Were container labels in good condition?

(YES) NO Was the client ID on the label?

(YES) NO Was the date of sampling on the label?

(YES) NO Was the time of sampling on the label?

(YES) NO Did all container labels agree with custody papers?

Sample Containers:

YES (NO) Were all containers sealed in separate bags?

(YES) NO Did all containers arrive unbroken?

YES (NO) Was there any leakage from samples?

YES (NO) Were any of the lids cracked or broken?

(YES) NO Were correct containers used for the tests indicated?

(YES) NO Was a sufficient amount of sample sent for tests indicated?

YES NO (NA) Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

(YES) NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO (NA) Were correct preservatives added to the samples?

YES NO (NA) Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO (NA) Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies:

Signature of personnel receiving samples: Libby Anderson Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

APPL - Analysis Request Form 49374

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda
PO #: CTO 0077
Chain of Custody (Y/N): Y # TOO MANY
RAD Screen (Y/N): Y pH (Y/N): Y
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/20/05 Time: 08:00
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): 2.0°C 3.0°C 3.5°C
Color: VOA/BLUYEL/ORGGRN
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson
QC Report Type: DVP4/EDD/CA
Due Date: 01/03/06

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for met als and wet lab. Do not report undiluted val
****** NO TICs required ******

Sample Distribution: Charges: Invoice To:
GC: 2-$TPUW
Extractions: 2- SEP011
VOA: 4-$86UW, 1-$GAUW
Metals: 7-$HG, 7-$MTL1
Wetlab: 9-$1601

	Client ID		APPL ID	Sampled		Analyses Requested
1.	C077G251	X-SPK	AX32705W	12/19/05	08:40	$1601, $86UW, $TPUW
2.	C077TB19	X-SPK	AX32706W	12/19/05	09:30	$86UW
3.	C077R016	X-SPK	AX32707W	12/19/05	11:45	$1601, $86UW, $HG, $MTL1
4.	C077G153	X-SPK	AX32708W	12/19/05	13:27	$1601, $86UW, $HG, $MTL1
5.	C077R017	X-SPK	AX32709W	12/19/05	14:40	$1601, $HG, $MTL1
6.	C077G171	X-SPK	AX32710W	12/19/05	09:30	$1601, $HG, $MTL1
7.	C077G172	X-SPK	AX32711W	12/19/05	11:10	$1601, $HG, $MTL1

8.	C077G173	X-SPK	AX32712W	12/19/05	11:00	$1601, $HG, $MTL1
9.	C077G174	SPKMS/MS	AX32713W	12/19/05	12:55	$1601, $GAUW, $HG, $MTL1, $TPUW -- MS/MSD FOR TPH-FF/GAS
10.	C077G252	X-SPK	AX32714W	12/19/05	08:40	$1601

AOC 23 EBS 126

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23182

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHNSEN

Sampler(s): M. Shank, J. Dean
Signature(s):

Pay Items/ Analyses Required

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4208 W. SWIFT AV FRESNO CA 93722
Field Logbook/Page Number:

Preservation (4°C): HCl

1,50 B260B VOCs

TAT (in days): 2 | 7 | (14) | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTG153	12/19/05 1327	A23398-MW1	Water	3		01 02 03	7-12'
COTTRD17	↓ 1440	FQC	↓	↓		01 02 03	Rinsate-Pump

GH

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
	APPL INC	12/19/05	1700	Lab Courier
		12/20/05	0800	

Comments/Instructions:

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 6
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

SWMU 173*

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23210

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): O. Khan, M. Swank, G. Yao
Signature(s): Gary Yao, [signature], [signature]

Pay Items/Analyses Required: 2.18 8015B-m TPH-g *; 5.28 160.1 TDS; 5.9 DECANT AT LAB

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV FRESNO CA 93722
Field Logbook/Page Number: SWMU 173

Preservation (4°C)

TAT (in days): 2 7 (14) 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)			Remarks (e.g., MS, MSD)
C07TG251	12/19/05 840	SIT35B01	WATER	4		20 21 22	70	X	5-10'
C07TG252	↓ 840	↓	↓	1			70		5-10' Dup.

GY

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao/Bechtel	[signature]/APPL Inc	12/19/05	1700	Lab Courier
	[signature]	12/20/05	0800	

Comments/Instructions: *DECANT AT LAB, SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: Lab Courier

Total No. of Coolers Shipped: 1

Airbill No.:

Total No. of Containers: 5

Lab SDG:

Cooler Temp.:

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AOC23 EBS 126

BECHTEL **CLEAN**

CHAIN-OF-CUSTODY RECORD

23184

Site Name: ALAMEDA 0003
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): M. Swank, J. Dean
Signature(s):

Pay Items/ Analyses Required

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV FRESNO CA 93722
Field Logbook/Page Number:

Preservation (4°C): HNO3

4.2 6010B/7000 Metals
5.38 160.1 TDS

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
COTT6153	12/19/05 1327	A23398-MW1	Water	2		60 70	T-12
COTTR017	↓ 1440	FQC	↓	3		60 70	Rinsate-Pump

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
Mark Swank	APPL Inc	12/19/05	1700	Lab Courier	** Filtered & Pres. in field
		12/20/05	0800		

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 5
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

AOC 25

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23155

Site Name: ALAMEDA 00035
CTO Number: 077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yao, D. Khan
Signature(s): Gary Yao, [signature]

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number: AOC 25

Pay Items/ Analyses Required: 1.15 8015-M TPH G&S; 2.18 8015B-M TPH-JP**; 4.2 6010B/7000 METALS*; 5.38 160.1 TDS; 5.9 DECANT AT LAB

Preservation (4°C): HCl, HNO3

TAT (in days): 2 7 (14) 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)				Remarks (e.g., MS, MSD)
C077G171	12/19/05 930	A25SB01	WATER	2				60	70	5-10'
C077G172	1110	A25SB02		2				60	70	5-10'
C077G173	1100	A25SB03		3				60 61	70	2-7'
C077R016	1145	FQC		4			20 21	60 61		Rinsate
C077G174	1255	A25SB04		8			20→25	60	70	5-10' MS/MSD for TPH-ff

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao / Bechtel	[signature] / APPL Inc	12/19/05	1700	Lab Courier
[signature]		12/05/05	0840	

Comments/Instructions:
* FILTERED AND PRESERVED IN FIELD
** DECANT AT LAB; SILICA-GEL CLEANUP, IF NEEDED

Method of Shipment: Lab Courier
Total No. of Coolers Shipped: 1
Airbill No.:
Total No. of Containers: 19
Lab SDG:
Cooler Temp.:

SWMU 173

BECHTEL CLEAN

CHAIN-OF-CUSTODY RECORD

23211

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G. Yao, M. Waterman
Signature(s): Gary Yao, M. [signature]

Pay Items/ Analyses Required: 6.00 8260B VOCs; 7.18 8015B-M TPH-E*; 9.12 ~~6010/7000 METALS~~; 1.50 8260B VOCs

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV FRESNO CA 93722
Field Logbook/Page Number: SWMU 173

Preservation (4°C): HCl

TAT (in days): 2 7 (14) 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	6.00 8260B VOCs	7.18 8015B-M TPH-E*	9.12	1.50 8260B VOCs	Remarks (e.g., MS, MSD)
CDT7S641	12/19/05 800	SIT35B01	SOIL	10		01-9 09	20			1-2' MS/MSD for VOCs
CDT7S642	↓ 805	↓	↓	4		0102 03	20			3-4'
CDT7G251	↓ 840	SIT35B01	Water	3					0102 03	5-10'
CDT7TB19	12/19/05 930	FQC	↓	2					01 02	Trip Blank
CDT7R016	↓ 1145	FQC	Water	3					0102 03	Rinsate-Soil

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao / Bechtel	[signature] / APPL Inc	12/19/05	1700	Lab Courier
	[signature]	12/20/05	0840	

Comments/Instructions: *SILICA GEL CLEANUP, IF NEEDED

Method of Shipment: Lab Courier
Total No. of Coolers Shipped: 1
Airbill No.:
Lab SDG:
Total No. of Containers:
Cooler Temp.:

AOC 25

CLEAN

CHAIN-OF-CUSTODY RECORD

23152

Site Name: ALAMEDA 00035
CTO Number: 077
Site Contact/Supervisor: JOHANSEN

Sampler(s): G Yao, M. Waterman
Signature(s): Gary Yao, [signature]

Pay Items/ Analyses Required: 4.2 6010B/7000 METALS; 1.15 8015M/TPH-gas

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AVE FRESNO CA 93722
Field Logbook/Page Number: AOC 25

Preservation (4°C): HCl

TAT (in days): 2 7 (14) 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)		Remarks (e.g., MS, MSD)
C077S481	12/19/05 920	A25SB01	SOIL	1		20		1-1.5'
C077S482	925	↓	↓	↓		20		2-2.5'
C077S483	930	↓	↓	↓		20		7.5-8'
C077S484	940	A25SB02	↓	↓		20		1.5-2'
C077S485	945	↓	↓	↓		20		3.5-4'
C077S486	950	↓	↓	↓		20		7.5-8'
C077S487	955	A25SB03	↓	↓		20		1.5-2'
C077S488	1000	↓	↓	↓		20		3.5-4'
C077S489	↓ 1005	↓	↓	↓		20		6.5-7'
C077G174	12/19/05 1255	A25SB04	Water	6	GY	01-04	01-02	MS/MSD for TPH gas

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer
Gary Yao / Bechtel	[signature] / APPL Inc	12/19/05	1700	Lab Courier
	[signature]	12/20/05	0840	

Comments/Instructions:

Method of Shipment: Lab Courier

Total No. of Coolers Shipped: 1

Airbill No.:

Total No. of Containers: ~~9~~ 15 GY

Lab SDG:

Cooler Temp.:

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/20/05

Coolers: Number of Coolers: 3

YES NO Were coolers and samples screened for radioactivity?

YES NO Were custody seals on outside of cooler? How many? 3 Date on seal? NA

Name on seal? torn while removing

YES NO NA Were custody seals unbroken and intact at the time of arrival?

YES NO Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:

Shipping slip numbers: 1) 2) 3)

YES NO NA Was the shipping slip scanned into the database?

YES NO NA If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): wet ice bubble wrap & samples

YES NO NA For hand delivered samples was sufficient ice present to start the cooling process?

YES NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: #13250397 Correction factor: 0

Cooler temp(s): 1) 2.0° 2) 3.0° 3) 3.5° 4) 5) 6) 7) 8)

Chain of custody:

YES NO Was a chain of custody received?

YES NO Were the custody papers signed in the appropriate places?

YES NO Was the project identifiable from custody papers?

YES NO Did the chain of custody include date and time of sampling?

YES NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

YES NO Were container labels in good condition?

YES NO Was the client ID on the label?

YES NO Was the date of sampling on the label?

YES NO Was the time of sampling on the label?

YES NO Did all container labels agree with custody papers?

Sample Containers:

YES NO Were all containers sealed in separate bags?

YES NO Did all containers arrive unbroken?

YES NO Was there any leakage from samples?

YES NO Were any of the lids cracked or broken?

YES NO Were correct containers used for the tests indicated?

YES NO Was a sufficient amount of sample sent for tests indicated?

YES NO NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea: AX32705W03 AX32706W01 W02 AX32702W01

Preservation & Hold time:

YES NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO NA Were correct preservatives added to the samples?

YES NO NA Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO NA Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies:

Signature of personnel receiving samples: Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

APPL - Analysis Request Form 49394

Client: Bechtel National/Navy Clean
Address: 1230 Columbia St. Ste 400
San Diego, CA 92101
Attn: Toni Kuzmack
Phone: 619-744-3056 Fax: 619-687-8787
Job: Alameda
PO #: CTO 0077
Chain of Custody (Y/N): Y # 23185
RAD Screen (Y/N): Y pH (Y/N): N
Turn Around Type: 14 DAYS

Received by: CM
Date Received: 12/21/05 Time: 08:00
Delivered by: APPL COURIER
Shuttle Custody Seals (Y/N): Y
Chest Temp(s): 2.5°C
Color: PURPLE
Samples Chilled until Placed in Refrig/Freezer: Y
Project Manager: Diane Anderson
QC Report Type: DVP4/EDD/CA
Due Date: 01/04/06

Comments:
PLEASE MAKE SURE THAT YOU USE THE CORRECT CLIENT CONTAINER FOR YOUR ANALYSIS! PRINT FORMS WITH CONTAINER ID.
Report J-values to MDL. Report w/ special forms w/ MDLs
Requires only LCS. Moisture correct after analyses.
Only report diluted values for metals and wet lab. Do not report undiluted val
****** NO TICs required ******

Sample Distribution:
Metals: 1-$MTL3(Pb)
Wetlab: 1-MOIST

Charges:

Invoice To:

	Client ID		APPL ID	Sampled	Analyses Requested
1.	C077CB03	X-SPK	AX32846S	12/20/05 08:00	$MTL3(Pb), MOIST

BECHTEL **CLEAN**

CHAIN-OF-CUSTODY RECORD

23185

Site Name: ALAMEDA 00035
CTO Number: 0077
Site Contact/Supervisor: JDHANSEN

Sampler(s): D. McHugh
Signature(s):

Analytical Laboratory Name: APPL
Analytical Laboratory Address: 4203 W. SWIFT AV. FRESNO CA 93722
Field Logbook/Page Number:

Pay Items/ Analyses Required: Pb Lead TCP

Preservation (4°C)

TAT (in days): 2 | 7 | 14 | 30

Sample ID No. (8 digit)	Date/Time Collected	Station Description	Sample Matrix	Number of Containers	Archive (Container No.)	Container Nos. (2 digit)	Remarks (e.g., MS, MSD)
C0T1CB03	12/20/05 800	6G-2	Soil	1		20	DTW=63' Moonlight Stardust

Relinquished By/Company	Received By/Company	Date	Time	Reason for Transfer	Comments/Instructions:
BEI	APPL	12/20/05	1600	Lab Courier	
		12/21/05	0800		

Method of Shipment: Lab Courier
Airbill No.:
Total No. of Containers: 1
Total No. of Coolers Shipped: 1
Lab SDG:
Cooler Temp.:

COOLER RECEIPT FORM

Project: Alameda Date Received: 12/21/06

Coolers: Number of Coolers: 1

YES NO Were coolers and samples screened for radioactivity?

YES NO Were custody seals on outside of cooler? How many?_____ Date on seal? _____

Name on seal?_____

YES NO NA Were custody seals unbroken and intact at the time of arrival?

YES NO Did the cooler come with a shipping slip (air bill, etc.)? Carrier name:_____

Shipping slip numbers:1)_____ 2)_____ 3)_____

YES NO NA Was the shipping slip scanned into the database?

YES NO NA If cooler belongs to APPL, has it been logged into the ice chest database?

Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): SAMPLES & WET ICE

YES NO NA For hand delivered samples was sufficient ice present to start the cooling process?

YES NO Was a temperature blank included in the cooler?

Serial number of certified NIST thermometer used: #B85072 Correction factor: -0

Cooler temp(s): 1) 2.5° 2)_____ 3)_____ 4)_____ 5)_____ 6)_____ 7)_____ 8)_____

Chain of custody:

YES NO Was a chain of custody received?

YES NO Were the custody papers signed in the appropriate places?

YES NO Was the project identifiable from custody papers?

YES NO Did the chain of custody include date and time of sampling?

YES NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

YES NO Were container labels in good condition?

YES NO Was the client ID on the label?

YES NO Was the date of sampling on the label?

YES NO Was the time of sampling on the label?

YES NO Did all container labels agree with custody papers?

Sample Containers:

YES NO Were all containers sealed in separate bags?

YES NO Did all containers arrive unbroken?

YES NO Was there any leakage from samples?

YES NO Were any of the lids cracked or broken?

YES NO Were correct containers used for the tests indicated?

YES NO Was a sufficient amount of sample sent for tests indicated?

YES NO NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea: _____

Smaller than a pea: _____

Preservation & Hold time:

YES NO Was a sufficient amount of holding time remaining to analyze the samples?

YES NO NA Were correct preservatives added to the samples?

YES NO NA Was the pH taken of all non-VOA preserved samples and written on the sample container?

YES NO NA Was the pH of acid preserved samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:_____

Deficiencies:_____

Signature of personnel receiving samples:_____ Second reviewer: Libby Colson

Signature of project manager notified:_____ Date and Time of notification:_____

Name of client notified:_____ Date and Time of notification:_____

Information given to client:_____

_____ by whom (Initials): _____

ATTACHMENT C3

DISPOSITION OF INVESTIGATION-DERIVED WASTE (Manifests)

FORWARD INCORPORATED

9999 South Austin Road
Manteca, CA 95336
Landfill: (209) 982-4298 Fax (209) 982-1009
Resource Recovery: (209) 982-4298

P.O. Box 6336
Stockton, CA 95206
Main Office: (209) 466-4482
Fax: (209) 465-0631

DATE 02-02-04

CUSTOMER NO. 1119 NRC TRUCK NO. 2081 TRUCK LIC.# _____ TRAILER LIC. # _____

BILL TO: NRC Environmental

232593

SIZE YDS.	DESCRIPTION	NOTES	
	☐ REFUSE ☐ TREATED WOOD		44460 GROSS
	☐ SLUDGE ☐ ASH		39420 TARE
	☐ ASBESTOS ☐ NON-FRIABLE ASBESTOS		5040 NET
10 FB	☐ II SOIL ☑ SOIL		4.47 TONS
	☐ STOCKPILE		

IN _____ A.M./P.M.

Signed Brian Stark

OUT _____ A.M./P.M.

☐ **Keller Canyon Sanitary Landfill**
901 Bailey Road
Pittsburg, CA 94565
Phone (925) 458-9800
Fax (925) 458-9891

☐ **Ox Mountain Sanitary Landfill**
12310 San Mateo Road
Half Moon Bay, CA 94019
Phone (650) 726-1819
Fax (650) 726-9183

☐ **Newby Island Sanitary Landfill**
1601 Dixon Landing Road
Milpitas, CA 95035
Phone (408) 945-2800
Fax (408) 262-2871

☑ **Forward Landfill**
9999 S. Austin Road
Manteca, CA 95336
Phone (209) 982-4298
Fax (209) 982-1009

NON-HAZARDOUS WASTE MANIFEST 15816

GENERATOR Department of Navy
ROICC SF Bay Area
MAILING ADDRESS 2450 Saratoga St.
Suite 200
CITY, STATE, ZIP Alameda, CA 94501
PHONE 510-749-5940
CONTACT PERSON

WASTE ACCEPTANCE NO. 6119

REQUIRED PERSONAL PROTECTIVE EQUIPMENT
☐ GLOVES ☐ GOGGLES ☐ RESPIRATOR ☐ HARD HAT
☐ TY-VEK ☐ OTHER

SPECIAL HANDLING PROCEDURES:
Disposal P/O No. 131508

SIGNATURE OF AUTHORIZED AGENT / TITLE * Robt Brown — DATE 2/2/06

GENERATOR'S CERTIFICATION: I hereby certify that the above named material is not a hazardous waste as defined by 40 CFR Part 261 or title 22 of the California code of regulations, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations; **AND, If the waste is a treatment residue of a previously restricted hazardous waste** subject to the Land Disposal Restrictions, I certify and warrant that the waste has been treated in accordance with the requirements of 40 CFR Part 268 and is no longer a hazardous waste as defined by 40 CFR Part 261.

WASTE TYPE:
☑ DISPOSAL ☐ SLUDGE
☐ CONSTRUCTION ☐ WOOD
☐ DEBRIS ☐ OTHER
☐ SPECIAL WASTE

GENERATING FACILITY
Alameda Point, Alameda CA

RECEIVING FACILITY

TRANSPORTER NRC Environmental Services
ADDRESS 1605 Ferry Point
CITY, STATE, ZIP Alameda, CA 94501
PHONE 510-749-1390

NOTES:

VEHICLE LICENSE NUMBER	TRUCK NUMBER
9B94827	2084

Bin # 3244

END DUMP	BOTTOM DUMP	TRANSFER
☐	☐	☐

ROLL-OFF(S)	FLAT-BED	VAN	DRUMS
☑	☐	☐	☐

SIGNATURE OF AUTHORIZED AGENT OR DRIVER * Brian Stark — DATE 2 Feb 06

I hereby certify that the above named material has been accepted and to the best of my knowledge the foregoing is true and accurate.

REMARKS

FACILITY TICKET NUMBER

SIGNATURE OF AUTHORIZED AGENT * — DATE

CUBIC YARDS

DISPOSAL METHOD: (TO BE COMPLETED BY LANDFILL)

	DISPOSE	OTHER
☐ SOIL		
☐ CONSTRUCTION DEBRIS		
☐ NON-FRIABLE ASBESTOS		
☐ WOOD		
☐ ASH		
☐ SPECIAL OTHER		

SCHEDULING MUST BE MADE PRIOR TO 3:00 P.M. THE DAY PRIOR TO EXPECTED ARRIVAL • ANY UNSCHEDULED LOADS ARE SUBJECT TO REFUSAL UPON ARRIVAL. ONGOING DAILY DELIVERIES MUST BE SCHEDULED WITH THE LANDFILL THE DAY BEFORE.

MANIFEST # 41049

TRANSPORTER COPY

WEIGHMASTER Altamont Landfill & RRF
10840 Altamont Pass Road
Livermore CA 94551

DATE: 02/02/2006
TIME IN: 11:27
TIME OUT: 11:55

TICKET: 693181-1
I/O: I

CARRIER: NRC / nrc envir
TRUCK: 2106 TRAILER#:
CUSTOMER: FOSS ENVIR / NRC Environmental Services
GENERATOR: NAVYSITE35 / Dept of Navy, ROICC SF/Alameda Pt Site35 PO: 19184
ORIGIN: ALAM / Alameda
DESTINATION: NA / Non Appr
MANIFEST WASTE / DESCRIPTION QNTY PER

19184 SC2C / Soil [illegible] 3 T

DEPUTY IN: Rojas,Reggie
DEPUTY OUT: Brown, Kenn

GROSS: 4[illegible] LBS
TARE: 40040 LBS
NET: 8260 LBS TONS: 4.13

CUSTOMER:

WASTE MANAGEMENT

My signature, as customer, confirms that the information recorded by the weighmaster is correct, and understand and agree to all WM rules and policies while on site.

W E I G H M A S T E R C E R T I F I C A T E

THIS IS TO CERTIFY that the following described commodity was weighed, measured, or counted by a weighmaster, whose signature is on this certificate, who is a recognized authority of accuracy, as prescribed by Chapter 7 (commencing with Section 12700) of Division 5 of the California Business and Professions Code, administered by the Division of Measurement Standards of the California Department of Food and Agriculture.

15817

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.	Manifest Document No.	2. Page 1 of 1
NA	19184	

GENERATOR

3. Generator's Name and Mailing Address
Department of Navy, ROICC SF Bay
2450 Saratoga Street, Suite 200, Alameda
4. Generator's Phone (510) 749-5940 CA 94501

5. Transporter 1 Company Name	6. US EPA ID Number	A. Transporter's Phone
NRC Environmental Services	CAR.000.030.114	510-749-1390
7. Transporter 2 Company Name	8. US EPA ID Number	B. Transporter's Phone
	. . . . .	

9. Designated Facility Name and Site Address	10. US EPA ID Number	C. Facility's Phone
Altamont Landfill & Resource Recovery 10840 Altamont Pass Road Livermore, CA 94550	NA	925-455-7300

11. Waste Shipping Name and Description	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol
a. Non-Hazardous Waste Liquids (water)	001	TT	8000	G
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above
Ha Profile No 55351680

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
NREES Job No. 19184 Disposal P/O 19184

Emergency Contact: NRC Envir. Services 24 Hr Ph No. 510-749-1390

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name	Signature	Month	Day	Year
Bob Perriconne		02	02	06

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
Arnold Kramer		02	02	06

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
		.	.	.

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month	Day	Year
		12	12	06

TRANSPORTER #1

APPENDIX D

BORING LOGS

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A01SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 01	Alameda	NA	12-14-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,114,259.2 E 6,039,315.5	Jennifer Dean	NA	12-14-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	8.92	Matthew Waterman	12.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
144					8.3	1		**Concrete** 100% other.	at 8:25am breathing zone:FID=2.7,PID=142, O2=20.9,LEL=0 in borehole:FID=3.15, O2=20.9,LEL=.0
	73	3.3	2.4	C077S001 (1.0 - 2.0)	6.9	2		**Silty sand with gravel(SM)**: yellowish red [5YR 4/6], poorly-graded, moist, [BASE ROCK], 30% gravel, 55% sand, 15% silt.	sample time: 08:00
				C077S009 (3.0 - 4.0)		3		**Poorly graded sand with silt(SP-SM)**: brown [10YR 5/3], poorly-graded, wet, [FILL], 90% sand, 10% silt.	sample time: 09:00
56	79	4.0	3.2			4			at 08:30am breathing zone:FID=2.97,PID=85.02, O2=20.9,LEL=0 in borehole:FID=3.3, O2=20.9,LEL=.0
					3.9	5		**Poorly graded sand with silt(SP-SM)**: dark gray [5Y 4/1], poorly-graded, wet, [BAY SEDIMENTS], 90% sand, 10% silt.	some gravel 5 feet
				C077S002 (7.0 - 8.0)		6			
	100	4.0	4			7			sample time: 08:30 Water Sample ID: C077G001 taken at 10:45 from 7 to 12 feet bgs.
						8			at 08:33am breathing zone:FID=3.3, O2=20.9,LEL=0 in borehole:FID=3.3, O2=20.9,LEL=.0
						9			
						10			
				C077S003 (11.0 - 12.0)		11			sample time: 08:50
					-3.1	12		**TOTAL DEPTH = 12.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

frm: CTO 077 LOG Time: 4:58:23 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A01SB02

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 01	Alameda	NA	12-13-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,114,148.8 E 6,039,349.3	Jennifer Dean	NA	12-13-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.60	Matthew Waterman	12.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					8.9			**Concrete** 100% other.	
	31	3.3	1	C077S004 (1.0 - 2.0)	8.6	1		**Poorly graded gravel with sand(GP)**: brownish yellow [10YR 6/8], moist, [ROCK BASE], 75% gravel, 25% sand.	sample time: 09:20 on 12/14/2005
						2		**Poorly graded sand(SP)**: brown [10YR 5/3], poorly-graded, wet, [FILL], 95% sand, 5% silt.	
				C077S005 (3.0 - 4.0)		3			sample time: 09:30 on 12/14/2005
	33	4.0	1.3			4			at 09:00 breathing zone FID.=-0.1,O2=20.9,LEL=.0 in borehole: FID.=-0.6,O2=20.9,LEL=.0
						5			
						6			
						7			Water Sample ID: C077G002 taken at 11:15 on 12/14/2005 from 7 to 12 feet bgs. breathing zone FID.=2.4,O2=20.9,LEL=.0 in borehole: FID.=2.2,O2=20.9,LEL=.0
	42	4.0	1.7		1.6	8		**Poorly graded sand (SP)**: dark gray [5Y 4/1], poorly-graded, wet, [BAY SEDIMENT], 95% sand, 5% silt.	
						9			
						10			
				C077S006 (11.0 - 12.0)		11			sample time: 09:40 on 12/14/2005
					-2.4	12		**TOTAL DEPTH = 12.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION: AOC 01 Alameda

HOLE NO.: A01SB02

Report form: CTO 077 LOG Time: 5:03:48 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A01SB03

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 01	Alameda	NA	12-14-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,114,138.3 E 6,039,298.9	Jennifer Dean	NA	12-14-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.24	Matthew Waterman	12.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	46	4.0	1.8	C077S007 (1.0 - 2.0)	9.1	0		**Silt (ML)**: soft, low plasticity, grass at surface; [TOPSOIL], 50% clay, 50% silt.	
						1		**Poorly graded sand with silt(SP-SM)**: brown [10YR 5/3], poorly-graded, wet, [FILL], 90% sand, 10% silt.	sample time: 10:00
				C077S008 (3.0 - 4.0)		2			
						3			sample time: 10:10
	56	4.0	2.3			4			at 10:05 breathing zone FID.=-2.4,O2=20.9,LEL=.0 in borehole: FID.=-2.25,O2=20.9,LEL=.0
					4.2	5		**Poorly graded sand (SP)**: dark gray [5Y 4/1], poorly-graded, wet, [BAY SEDIMENTS] screen interval from 7 to 12 feet, odor - hydrocarbons, 95% sand, 5% silt.	
						6			
						7			
	71	4.0	2.8			8			Water Sample ID: C077G003 taken at 12:35 from 7 to 12 feet bgs. at 8 feet oil sheen on sample
						9			
						10			
				C077S010 (10.5 - 12.0)		11			sample time: 10:20
					-2.8	12			
								TOTAL DEPTH = 12.0 FEET	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7000
STATE OF CA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 01 Alameda	A01SB03

fn: CTO 077 LOG Time: 5:03:55 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A02SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 02	Alameda	NA	12-15-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,115,100.8 E 6,040,589.8	Jennifer Dean	NA	12-15-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.31	Matthew Waterman	12.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	54	3.7	2	C077S021 (1.0 - 2.0)	9.0	1		**Asphalt** 100% other. **Silty sand with gravel (SM)**: brown [10YR 4/3], well-graded, dry, [BASE MATERIAL], 25% gravel, 45% sand, 30% silt.	sample time: 09:15
					7.3	2		**Silty sand (SM)**: brown [10YR 5/3], poorly-graded, moist, low plasticity, low dry strength, [FILL], 60% sand, 40% silt.	
				C077S022 (3.0 - 4.0)		3			sample time: 09:20
	47	4.0	1.9			4			at 08:40 breathing zone: FID=0.56,O2=20.9,LEL=0 borehole: FID=0.44,O2=20.9,LEL=0
					4.8	5		**Poorly graded sand (SP)**: dark gray [5Y 4/1], poorly-graded, wet, [BAY SEDIMENTS], 95% sand, 5% silt.	
				C077S023 (6.5 - 8.0)		6			sample time: 09:25
						7			Water Sample ID: C077G011 & C077G0122 taken at 09:30 from 7 to 12 feet bgs.
	58	4.0	2.3			8			
						9			
						10			
						11			
					-1.9			**Silty sand (SM)**: dark gray [5Y 4/1], poorly-graded, wet, [BAY SEDIMENTS], 70% sand, 30% silt.	
					-2.7	12			

TOTAL DEPTH = 12.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION: AOC 02 Alameda

HOLE NO.: A02SB01

Report form: CTO 077 LOG Time: 5:04:01 PM

BORECHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A02SB02

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 02	Alameda	NA	12-15-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,115,091.6 E 6,040,620.1	Jennifer Dean	NA	12-15-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.30	Matthew Waterman	12.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	36	3.7	1.3	C077S024 (1.5 - 2.0)	9.0	1		**Asphalt** 100% other. **Silty sand with gravel (SM)**: brown [10YR 5/3], well-graded, moist, [FILL], 25% gravel, 45% sand, 30% silt.	sample time: 9:45
				C077S025 (3.5 - 4.0)		2			sample time: 9:50
	56	4.0	2.3		4.8	3			sample time: 8:45am in breathing zone: FID=0.31, LEL=0,O2=20.9 in borehole: FID=0.42, LEL=0,O2=20.9
						4		**Silty sand (SM)**: dark gray [5Y 4/1], poorly-graded, moist, sand becomes coarser with depth [FILL], 55% sand, 45% silt.	
				C077S026 (7.0 - 8.0)	2.3	5			sample time: 9:55 Water Sample ID: C077G013 & C077G014 taken at 10:30 from 7 to 12 feet bgs.
	63	4.0	2.5			6		**Poorly graded sand (SP)**: olive gray [5Y 4/2], poorly-graded, wet, coarse sand with some shell fragments [FILL], 95% sand, 5% silt.	
						7			
						8			
						9			
					-0.7	10		**Poorly graded sand with silt and gravel (SP-SM)**: brown [10YR 5/3], poorly-graded, wet, becomes black at 11 feet possible hydrocarbons? [FILL], 30% gravel, 60% sand, 10% silt.	
						11			
					-2.7	12		**TOTAL DEPTH = 12.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

m: CTO 077 LOG Time: 5:04:08 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A02SB03

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 02	Alameda	NA	12-15-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,115,043.0 E 6,040,580.1	Jennifer Dean	NA	12-15-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.48	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
								Asphalt 100% other.	
	76	2.8	2.2	C077S027 (1.2 - 2.0)	8.3	1		**Silty sand (SM)**: brown [10YR 5/3], poorly-graded, moist, [FILL], 10% gravel, 45% sand, 45% silt.	sample time: 10:30
				C077S028 (2.5 - 4.0)		2			sample time: 10:35
		1.5			6.0	3		**Poorly graded sand with silt (SP-SM)**: brown [10YR 5/3], poorly-graded, wet, [FILL], 90% sand, 10% silt.	in breathing zone: FID=1.77,O2=20.9,LEL=0 in borehole: FID=1.97,O2=20.9,LEL=0
						4			
						5			
						6			
				C077S029 (7.0 - 8.0)	2.5 ▽	7		**Poorly graded sand (SP)**: dark gray [5Y 4/1], poorly-graded, wet, [BAY SEDIMENTS], 95% sand, 5% silt.	sample time: 10:40
					1.5	8		**TOTAL DEPTH = 8.0 FEET**	

REGISTERED GEOLOGIST
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SITE and LOCATION	HOLE NO.
AOC 02 Alameda	A02SB03

Report form: CTO 077 LOG Time: 5:04:15 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A02SB04

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 02	Alameda	NA	12-15-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,115,041.8 E 6,040,613.1	Jennifer Dean	NA	12-15-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.66	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					9.2			**Concrete** 100% other.	
	70	3.6	2.5	C077S030 (1.5 - 2.0)		1		**Poorly graded sand with silt(SP-SM)**: brown [10YR 5/3], poorly-graded, wet, occasional fine gravel; [FILL], 90% sand, 10% silt.	sample time: 10:45
				C077S031 (2.5 - 4.0)		2			sample time: 10:50
	33	4.0	1.3			3			sample time: 10:25 in breathing zone: FID=1.77,O2=20.9,LEL=0 in borehole: FID=2.0,O2=20.9,LEL=0
						4			
						5			
						6			
				C077S032 (7.0 - 8.0)		7			sample time: 10:55
					1.7	8			

TOTAL DEPTH = 8.0 FEET

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SITE and LOCATION	HOLE NO.
AOC 02 Alameda	A02SB04

frm: CTO 077 LOG Time: 5:04:22 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A03SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 03	Alameda	NA	12-14-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,115,064.5 E 6,041,058.8	Jennifer Dean	NA	12-14-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.70	Matthew Waterman	4.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	71	4.0	2.8	C077S041 (1.5 - 2.0)	8.7	1		**Silty sand with gravel (SM)**: dark yellowish brown [10YR 3/4], poorly-graded, dry, [TOPSOIL], 20% gravel, 55% sand, 25% silt.	
						2		**Poorly graded sand with silt (SP-SM)**: brown [10YR 5/3], poorly-graded, moist, [FILL], 90% sand, 10% silt.	sample time: 12:30
				C077S042 (2.5 - 4.0)		3			sample time: 12:35
					6.0				
					5.7	4		**Silty sand (SM)**: brown [10YR 5/3], poorly-graded, wet, [FILL], 75% sand, 25% silt.	
								TOTAL DEPTH = 4.0 FEET	

REGISTERED GEOLOGIST
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SITE and LOCATION	HOLE NO.
AOC 03 Alameda	A03SB01

Report form: CTO 077 LOG Time: 5:04:28 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A03SB02

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 03	Alameda	NA	12-14-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,115,004.5 E 6,041,029.8	Jennifer Dean	NA	12-14-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.12	Matthew Waterman	4.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	54	4.0	2.2					**Silt with sand (ML)**: dark brown [10YR 3/3], poorly-graded, soft, dry, low plasticity, [TOPSOIL], 20% sand, 80% silt.	
				C077S043 (1.5 - 2.0)	7.8	1		**Poorly graded sand (SP)**: brown [10YR 5/3], poorly-graded, dry, [FILL], 95% sand, 5% silt.	sample time: 14:30
					6.6	2		**Well-graded sand with silt and gravel (SW-SM)**: brownish yellow [10YR 6/8], well-graded, dry, containing concrete fragments ; [FILL], 40% gravel, 50% sand, 10% silt.	
				C077S044 (3.5 - 4.0)	5.1	3			sample time: 14:35
						4		**TOTAL DEPTH = 4.0 FEET**	sample at 14:31 in breathing zone: FID=1.2,O2 =20.9,LEL=0 in borehole : FID=1.6,O2 =20.9,LEL=0

REGISTERED GEOLOGIST
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SITE and LOCATION	HOLE NO.
AOC 03 Alameda	A03SB02

m: CTO 077 LOG Time: 5:04:33 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A03SB03

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 03	Alameda	NA	12-14-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,114,988.5 E 6,041,040.2	Jennifer Dean	NA	12-14-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	8.98	Matthew Waterman	4.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	73	4.0	2.9		8.0	1		**Silt with sand (ML)**: dark brown [10YR 3/3], poorly-graded, soft, dry, low plasticity, [TOPSOIL], 20% sand, 80% silt.	
				C077S045 (1.5 - 2.0)		2		**Poorly graded sand with silt(SP-SM)**: brown [10YR 5/3], poorly-graded, dry, [FILL], 90% sand, 10% silt.	sample time: 14:40
					6.7	3		**Well-graded sand with silt and gravel(SW-SM)**: brownish yellow [10YR 6/8], well-graded, dry, containing concrete fragments ; [FILL], 40% gravel, 50% sand, 10% silt.	
				C077S046 (3.5 - 4.0)	5.0	4			sample time: 14:45
								TOTAL DEPTH = 4.0 FEET	

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Report form: CTO 077 LOG Time: 5:04:39 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A03SB04

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 03	Alameda	NA	12-14-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,115,036.0 E 6,041,033.8	Jennifer Dean	NA	12-14-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.82	Matthew Waterman	14.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	75	4.0	3		8.8	1		**Silty sand (SM)**: brownish yellow [10YR 6/8], subangular, poorly-graded, dry, [TOPSOIL], 10% gravel, 70% sand, 20% silt.	
				C077S047 (1.5 - 2.0)		2		**Poorly graded sand with silt(SP-SM)**: brown [10YR 5/3], poorly-graded, dry, 2 inch clay lens at 3.75 feet [FILL], 90% sand, 10% silt.	sample time: 13:00
				C077S048 (3.0 - 4.0)		3			sample time: 13:05
	79	4.0	3.2		5.8	4		**Poorly graded sand with silt(SP-SM)**: brown [10YR 5/3], poorly-graded, moist, [FILL], 90% sand, 10% silt.	
				C077S049 (6.5 - 7.0)		6			sample time: 13:10
					2.8	7		**Poorly graded sand (SP)**: dark gray [5Y 4/1], subangular, poorly-graded, wet, [BAY SEDIMENTS], 95% sand, 5% silt.	
	79	4.0	3.2			8			
						9			Water Sample ID: C077G021 taken at 09:30 on 12/16/2005 from 9 to 14 feet bgs.
						10			
						11			
	100	2.0	2			12			
						13			
					-4.2	14		**TOTAL DEPTH = 14.0 FEET**	

REGISTERED GEOLOGIST
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No. 7096
11/07
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DRAFT	SITE and LOCATION	HOLE NO.
	AOC 03 Alameda	A03SB04

frm: CTO 077 LOG Time: 5:04:44 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A03SB05

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 03	Alameda	NA	12-14-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,115,010.7 E 6,041,057.8	Jennifer Dean	NA	12-14-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.53	Matthew Waterman	14.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	67	4.0	2.7					**Poorly graded sand with silt(SP-SM)**: dark brown [10YR 3/3], poorly-graded, dry, [TOPSOIL], 10% gravel, 80% sand, 10% silt.	
				C077S050 (1.5 - 2.0)	8.2	1		**Poorly graded sand with silt(SP-SM)**: brown [10YR 5/3], poorly-graded, dry, contains occasional thin (2-3inch) clay lenses. [FILL], 90% sand, 10% silt.	sample time: 13:50
				C077S051 (3.5 - 4.0)		2			sample time: 13:55
	54	4.0	2.2			3			at 13:45 in breathing zone: FID=2.2, O2=20.9,LEL=0 in borehole : FID=2.4, O2=20.9,LEL=0
						4			
						5			
						6			
						7			
				C077S052 (7.5 - 8.0)		8			sample time: 14:00
	85	4.0	3.4		1.0	9		**Silty sand (SM)**: dark gray [5Y 4/1], poorly-graded, wet, contains occasional thin (2-3inch) clay lenses. [BAY SEDIMENTS], 90% sand, 10% silt.	Water Sample ID: C077G023 taken at 10:00 on 12/16/2005 from 9 to 14 feet bgs.
						10			
						11			
	100	2.0	2			12			
						13			
					-4.5	14		**TOTAL DEPTH = 14.0 FEET**	

REGISTERED GEOLOGIST
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DRAFT	SITE and LOCATION	HOLE NO.
	AOC 03 Alameda	A03SB05

Report form: CTO 077 LOG Time: 5:04:51 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A03SB06

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 03	Alameda	NA	12-14-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,115,036.6 E 6,041,069.8	Jennifer Dean	NA	12-14-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.68	Matthew Waterman	12.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	64	3.8	2.4		9.4			**Asphalt** 100% other.	
					9.1	1		**Silty sand with gravel (SM)**: brownish yellow [10YR 6/8], poorly-graded, moist, [BASE ROCK], 15% gravel, 55% sand, 30% silt.	
				C077S053 (1.5 - 2.0)		2		**Poorly graded sand (SP)**: brown [10YR 5/3], poorly-graded, moist, [FILL], 95% sand, 5% silt.	sample time: 12:50
						3			
				C077S054 (3.5 - 4.0)	6.2	4		**Silty sand (SM)**: brown [10YR 5/3], poorly-graded, moist, [FILL], 55% sand, 45% silt.	sample time: 12:55
	71	4.0	2.8			5			
				C077S055 (5.5 - 6.0)		6			sample time: 13:00
						7			
					2.2 ▽	8		**Poorly graded sand (SP)**: dark gray [5Y 4/1], poorly-graded, wet, 4-inch clay lens at 10 feet. [BAY SEDIMENTS], 95% sand, 5% silt.	Water Sample ID: C077G025 taken at 09:00 on 12/16/2005 from 7 to 12 feet bgs.
	83	4.0	3.3			9			
						10			
						11			
					-2.3	12		**TOTAL DEPTH = 12.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION	HOLE NO.
	AOC 03 Alameda	A03SB06

fm: CTO 077 LOG Time: 5:04:58 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A05SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 05	Alameda	NA	12-15-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,114,782.1 E 6,043,320.7	Jennifer Dean	NA	12-15-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	8.73	Matthew Waterman	12.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	71	4.0	2.8	C077S071 (1.0 - 2.0)		1		**Sandy silt (ML)**: dark brown [10YR 3/3], moist, nonplastic, low dry strength, [TOPSOIL], 10% gravel, 40% sand, 50% silt.	sample time: 14:00
				C077S072 (3.0 - 4.0)		2 3			sample time: 14:05
	48	4.0	1.9		4.7	4		**Poorly graded sand with silt(SP-SM)**: yellowish red [5YR 4/6], poorly-graded, moist, mottled w/gray from 4-5 feet, 90% sand, 10% silt.	sample time: 14:00 in breathing zone: FID=not working,O2=20.9,LEL=0 in borehole: FID=not working,O2=20.9,LEL=0
						5 6			
				C077S073 (7.0 - 8.0)	1.7	7		**Lean clay (CL)**: dark gray [5Y 4/1], moist, medium plasticity, medium dry strength, [BAY SEDIMENTS], 60% clay, 40% silt.	sample time: 14:10 Water Sample ID: C077G031 & C077G032 taken at 08:35 on 12/16/2005 from 7 to 12 feet bgs.
	75	4.0	3			8 9			
						▽ 10 11			
					-3.3	12		**TOTAL DEPTH = 12.0 FEET**	

REGISTERED GEOLOGIST
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STATE OF CALIFORNIA

DRAFT

SITE and LOCATION: AOC 05 Alameda

HOLE NO.: A05SB01

Report form: CTO 077 LOG Time: 5:05:05 PM

BOREHOLE LOG

PROJECT and JOB NUMBER: Navy CLEAN 3 CTO-077		SHEET NO.: 1 of 1	HOLE NO.: A05SB02
DRILLER: Resonant Sonic	SITE and LOCATION: AOC 05 Alameda	OVERBURDEN: NA	BEGUN: 12-15-05
DRILL MAKE AND MODEL: Geoprobe Direct Push Rig	COORDINATES (NORTHING, EASTING): N 2,114,800.9 E 6,043,354.2	LOGGED BY: Jennifer Dean	ROCK (FT): NA / COMPLETED: 12-15-05
HOLE SIZE DIAMETER (IN): 2 / CORE SIZE DIAMETER (IN): 1.375	GROUND ELEVATION (FT MLLW): 8.30	CHECKED BY: Matthew Waterman	TOTAL DEPTH (FT BGS): 12.0 / UPDATE: 5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					7.9			**Concrete** 100% other.	water not encountered in borehole.
	47	3.6	1.7	CO77S074 (1.0 - 2.0)		1		**Sandy silt with gravel (ML)**: dark brown [10YR 3/3], moist, nonplastic, low dry strength, [FILL], 20% clay, 15% gravel, 35% sand, 30% silt.	sample time: 13:25
				CO77S075 (3.0 - 4.0)		2			sample time: 13:30
	33	4.0	1.3			3			sample time: 13:10 in breathing zone: FID=not working, O2=20.9,LEL=0 in borehole: FID=not working, O2=20.9,LEL=0
					3.3	4			
						5		**Silty sand (SM)**: dark gray [5Y 4/1], poorly-graded, moist, [BAY SEDIMENTS], 55% sand, 45% silt.	
				CO77S076 (7.0 - 8.0)		6			
						7			sample time: 13:35 Water Sample ID: C077G033 taken at 07:55 on 12/16/2005 from 7 to 12 feet bgs.
	85	4.0	3.4		0.3	8		**Lean clay (CL)**: dark gray [5Y 4/1], very soft, moist, medium plasticity, containing shell fragments; [BAY SEDIMENTS], 50% clay, 5% sand, 45% silt.	
						9			
						10			
						11			
					-3.7	12		**TOTAL DEPTH = 12.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION: AOC 05 Alameda

HOLE NO.: A05SB02

frm: CTO 077 LOG Time: 5:05:11 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A05SB03

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 05	Alameda	NA	12-15-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,114,774.2 E 6,043,344.3	Jennifer Dean	NA	12-15-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	8.28	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	71	4.0	2.8	C077S077 (1.0 - 2.0)	7.3	1		**Sandy silt (ML)**: dark brown [10YR 3/3], poorly-graded, moist, nonplastic, low dry strength, [TOPSOIL], 5% gravel, 40% sand, 55% silt.	
								Silty sand (SM): brown [10YR 5/3], poorly-graded, moist, [FILL], 60% sand, 40% silt.	sample time: 14:35
				C077S078 (3.0 - 4.0)		3			sample time: 14:40
	67	4.0	2.7		4.3	4		**Poorly graded sand with silt (SP-SM)**: brown [10YR 5/3], poorly-graded, moist, [FILL], 90% sand, 10% silt.	sample time:14:25 in breathing zone: FID=not working,O2=20.9,LEL=0 in borehole: FID=not working,O2=20.9,LEL=0
					3.3	5		**Lean clay (CL)**: dark gray [5Y 4/1], moist, medium plasticity, medium dry strength, containing thin lenses of fine silty sand; [BAY SEDIMENTS], 80% clay, 5% sand, 15% silt.	
				C077S079 (6.5 - 8.0)		7			sample time: 14:45
					0.3	8			

TOTAL DEPTH = 8.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
4/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 05 Alameda	A05SB03

Report form: CTO 077 LOG Time: 5:06:16 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A05SB04

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 05	Alameda	NA	12-15-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,114,779.4 E 6,043,363.3	Jennifer Dean	NA	12-15-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	8.42	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	58	4.0	2.3	C077S080 (0.5 - 2.0)		1		**Silty sand (SM)**: dark brown [10YR 3/3], poorly-graded, dry, [TOPSOIL], 60% sand, 40% silt.	sample time: 15:00
				C077S081 (3.0 - 4.0)		2			sample time: 15:05
	21	4.0	0.8			3			sample time: 14:55 in breathing zone: FID=not working,O2=20.9,LEL=0 in borehole: FID=not working,O2=20.9,LEL=0
						4			
						5			
						6			
				C077S082 (7.0 - 8.0)		7			sample time: 15:10
					0.9				
					0.4	8		**Poorly graded sand (SP)**: dark gray [5Y 4/1], poorly-graded, wet, [BAY SEDIMENTS], 95% sand, 5% silt.	
								TOTAL DEPTH = 8.0 FEET	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 05 Alameda	A05SB04

frm: CTO 077 LOG Time: 5:05:22 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A06SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 06	Alameda	NA	12-15-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,114,261.0 E 6,042,066.4	Maaike Petrie	NA	12-15-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.03	Matthew Waterman	4.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	75	4.0	3		8.3	1		**Silt with sand (ML)**: very dark brown [10YR 2/2], poorly-graded, soft, dry, low plasticity, rapid dilatancy, low toughness, low dry strength, Grass in top 2". Trace 5-7mm gravel around 0.5-1' bgs., odor - no, 20% sand, 80% silt, HCl reaction - not tested.	
				C077S091 (1.5 - 2.0)	7.2	2		**Silty sand (SM)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, dry, Silt lenses., odor - no, 80% sand, 20% silt, HCl reaction - not tested.	sample time: 08:30
						3		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, dry, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	
				C077S092 (3.5 - 4.0)	5.0	4		**TOTAL DEPTH = 4.0 FEET**	sample time: 08:35 sample time: 08:32 in breathing zone: FID=3.6,O2=20.9,LEL=0 in borehole: FID=5.4,O2=20.9,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 06 Alameda	A06SB01

Report form: CTO 077 LOG Time: 5:05:28 PM

BORELOG

PROJECT and JOB NUMBER: Navy CLEAN 3 — CTO-077			SHEET NO.: 1 of 1	HOLE NO.: A06SB02
DRILLER: Resonant Sonic	SITE and LOCATION: AOC 06 Alameda		OVERBURDEN: NA	BEGUN: 12-15-05
DRILL MAKE AND MODEL: Geoprobe Direct Push Rig	COORDINATES (NORTHING, EASTING): N 2,114,251.7 E 6,042,053.2	LOGGED BY: Maaike Petrie	ROCK (FT): NA	COMPLETED: 12-15-05
HOLE SIZE DIAMETER (IN): 2 — CORE SIZE DIAMETER (IN): 1.375	GROUND ELEVATION (FT MLLW): 9.00	CHECKED BY: Matthew Waterman	TOTAL DEPTH (FT BGS): 4.0	UPDATE: 5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	80	4.0	3.2	C077S093 (1.0 - 1.5)	8.0	1		**Silt with sand (ML)**: very dark grayish brown [10YR 3/2], poorly-graded, medium stiff, dry, low plasticity, rapid dilatancy, low toughness, low dry strength, Grass and roots in top 3"., odor - no, 5% gravel, 15% sand, 80% silt, HCl reaction - not tested.	sample time: 08:40
				C077S094 (2.5 - 3.0)	7.2	2		**Silty sand (SM)**: very dark grayish brown [2.5Y 3/2], subrounded, poorly-graded, dry, odor - no, 80% sand, 20% silt, HCl reaction - not tested.	sample time: 08:45
						3		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, dry, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	
					5.0	4		**TOTAL DEPTH = 4.0 FEET**	sample time: 08:55 in breathing zone: FID=3.11,O2=20.9,LEL=0 in borehole: FID=3.60,O2=20.9,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 06 Alameda	A06SB02

m: CTO 077 LOG Time: 5:05:34 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A06SB03

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 06	Alameda	NA	12-15-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,114,241.7 E 6,042,042.5	Maaike Petrie	NA	12-15-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.06	Matthew Waterman	4.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	80	4.0	3.2	C077S095 (0.5 - 1.0)	8.0	1		**Silt (ML)**: very dark gray [10YR 3/1], poorly-graded, medium stiff, dry, low plasticity, rapid dilatancy, low toughness, low dry strength, Roots in top 2"., odor - no, 10% sand, 90% silt, HCl reaction - not tested.	sample time: 08:50
				C077S096 (2.0 - 2.5)	6.9	2		**Silty sand (SM)**: dark olive brown [2.5Y 3/3], subrounded, poorly-graded, dry, odor - no, 5% gravel, 80% sand, 15% silt, HCl reaction - not tested.	sample time: 08:55
						3		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, dry, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	
					5.1	4			sample time: 08:50 in breathing zone: FID=3.6,O2=20.9,LEL=0 in borehole: FID=4.0,O2=20.9,LEL=0
								TOTAL DEPTH = 4.0 FEET	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 06 Alameda	A06SB03

Report form: CTO 077 LOG Time: 5:05:39 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A06SB04

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 06	Alameda	NA	12-15-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,114,240.3 E 6,042,065.1	Maaike Petrie	NA	12-15-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.10	Matthew Waterman	4.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	65	4.0	2.6	C077S097 (1.5 - 2.0)	8.1 7.8 7.2	1 2		**Silt with sand (ML)**: very dark gray [10YR 3/1], poorly-graded, medium stiff, dry, low plasticity, rapid dilatancy, low toughness, low dry strength, Roots in top 2"., odor - no, 15% sand, 85% silt, HCl reaction - not tested. **Poorly graded sand with silt (SP-SM)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, dry, odor - no, 90% sand, 10% silt, HCl reaction - not tested.	sample time: 09:10
				C077S098 (3.5 - 4.0)	5.1	3 4		**Silt with sand (ML)**: olive brown [2.5Y 4/3], poorly-graded, stiff, dry, low plasticity, rapid dilatancy, low toughness, low dry strength, odor - no, 20% sand, 80% silt, HCl reaction - not tested. **Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, dry, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 00:15 sample time: 09:20 in breathing zone: FID=1.1,O2=20.9,LEL=0 in borehole: FID=0.7,O2=20.9,LEL=0

TOTAL DEPTH = 4.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION	HOLE NO.
	AOC 06 Alameda	A06SB04

frm: CTO 077 LOG Time: 5:05:44 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A06SB05

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 06	Alameda	NA	12-15-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,114,229.8 E 6,042,051.4	Maaike Petrie	NA	12-15-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.37	Matthew Waterman	4.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	79	4.0	3.2	C077S099 (1.5 - 2.0)	8.4	1		**Silt with sand (ML)**: very dark grayish brown [10YR 3/2], poorly-graded, medium stiff, dry, low plasticity, rapid dilatancy, low toughness, low dry strength, odor - no, 15% sand, 85% silt, HCl reaction - not tested.	
					7.6	2		**Silty sand (SM)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, dry, odor - no, 80% sand, 20% silt, HCl reaction - not tested.	sample time: 09:20
				C077S100 (3.0 - 3.5)		3		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, dry, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 09:25
					5.4	4		**TOTAL DEPTH = 4.0 FEET**	sample time: 09:35 in breathing zone: FID=0.4,O2=20.9,LEL=0 in borehole: FID=0.4,O2=20.9,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 06 Alameda	A06SB05

Report form: CTO 077 LOG Time: 5:05:48 PM

BOREHOLE LOG

PROJECT and JOB NUMBER: Navy CLEAN 3 CTO-077		SHEET NO.: 1 of 1	HOLE NO.: A06SB06
DRILLER: Resonant Sonic	SITE and LOCATION: AOC 06 Alameda	OVERBURDEN: NA	BEGUN: 12-15-05
DRILL MAKE AND MODEL: Geoprobe Direct Push Rig	COORDINATES (NORTHING, EASTING): N 2,114,212.5 E 6,042,064.9	LOGGED BY: Maaike Petrie	ROCK (FT): NA / COMPLETED: 12-15-05
HOLE SIZE DIAMETER (IN): 2 / CORE SIZE DIAMETER (IN): 1.375	GROUND ELEVATION (FT MLLW): 8.96	CHECKED BY: Matthew Waterman	TOTAL DEPTH (FT BGS): 4.0 / UPDATE: 5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	69	4.0	2.75	C077S101 (0.5 - 1.0)	8.1	1		**Silt with sand (ML)**: very dark grayish brown [10YR 3/2], poorly-graded, medium stiff, dry, low plasticity, rapid dilatancy, low toughness, low dry strength, Roots in top 3"., odor - no, 15% sand, 85% silt, HCl reaction - not tested.	
				C077S102 (2.0 - 2.5)	6.8	2		**Silty sand (SM)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, dry, Some gravel around 2' bgs., odor - no, 5% gravel, 80% sand, 15% silt, HCl reaction - not tested.	sample time: 09:50
						3			
					5.0	4		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, dry, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 09:55
								TOTAL DEPTH = 4.0 FEET	sample time: 09:50 in breathing zone: FID=1.01,O2=20.9,LEL=0 in borehole: FID=0.5,O2=20.9,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION: AOC 06 Alameda

HOLE NO.: A06SB06

jmm: CTO 077 LOG Time: 5:05:55 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A08SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 08	Alameda	NA	12-7-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Hand Auger	N 2,113,844.9 E 6,042,713.1	Matthew Waterman	NA	12-7-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
3.25 / 1.375	11.68	Matthew Waterman	4.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
								Silt with sand (ML): dark brown [10YR 3/3], 20% sand, 80% silt.	
				C077S111 (1.0 - 1.5)	10.7	1		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/4], moist, 100% sand, mottled structure.	sample time: 11:25
						2			
				C077S112 (3.0 - 3.5)		3			sample time: 11:30
					7.7	4		**TOTAL DEPTH = 4.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 08 Alameda	A08SB01

Report form: CTO 077 LOG Time: 5:06:02 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A08SB02

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 08	Alameda	NA	12-7-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Hand Auger	N 2,113,853.8 E 6,042,753.3	Matthew Waterman	NA	12-7-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
3.25 / 1.375	11.33	Matthew Waterman	4.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					10.3	0		**Silt with sand (ML)**: dark brown [10YR 3/3], dry, 15% sand, 85% silt.	
				C077S113 (1.0 - 1.5)		1		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/4], moist, 100% sand.	sample time: 11:15
						2			
				C077S114 (3.0 - 4.0)		3			sample time: 11:20
					7.3	4		**TOTAL DEPTH = 4.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

frm: CTO 077 LOG Time: 5:06:06 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A08SB03

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 08	Alameda	NA	12-7-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Hand Auger	N 2,113,857.6 E 6,042,780.4	Matthew Waterman	NA	12-7-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
3.25 / 1.375	11.48	Matthew Waterman	4.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					10.5	0		**Sandy silt (ML)**: dark brown [10YR 3/3], 40% sand, 60% silt.	
				C077S115 (1.0 - 1.5)		1		**Poorly graded sand (SP)**: yellowish brown [10YR 5/6], moist, 100% sand.	sample time: 10:55
						2			
				C077S116 (3.0 - 3.5)		3			sample time: 11:00
					7.5	4		**TOTAL DEPTH = 4.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION	HOLE NO.
	AOC 08 Alameda	A08SB03

Report form: CTO 077 LOG Time: 5:06:11 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A08SB04

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 08	Alameda	NA	12-7-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Hand Auger	N 2,113,838.7 E 6,042,785.5	Matthew Waterman	NA	12-7-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
3.25 / 1.375	11.55	Matthew Waterman	4.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					11.2			**Silty sand (SM)**: dark brown [10YR 3/3], Topsoil with mulch., 75% sand, 25% silt.	
				C077S117 (1.0 - 1.5)	10.6	1		**Well-graded gravel with silt and sand(GW-GM)**: dark olive brown [2.5Y 3/3], angular, moist, 50% gravel, 40% sand, 10% silt.	sample time: 10:20
						2		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/4], Occasional silt lenses., 100% sand.	
				C077S118 (3.0 - 3.5)		3			sample time: 10:25
					7.6	4		**TOTAL DEPTH = 4.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7036
11/07
STATE OF CALIFORNIA

Form: CTO 077 LOG Time: 5:06:16 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A08SB05

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 08	Alameda	NA	12-7-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Hand Auger	N 2,113,795.5 E 6,042,763.5	Matthew Waterman	NA	12-7-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
3.25 / 1.375	11.77	Matthew Waterman	4.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					11.4			**Silty sand (SM)**: dark brown [10YR 3/3], Topsoil with mulch., 75% sand, 25% silt.	
				C077S119 (1.0 - 1.5)	10.8	1		**Well-graded gravel with silt and sand (GW-GM)**: dark olive brown [2.5Y 3/3], angular, 50% gravel, 40% sand, 10% silt.	sample time: 10:05
						2		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/4], moist, 100% sand.	
				C077S120 (3.0 - 3.5)		3			sample time: 10:10
					7.8	4		**TOTAL DEPTH = 4.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION: AOC 08 Alameda

HOLE NO.: A08SB05

Report form: CTO 077 LOG Time: 5:06:21 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A09SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 09	Alameda	NA	12-16-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,541.0 E 6,041,354.2	Jennifer Dean	NA	12-16-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.85	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
								Concrete 100% other.	
	68	3.3	2.25	C077S131 (1.5 - 2.0)	9.2	1		**Poorly graded sand (SP)**: brown [10YR 4/3], poorly-graded, moist, [FILL], 95% sand, 5% silt.	sample time: 09:55
						2			
						3			
				C077S132 (3.5 - 4.0)		4			sample time: 10:00
	58	4.0	2.33			5			sample time: 08:10 in breathing zone: FID=0.94,O2=20.9,LEL=0, in borehole : FID=0.96,O2=20.9,LEL=0
					3.9 ▽	6		**Poorly graded sand (SP)**: dark gray [5Y 4/1], poorly-graded, wet, [BAY SEDIMENTS], 95% sand, 5% silt.	
				C077S133 (7.5 - 8.0)		7			sample time: 10:05
					1.9	8		**TOTAL DEPTH = 8.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
STATE OF CALIFORNIA

Form: CTO 077 LOG Time: 5:06:27 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A09SB02

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 09	Alameda	NA	12-16-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,564.4 E 6,041,415.7	Jennifer Dean	NA	12-16-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.86	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	64	3.5	2.3	C077S134 (1.5 - 2.0)	9.4	1		**Asphalt** 100% other.	rig down at 10:22, brought over second rig to finish hole. Restarted drilling at 10:35.
					8.4			**Silty sand with gravel (SM)**: very dark grayish brown [10YR 3/2], poorly-graded, moist, greenish tinge in places; [BASE FILL], 15% gravel, 40% sand, 45% silt.	sample time: 10:30
					7.7	2		**Silty sand (SM)**: yellowish brown [10YR 5/4], poorly-graded, moist, [FILL], 5% gravel, 55% sand, 40% silt.	
				C077S135 (3.5 - 4.0)		3		**Poorly graded sand with silt (SP-SM)**: brown [10YR 5/3], poorly-graded, moist, [FILL], 90% sand, 10% silt.	sample time: 10:35
	83	4.0	3.3			4			sample time: 09:00 in breathing zone: FID=1.57,O2=20.9,LEL=0 in borehole: FID=88.65,O2=20.9,LEL=0
						5			
						6			
						7			
				C077S136 (7.0 - 8.0)	2.4				sample time: 10:45
					1.9	8		**Poorly graded sand (SP)**: dark gray [5Y 4/1], poorly-graded, wet, [BAY SEDIMENTS], 95% sand, 5% silt.	

TOTAL DEPTH = 8.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 09 Alameda	A09SB02

Report form: CTO 077 LOG Time: 5:06:34 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A09SB03

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 09	Alameda	NA	12-16-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,612.8 E 6,041,395.0	Jennifer Dean	NA	12-16-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.51	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	63	4.0	2.5		9.8			**Silt with sand (ML)**: dark brown [10YR 3/3], dry, low plasticity, low dry strength, [TOPSOIL], 25% clay, 25% sand, 50% silt.	
				C077S137 (1.5 - 2.0)		1		**Poorly graded sand (SP)**: brown [10YR 5/3], poorly-graded, wet, [FILL], 100% sand.	sample time: 09:00
						2			
				C077S138 (3.5 - 4.0)		3			sample time: 09:05
	81	4.0	3.3			4			sample time: 08:30 in breathing zone: FID=1.23,O2=20.9,LEL=0 in borehole: FID=0.77,O2=20.9,LEL=0
						5			
						6			
						7			
				C077S139 (7.5 - 8.0)	2.5	8			sample time: 09:10
								TOTAL DEPTH = 8.0 FEET	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 09 Alameda	A09SB03

frm: CTO 077 LOG Time: 5:06:40 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A09SB04

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 09	Alameda	NA	12-16-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,646.1 E 6,041,366.3	Jennifer Dean	NA	12-16-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.11	Matthew Waterman	12.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	50	4.0	2					**Lean clay with sand (CL)**: dark brown [10YR 3/3], moist, low plasticity, low dry strength, containing wood chips near surface; [TOPSOIL], 25% clay, 25% sand, 50% silt.	
				C077S140 (1.5 - 2.0)	9.6	1		**Poorly graded sand (SP)**: brown [10YR 5/3], poorly-graded, moist, [FILL], 100% sand.	sample time: 08:20
				C077S141 (3.5 - 4.0)		2			sample time: 08:25
	63	4.0	2.5			3			sample time: 08:00 in breathing zone: FID=1.18,O2=20.9,LEL=0 in borehole: FID=1.17,O2=20.9,LEL=0
						4			
						5			
						6			
					4.1	7		**Poorly graded sand (SP)**: dark gray [5Y 4/1], poorly-graded, wet, [BAY SEDIMENTS], 100% sand.	
				C077S142 (7.5 - 8.0)		8			Water Sample ID: C077G041 taken at 10:30 from 7 to 12 feet bgs.
	81	4.0	3.3			9			sample time: 08:30
						10			
					0.1	11		**Lean clay (CL)**: dark gray [5Y 4/1], very soft, wet, medium plasticity, [BAY SEDIMENT], 80% clay, 20% silt.	
					-0.9	12			

TOTAL DEPTH = 12.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION	HOLE NO.
	AOC 09 Alameda	A09SB04

Report form: CTO 077 LOG Time: 5:08:46 PM

BORECHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A10SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 10	Alameda	NA	12-15-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,506.5 E 6,042,193.4	Maaike Petrie	NA	12-15-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.55	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	59	3.7	2.17		11.2 11.0			**Asphalt** 100% other. **Silt with sand (ML)**: dark olive brown [2.5Y 3/3], poorly-graded, soft, moist, low plasticity, rapid dilatancy, low toughness, low dry strength, odor - no, 20% sand, 80% silt, HCl reaction - not tested.	
				C077S151 (1.5 - 2.0)		1 2			sample time: 15:50
						3		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, moist, Wet around 4.8' bgs. Gets grayer colored with depth., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	
				C077S152 (3.5 - 4.0)		4			sample time: 15:55
	71	4.0	2.83			5			sample time: 15:40 in breathing zone: FID=0.54,O2=20.9,LEL=0 in borehole: FID=0.54,O2=20.9,LEL=0
						6 7			
				C077S153 (7.5 - 8.0)	3.6	8		**TOTAL DEPTH = 8.0 FEET**	sample time: 16:00 sample time: 15:45 in breathing zone: FID=1.50,O2=20.9,LEL=0 in borehole: FID=1.50,O2=20.9,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
STATE OF CALIFORNIA

Form: CTO 077 LOG Time: 5:06:53 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A10SB02

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 10	Alameda	NA	12-15-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,491.9 E 6,042,208.8	Maaike Petrie	NA	12-15-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.97	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					11.6			**Asphalt** 100% other.	
	73	3.5	2.5	C077S154 (1.0 - 1.5)		1		**Silty sand with gravel (SM)**: dark grayish brown [2.5Y 4/2], subangular, poorly-graded, moist, odor - no, 20% gravel, 55% sand, 25% silt, HCl reaction - not tested.	sample time: 15:30
				C077S155 (2.5 - 3.0)	9.2	2			sample time: 15:35
	79	4.0	3.2			3		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, moist, Some gravel around 6' bgs. Wet around 5' bgs., odor - no, 5% gravel, 95% sand, HCl reaction - not tested.	sample time: 15:10 in breathing zone: FID=1.50,O2=20.9,LEL=0 in borehole: FID=0.56,O2=20.9,LEL=0
						4			
						5			
				C077S156 (5.5 - 6.0)		6			sample time: 15:40
						7			
					4.0	8		**TOTAL DEPTH = 8.0 FEET**	sample time: 15:20 in borehole: FID=2.32,O2=20.9,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
1/07
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION	HOLE NO.
	AOC 10 Alameda	A10SB02

Report form: CTO 077 LOG Time: 5:06:59 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A10SB03

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 10	Alameda	NA	12-15-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,469.6 E 6,042,263.4	Maaike Petrie	NA	12-15-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	12.27	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	56	4.0	2.3	C077S157 (1.5 - 2.0)	12.1	1		**Asphalt** 100% other. **Poorly graded sand with silt and gravel (SP-SM)**: olive brown [2.5Y 4/4], subangular, poorly-graded, dry, Gravel gets smaller grained with depth., odor - no, 20% gravel, 70% sand, 10% silt, HCl reaction - not tested.	sample time: 12:30
					10.1	2		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, moist, Wet at about 5.5' bgs., odor - no, 100% sand, HCl reaction - not tested.	
				C077S158 (3.0 - 4.0)		3			sample time: 12:40
	63	4.0	2.5			4			sample time: 12:30 in breathing zone: FID=1.5,O2=20.9,LEL=0 in borehole: FID=1.6,O2=20.9,LEL=0
						5			
						6			
						7			
				C077S159 (7.5 - 8.0)	4.3	8			sample time: 12:50
								TOTAL DEPTH = 8.0 FEET	sample time: 12:33 in breathing zone: FID=0.9,O2=20.9,LEL=0 in borehole: FID=0.9,O2=20.9,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 10 Alameda	A10SB03

frm: CTO 077 LOG Time: 5:07:05 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A10SB04

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 10	Alameda	NA	12-16-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,448.0 E 6,042,311.6	Maaike Petrie	NA	12-16-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.79	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	73	3.8	2.8	C077S160 (0.5 - 2.0)	11.6	0		**Asphalt** 100% other.	
						1		**Silty sand with gravel (SM)**: dark grayish brown [2.5Y 4/2], subangular, poorly-graded, wet, Wet from 0.17' to moist at around 2' bgs., odor - no, 20% gravel, 55% sand, 25% silt, HCl reaction - not tested.	sample time: 09:10
						2			
					9.3	3		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, moist, Wet at 4.7' bgs. Some coarse sand to fine gravel at 6.5-7' bgs., odor - no, 5% gravel, 90% sand, 5% silt, HCl reaction - not tested.	
				C077S161 (3.5 - 4.0)		4			sample time: 09:10
	79	4.0	3.2			5			sample time: 09:05 in breathing zone: FID=1.98,O2=20.9,LEL=0 in borehole: FID=2.11,O2=20.9,LEL=0
						6			
				C077S162 (7.0 - 7.5)		7			sample time: 09:10
					3.8	8		**TOTAL DEPTH = 8.0 FEET**	sample time: 09:10 in borehole: FID=2.06,O2=20.9,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A10SB05

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 10	Alameda	NA	12-15-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,489.5 E 6,042,237.2	Maaike Petrie	NA	12-15-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.91	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	67	3.6	2.42	C077S163 (1.0 - 1.5)	11.5	1		**Concrete** 100% other. **Poorly graded sand with gravel (SP)**: olive [5Y 4/3], subangular, poorly-graded, moist, odor - no, 20% gravel, 75% sand, 5% silt, HCl reaction - not tested.	sample time: 13:30
				C077S164 (2.5 - 3.0)	9.1	3		**Silt with gravel (ML)**: dark yellowish brown [10YR 4/4], poorly-graded, medium stiff, moist, low plasticity, rapid dilatancy, low toughness, low dry strength, odor - no, 10% gravel, 5% sand, 85% silt, HCl reaction - not tested.	sample time: 13:40
	60	4.0	2.42	C077S165 (4.5 - 5.0)	8.6	4		**Poorly graded sand (SP)**: light yellowish brown [2.5Y 6/4], subrounded, poorly-graded, moist, Wet around 4.5' bgs., odor - no, 100% sand, HCl reaction - not tested.	sample time: 13:09 in breathing zone: FID=2.69,O2=20.9,LEL=0 in borehole: FID=2.97,O2=20.9,LEL=0
					5.9	6		**Poorly graded sand (SP)**: dark grayish brown [2.5Y 4/2], subrounded, poorly-graded, wet, odor - no, 100% sand, HCl reaction - not tested.	sample time: 13:50
					3.9	8		**TOTAL DEPTH = 8.0 FEET**	sample time: 13:20 in breathing zone: FID=1.79,O2=20.9,LEL=0 in borehole: FID=3.20,O2=20.9,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 10 Alameda	A10SB05

frm: CTO 077 LOG Time: 5:07:19 PM

BORECHEM BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A11SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 11	Alameda	NA	12-13-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,505.2 E 6,041,433.8	Maaike Petrie	NA	12-13-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.20	Matthew Waterman	12.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	56	4.0	2.3	C077S171 (0.8 - 1.8)	10.0	0		**Organic soil (OL/OH)**: dark brown [7.5YR 3/2], poorly-graded, dry, Grass, roots, and soil., odor - no, 100% other, HCl reaction - not tested.	sample time: 15:20
				C077S172 (2.5 - 4.0)		1 2 3		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, moist, Shell fragments around 1' bgs. Color change around 9' bgs to dark greenish gray. Wet around 3.5' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 15:25
	44	4.0	1.8			4 5 6			sample time: 14:55 in breathing zone: FID=0.10,O2=20.9,LEL=0 in borehole: FID=0.59,O2=20.9,LEL=0
				C077S173 (7.0 - 8.0)		7			sample time: 15:30 Water Sample ID: C077G051 & C077G052 taken at 08:00 on 12/14/2005 from 7 to 12 feet bgs.
	31	4.0	1.3			8 9 10 11			sample time: 14:58 in borehole: FID=0.5,O2=20.9,LEL=0
					-1.8	12		**TOTAL DEPTH = 12.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/09
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION	HOLE NO.
	AOC 11 Alameda	A11SB01

Report form: CTO 077 LOG Time: 5:07:26 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A11SB02

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 11	Alameda	NA	12-13-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
GeoProbe 6600	N 2,113,420.0 E 6,041,615.1	Maaike Petrie	NA	12-13-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.28	Matthew Waterman	10.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					10.8			**Concrete** 100% other.	
	69	3.5	2.4	C077S174 (1.0 - 2.0)	9.7	1		**Sandy silt with gravel (ML)**: strong brown [7.5YR 4/6], poorly-graded, soft, moist, nonplastic, rapid dilatancy, medium toughness, low dry strength, Interlayered., odor - no, 15% gravel, 25% sand, 60% silt, HCl reaction - not tested.	sample time: 14:30
				C077S175 (3.0 - 4.0)		2		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, moist, Increasing silt % around 7' bgs, color change to dark greenish gray, sand finer grained. Wet around 4' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 14:35
	77	4.0	3.1			3			in breathing zone: FID=0.0,O2=20.9,LEL=0 in borehole: FID=0.0,O2=20.9,LEL=0 sample time: 14:40 Water Sample ID: C077G053 & C077G054 taken at 14:30 from 5 to 10 feet bgs.
				C077S176 (4.5 - 6.0)		4			
						5			
						6			
						7			
					3.7	8		**Lean clay (CL)**: greenish black [5BG 2.5/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	
	92	2.0	1.8			9			in borehole: FID=0.0,O2=20.9,LEL=0
					1.3	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

form: CTO 077 LOG Time: 5:07:33 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A11SB03

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 11	Alameda	NA	12-13-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,297.8 E 6,041,453.7	Maaike Petrie	NA	12-13-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.38	Matthew Waterman	12.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					10.9			**Concrete** 100% other.	
	71	3.5	2.5	C077S177 (1.0 - 2.0)	10.2	1		**Poorly graded sand with silt and gravel (SP-SM)**: dark yellowish brown [10YR 4/4], subangular, poorly-graded, moist, Base rock., odor - no, 20% gravel, 70% sand, 10% silt, HCl reaction - not tested.	sample time: 13:00
				C077S178 (2.5 - 4.0)		2		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, moist, Gets grayer and finer grained near the clay. Shell fragments around 4' bgs. Wet around 4' bgs., odor - no, 90% sand, 10% silt, HCl reaction - not tested.	sample time: 13:05
	69	4.0	2.75			3			sample time: 13:05 in breathing zone: FID=0.15,O2=20.9,LEL=0 in borehole: FID=0.58,O2=20.9,LEL=0
						4			
						5			
						6			
				C077S179 (6.5 - 8.0)		7			sample time: 13:10
						8			sample time: 13:10 in borehole: FID=1.70,O2=20.9,LEL=0
						9			
						10			
						11			
					0.0				
					-0.6	12		**Lean clay (CL)**: dark greenish gray [5GY 4/1], poorly-graded, very soft, wet, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	

TOTAL DEPTH = 12.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

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SITE and LOCATION	HOLE NO.
AOC 11 Alameda	A11SB03

Report form: CTO 077 LOG Time: 5:07:38 PM

BORELOG

PROJECT and JOB NUMBER: Navy CLEAN 3 CTO-077			SHEET NO.: 1 of 1	HOLE NO.: A11SB04
DRILLER: Resonant Sonic	SITE and LOCATION: AOC 11 Alameda		OVERBURDEN: NA	BEGUN: 12-13-05
DRILL MAKE AND MODEL: Geoprobe Direct Push Rig	COORDINATES (NORTHING, EASTING): N 2,113,227.8 E 6,041,596.7	LOGGED BY: Maaike Petrie	ROCK (FT): NA	COMPLETED: 12-13-05
HOLE SIZE DIAMETER (IN): 2 CORE SIZE DIAMETER (IN): 1.375	GROUND ELEVATION (FT MLLW): 11.00	CHECKED BY: Matthew Waterman	TOTAL DEPTH (FT BGS): 8.0	UPDATE: 5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	75	3.9	2.917	C077S180 (0.1 - 1.1)	10.9	0		**Asphalt** 100% other.	sample time: 14:00
						1		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, moist, Wet around 4.7' bgs. All sand., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	
						2			
				C077S181 (3.0 - 4.0)		3			sample time: 14:05
	81	4.0	3.25			4			sample time: 13:40 in borehole: FID=0.75,O2=20.9,LEL=0
						5			
				C077S182 (6.0 - 7.0)		6			sample time: 14:10
						7			
					3.0	8		**TOTAL DEPTH = 8.0 FEET**	sample time: 13:45 in borehole: FID=0.25,O2=20.9,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

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SITE and LOCATION: AOC 11 Alameda

HOLE NO.: A11SB04

frm: CTO 077 LOG Time: 5:07:44 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A12SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 12	Alameda	NA	12-12-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,975.1 E 6,042,066.4	Matthew Waterman	NA	12-12-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.96	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					10.6	0		**Asphalt** 100% other.	
						1		**Clayey sand with gravel (SC)**: strong brown [7.5YR 5/6], Road base., 25% clay, 20% gravel, 55% sand.	
				C077S191 (1.5 - 2.0)	9.2	2		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/4], poorly-graded, Shell fragments at 5' bgs. Color change @ 4' to 2.5 Y 4/3. Color change @ 6.5' to 10 GY 4/1., 100% sand, HCl reaction - not tested.	sample time: 09:30
				C077S192 (3.5 - 4.0)		3			sample time: 09:35
						4			sample time: 09:30 FID=0.31
						5			
						6			
						7			
				C077S219 (7.5 - 8.0)	3.0	8			sample time: 09:40
								TOTAL DEPTH = 8.0 FEET	sample time: 09:40 FID=0.22

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION: AOC 12 Alameda

HOLE NO.: A12SB01

Report form: CTO 077 LOG Time: 5:07:50 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A12SB02

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 12	Alameda	NA	12-9-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,030.9 E 6,042,113.2	Maaike Petrie	NA	12-9-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.96	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	80	3.8	3.08	C077S193 (1.0 - 1.5)	11.8	0		**Asphalt** 100% other.	
						1		**Poorly graded gravel with silt and sand(GP-GM)**: light olive brown [2.5Y 5/3], subangular, poorly-graded, wet, Base rock., odor - no, 60% gravel, 30% sand, 10% silt, HCl reaction - not tested.	sample time: 11:40
				C077S194 (2.0 - 2.5)	10.0	2		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, moist, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 11:40
						3			
						4			in breathing zone: FID=0.5,O2=20.9,LEL=0 in borehole: FID=9.0,O2=20.9,LEL=0
					7.0	5		**Silty sand with gravel(SM)**: olive brown [2.5Y 4/4], wet, [FILL], 15% gravel, 50% sand, 35% silt.	
					6.0	6		**Poorly graded sand with silt(SP-SM)**: dark gray [5Y 4/1], wet, [BAY SEDIMENTS], 90% sand, 10% silt.	
				C077S220 (7.0 - 8.0)		7			sample time: 14:15
					4.0	8		**TOTAL DEPTH = 8.0 FEET**	in borehole: FID=0.61,O2=20.9,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 12 Alameda	A12SB02

form: CTO 077 LOG Time: 5:07:57 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A12SB03

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 12	Alameda	NA	12-9-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,027.1 E 6,042,151.2	Maaike Petrie / Jennifer Dean	NA	12-9-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	12.16	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	91	3.8	3.5		12.0			**Asphalt** 100% other.	
					10.8	1		**Poorly graded gravel with silt and sand (GP-GM)**: light olive brown [2.5Y 5/3], subangular, poorly-graded, moist, odor - no, 60% gravel, 30% sand, 10% silt, HCl reaction - not tested.	
				C077S195 (1.5 - 2.0)		2			sample time: 11:50
				C077S196 (2.5 - 3.0)		3		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, moist, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 11:50
	90	4.0	3.58			4			in breathing zone: FID=1.2,O2=20.9,LEL=0 in borehole: FID=17.0,O2=20.9,LEL=0
						5			
					6.0	6		**Poorly graded sand with silt (SP-SM)**: dark gray [5Y 4/1], poorly-graded, wet, [BAY SEDIMENTS], 90% sand, 10% silt.	
				C077S221 (7.0 - 8.0)		7			sample time: 14:30
					4.2	8		**TOTAL DEPTH = 8.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 12 Alameda	A12SB03

Report form: CTO 077 LOG Time: 5:06:03 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A12SB04

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 12	Alameda	NA	12-9-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,028.0 E 6,042,164.4	Jennifer Dean	NA	12-9-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	12.31	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	86	3.8	3.29	C077S197 (1.0 - 1.5)	12.1	0		**Asphalt** 100% other.	
						1		**Well-graded gravel with silt and sand(GW-GM)**: light olive brown [2.5Y 5/3], [BASE ROCK], 60% gravel, 30% sand, 10% silt.	sample time: 14:00
					10.8	2		**Poorly graded sand with silt(SP-SM)**: [FILL], 90% sand, 10% silt.	
				C077S198 (3.0 - 3.5)		3			sample time: 14:00
	75	4.0	3			4			sample time: 13:50 in breathing zone: FID=0.0,O2=20.9,LEL=0 in borehole: FID=1.0,O2=20.9,LEL=0
						5			
						6			
				C077S222 (7.0 - 8.0)	5.3	7		**Poorly graded sand with silt(SP-SM)**: dark gray [5Y 4/1], poorly-graded, wet, [BAY SEDIMENTS], 90% sand, 10% silt.	sample time: 14:00
					4.3	8		**TOTAL DEPTH = 8.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/09
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 12 Alameda	A12SB04

Jm: CTO 077 LOG Time: 5:08:10 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A12SB05

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 12	Alameda	NA	12-9-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,013.1 E 6,042,179.0	Jennifer Dean	NA	12-9-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.95	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					11.3			**Concrete** 100% other.	
				C077S199 (1.5 - 2.0)	10.5	1		**Poorly graded gravel with silt and sand(GP-GM)**: light olive brown [2.5Y 5/3], dry, [BASE ROCK], 60% gravel, 30% sand, 10% silt.	sample time: 14:05
						2		**Poorly graded sand with silt(SP-SM)**: olive brown [2.5Y 4/3], wet, 90% sand, 10% silt.	
				C077S200 (3.5 - 4.0)		3			sample time: 14:45 in borehole: FID=0.63,O2=20.9,LEL=0
						4			
						5			
						6			
						7			
				C077S223 (7.5 - 8.0)	4.0	8			sample time: 14:45 in borehole: FID=0.68,O2=20.9,LEL=0
								TOTAL DEPTH = 8.0 FEET	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

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SITE and LOCATION: AOC 12 Alameda

HOLE NO.: A12SB05

Report form: CTO 077 LOG Time: 5:08:16 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A12SB06

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 12	Alameda	NA	12-9-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,070.0 E 6,042,190.1	Jennifer Dean	NA	12-9-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	12.62	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	67	3.8	2.58	C077S201 (1.0 - 1.5)	12.5 11.6	0 1		**Asphalt** 100% other. **Well-graded gravel with silt and sand(GW-GM)**: olive gray [5Y 4/2], dry, [BASE ROCK], 60% gravel, 30% sand, 10% silt.	sample time: 15:25
	71	4.0	2.83	C077S202 (3.5 - 4.0)		2 3 4 5 6 7		**Poorly graded sand (SP)**: grayish brown [2.5Y 5/2], poorly-graded, wet, 95% sand, 5% silt.	sample time: 15:25 in borehole: FID=1.02,O2=20.9,LEL=0
				C077S224 (7.5 - 8.0)	4.6	8		**TOTAL DEPTH = 8.0 FEET**	sample time: 15:25 in borehole: FID=0.59,O2=20.9,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 12 Alameda	A12SB06

Form: CTO 077 LOG Time: 5:08:22 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A12SB07

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 12	Alameda	NA	12-12-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,044.9 E 6,042,185.0	Maaike Petrie	NA	12-12-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	12.13	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
								Asphalt 100% other.	
	62	3.3	2	C077S203 (1.0 - 1.5)	11.4 10.9	1		**Silty sand with gravel(SM)**: olive brown [2.5Y 4/3], subangular, poorly-graded, moist, Base rock., odor - no, 15% gravel, 60% sand, 25% silt, HCl reaction - not tested.	sample time: 10:00
						2		**Poorly graded sand with silt(SP-SM)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, moist, Shell fragments around 4-4.5' bgs. Wet around 4.5' bgs. Trace gravel., odor - no, 90% sand, 10% silt, HCl reaction - not tested.	
				C077S204 (3.5 - 4.0)		3			
	81	4.0	3.25	C077S225 (4.0 - 4.5)		4			sample time: 10:05 sample time: 10:10 sample time: 10:20 in breathing zone: FID=0.0,O2=20.9,LEL=0 in borehole: FID=0.0,O2=20.9,LEL=0
						5			
						6			
						7			
					4.1	8		**TOTAL DEPTH = 8.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 12 Alameda	A12SB07

Report form: CTO 077 LOG Time: 5:08:28 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A12SB08

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 12	Alameda	NA	12-12-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,043.6 E 6,042,219.5	Maaike Petrie	NA	12-12-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.94	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	73	3.7	2.67	C077S205 (0.5 - 1.0)	11.6	0		**Asphalt** 100% other.	
					11.3	1		**Silty gravel (GM)**: gray [2.5Y 5/1], subangular, poorly-graded, dry, Base rock., odor - no, 10% clay, 80% gravel, 10% sand, HCl reaction - not tested.	sample time: 09:20
				C077S206 (2.5 - 3.0)		2		**Poorly graded sand with silt(SP-SM)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, dry, Trace gravel near top. Wet around 4.5' bgs., odor - no, 5% gravel, 85% sand, 10% silt, HCl reaction - not tested.	sample time: 09:25
						3			
	85	4.0	3.42			4			sample time: 09:25 in breathing zone: FID=0.0,O2=20.9,LEL=0
				C077S226 (4.5 - 5.0)	6.9	5		**Silt (ML)**: light olive brown [2.5Y 5/4], poorly-graded, soft, wet, low plasticity, rapid dilatancy, low toughness, low dry strength, Layer of silt., odor - no, 10% sand, 90% silt, HCl reaction - not tested.	in borehole: FID=2.35,O2=20.9,LEL=0 sample time: 09:30
					5.9	6			
						7		**Poorly graded sand with silt(SP-SM)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, wet, Gets grayer near 8' bgs., odor - no, 90% sand, 10% silt, HCl reaction - not tested.	
					4.0	8			
					3.9			**Lean clay (CL)**: dark greenish gray [5GY 4/1], poorly-graded, very soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, Some clay at very bottom of sample., odor - no, 100% clay, HCl reaction - not tested.	

TOTAL DEPTH = 8.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 12 Alameda	A12SB08

frm: CTO 077 LOG Time: 5:08:35 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A12SB09

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 12	Alameda	NA	12-12-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,029.6 E 6,042,253.5	Matthew Waterman	NA	12-12-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.19	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	65	3.8	2.5	C077S207 (1.5 - 2.0)	11.0	1		**Asphalt** 100% other. **Well-graded gravel with sand (GW)**: very dark grayish brown [2.5Y 3/2], well-graded, Compacted road base., 70% gravel, 30% sand, HCl reaction - not tested.	sample time: 08:30
					8.7	2			
				C077S208 (3.0 - 4.0)		3		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], poorly-graded, 100% sand, HCl reaction - not tested.	sample time: 08:35
	67	4.0	2.67			4			FID=2.11
						5			
					5.7	6		**Lean clay (CL)**: very dark greenish gray [10GY 3/1], saturated, 100% clay, HCl reaction - not tested.	
						7			
				C077S227 (7.5 - 8.0)	3.2	8			sample time: 08:40 FID=4.5

TOTAL DEPTH = 8.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7036
STATE OF CALIFORNIA
6/07

DRAFT	SITE and LOCATION	HOLE NO.
	AOC 12 Alameda	A12SB09

Report form: CTO 077 LOG Time: 5:06:41 PM

BECHTEL BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A12SB10

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 12	Alameda	NA	12-12-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,037.1 E 6,042,301.2	Maaike Petrie	NA	12-12-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.00	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	48	3.8	1.83	C077S209 (1.0 - 1.5)	10.8	0		**Asphalt** 100% other.	
					9.7	1		**Silty sand with gravel (SM)**: light olive brown [2.5Y 5/3], subangular, poorly-graded, dry, Base rock., odor - no, 20% gravel, 60% sand, 20% silt, HCl reaction - not tested.	sample time: 14:00
				C077S210 (2.5 - 3.0)		2		**Poorly graded sand with silt (SP-SM)**: light olive brown [2.5Y 5/3], subrounded, poorly-graded, moist, Wet around 4' bgs, silt/clay lenses from about 1.5-2 feet bgs., odor - no, 90% sand, 10% silt, HCl reaction - not tested.	sample time: 14:05
	42	4.0	1.67	C077S228 (4.5 - 5.0)		3			
						4			sample time: 14:10 in breathing zone: FID=1.75,O2=20.9,LEL=0 in borehole: FID=3.01,O2=20.9,LEL=0 sample time: 14:10
						5			
						6			
						7			
					3.0	8		**TOTAL DEPTH = 8.0 FEET**	sample time: 14:20 in breathing zone: FID=0.0,O2=20.9,LEL=0 in borehole: FID=2.54,O2=20.9,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

Form: CTO 077 LOG Time: 5:08:49 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A12SB11

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 12	Alameda	NA	12-12-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,121.2 E 6,042,206.2	Maaike Petrie	NA	12-12-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	12.70	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	68	3.7	2.5	C077S211 (1.0 - 1.5)	12.4	0		**Asphalt** 100% other.	
					11.2	1		**Silty sand with gravel (SM)**: olive gray [5Y 4/2], subangular, poorly-graded, moist, Base rock to approximately, odor - no, 25% gravel, 60% sand, 15% silt, HCl reaction - not tested.	sample time: 08:35
					9.9	2		**Silty sand (SM)**: olive brown [2.5Y 4/3], subangular, poorly-graded, moist, odor - no, 10% gravel, 75% sand, 15% silt, HCl reaction - not tested.	
				C077S212 (3.5 - 4.0)		3		**Poorly graded sand with silt (SP-SM)**: light olive brown [2.5Y 5/3], subrounded, poorly-graded, moist, Trace gravel., odor - no, 5% gravel, 85% sand, 10% silt, HCl reaction - not tested.	sample time: 08:40
	73	4.0	2.92			4			sample time: 08:33 in breathing zone: FID=0.0,O2=20.9,LEL=0 in borehole: FID=1.03,O2=20.9,LEL=0
				C077S229 (5.0 - 5.5)		5			sample time: 08:45
						6			
						7			
					5.0	8		**Lean clay (CL)**: dark greenish gray [10GY 4/1], poorly-graded, medium stiff, moist, low plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	sample time: 08:37 in breathing zone: FID=0.0,O2=20.9,LEL=0 in borehole: FID=1.3,O2=20.9,LEL=0
					4.7			**TOTAL DEPTH = 8.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 12 Alameda	A12SB11

Report form: CTO 077 LOG Time: 5:08:56 PM

BORECHTEL BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A12SB12

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 12	Alameda	NA	12-12-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,106.0 E 6,042,339.4	Maaike Petrie	NA	12-12-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.59	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	76	3.8	2.92		11.4			**Asphalt** 100% other.	
					10.4	1		**Silty sand with gravel (SM)**: dark grayish brown [2.5Y 4/2], subangular, poorly-graded, dry, Base rock., odor - no, 20% gravel, 60% sand, 20% silt, HCl reaction - not tested.	
				C077S213 (1.5 - 2.0)	10.0	2		**Lean clay (CL)**: dark greenish gray [10Y 4/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, Small clay layer., odor - no, 90% clay, 10% sand, HCl reaction - not tested.	sample time: 10:30
				C077S214 (3.5 - 4.0)		3			sample time: 10:35
	56	4.0	2.25			4		**Poorly graded sand with silt (SP-SM)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, moist, Wet around 4.5' bgs., odor - no, 5% gravel, 85% sand, 10% silt, HCl reaction - not tested.	sample time: 10:40 in breathing zone: FID=1.5,O2=20.9,LEL=0 in borehole: FID=1.5,O2=20.9,LEL=0
						5			
					6.1	6		**Poorly graded sand with silt (SP-SM)**: olive brown [2.5Y 4/3], subangular, poorly-graded, wet, Gets grayer near the bottom. Interlayered gravels., odor - no, 10% gravel, 80% sand, 10% silt, HCl reaction - not tested.	
				C077S230 (6.5 - 7.0)		7			sample time: 10:40
					3.6	8		**TOTAL DEPTH = 8.0 FEET**	sample time: 10:55 in breathing zone: FID=0.0,O2=20.9,LEL=0 in borehole: FID=0.0,O2=20.9,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

frm: CTO 077 LOG Time: 5:09:02 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A12SB13

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 12	Alameda	NA	12-12-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,067.7 E 6,042,336.3	Maaike Petrie	NA	12-12-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.40	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	73	3.8	2.75		11.2			**Asphalt** 100% other.	
					10.1	1		**Silty sand with gravel (SM)**: olive brown [2.5Y 4/3], subangular, poorly-graded, dry, Base rock., odor - no, 20% gravel, 60% sand, 20% silt, HCl reaction - not tested.	
				C077S215 (1.5 - 2.0)		2			sample time: 13:30
				C077S216 (3.0 - 3.5)		3		**Poorly graded sand with silt (SP-SM)**: light olive brown [2.5Y 5/4], subrounded, Some organics, shell fragments around 2.5. Wet around 4.5' bgs., 90% sand, 10% silt.	sample time: 13:35
	75	4.0	3			4			sample time: 13:25 in breathing zone: FID=1.0,O2=20.9,LEL=0 in borehole: FID=1.03,O2=20.9,LEL=0
					6.8	5		**Lean clay (CL)**: very dark greenish gray [5GY 3/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	
				C077S231 (5.5 - 6.0)		6			sample time: 13:40
					4.2	7		**Poorly graded sand (SP)**: very dark greenish gray [5GY 3/1], subrounded, poorly-graded, wet, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	
					3.4	8			sample time: 13:40 in breathing zone: FID=1.0,O2=20.9,LEL=0 in borehole: FID=1.5,O2=20.9,LEL=0
								TOTAL DEPTH = 8.0 FEET	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 12 Alameda	A12SB13

Report form: CTO 077 LOG Time: 5:09:10 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A12SB14

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 12	Alameda	NA	12-12-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,053.9 E 6,042,353.4	Maaike Petrie	NA	12-12-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.98	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	64	3.8	2.42		10.7			**Asphalt** 100% other.	
				C077S217 (1.5 - 2.0)	9.6	1		**Silty sand with gravel (SM)**: olive brown [2.5Y 4/3], subangular, poorly-graded, dry, Base rock., odor - no, 30% gravel, 50% sand, 20% silt, HCl reaction - not tested.	sample time: 09:50
						2		**Poorly graded sand with silt (SP-SM)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, moist, Wet around 4' bgs., odor - no, 90% sand, 10% silt, HCl reaction - not tested.	
				C077S218 (3.5 - 4.0)		3			sample time: 09:55
	85	4.0	3.42			4			sample time: 10:00 in breathing zone: FID=1.0,O2=20.9,LEL=0 in borehole: FID=1.7,O2=20.9,LEL=0
						5			
						6			
				C077S232 (7.0 - 8.0)	3.8	7		**Lean clay (CL)**: dark greenish gray [5GY 4/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	sample time: 10:00
					3.0	8		**TOTAL DEPTH = 8.0 FEET**	sample time: 10:05 in breathing zone: FID=0.0,O2=20.9,LEL=0 in borehole: FID=1.84,O2=20.9,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07

DRAFT

SITE and LOCATION	HOLE NO.
AOC 12 Alameda	A12SB14

frm: CTO 077 LOG Time: 5:09:16 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A13SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 13	Alameda	NA	12-14-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,876.6 E 6,042,723.9	Maaike Petrie	NA	12-14-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.79	Matthew Waterman	4.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	73	4.0	2.9	C077S241 (1.0 - 1.5)	9.6	1		**Silt with sand (ML)**: dark brown [10YR 3/3], poorly-graded, dry, Grass and roots in top 2"., odor - no, 10% gravel, 10% sand, 80% other, HCl reaction - not tested.	sample time: 09:55
				C077S242 (2.5 - 3.0)		2		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, moist, Some darker brown mottling throughout., odor - no, 100% sand, HCl reaction - not tested.	sample time: 09:55
					6.8	3			
						4		**TOTAL DEPTH = 4.0 FEET**	sample time: 09:50 in breathing zone: FID=0.51,O2=20.9,LEL=0 in borehole: FID=0.57,O2=20.9,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 13 Alameda	A13SB01

Report form: CTO 077 LOG Time: 5:09:23 PM

BORECHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A13SB02

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 13	Alameda	NA	12-14-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,825.6 E 6,042,746.2	Maaike Petrie	NA	12-14-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.79	Matthew Waterman	4.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	85	4.0	3.4					**Silt with sand (ML)**: very dark grayish brown [10YR 3/2], poorly-graded, medium stiff, dry, nonplastic, rapid dilatancy, low toughness, low dry strength, Grass in top 3"., odor - no, 5% gravel, 10% sand, 85% silt, HCl reaction - not tested.	
				C077S243 (1.5 - 2.0)	10.6 / 10.0	1 / 2		**Silty sand (SM)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, dry, odor - no, 85% sand, 15% silt, HCl reaction - not tested.	sample time: 10:15
				C077S244 (3.5 - 4.0)	7.8	3 / 4		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/3], subrounded, poorly-graded, dry, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 10:15 sample time: 10:10 in breathing zone: FID=0.31,O2=20.9,LEL=0 in borehole: FID=0.30,O2=20.9,LEL=0
								TOTAL DEPTH = 4.0 FEET	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 13 Alameda	A13SB02

frm: CTO 077 LOG Time: 5:09:28 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A13SB03

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 13	Alameda	NA	12-14-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,810.0 E 6,042,703.4	Maaike Petrie	NA	12-14-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	12.07	Matthew Waterman	4.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	79	4.0	3.2	C077S245 (0.5 - 1.0)				**Silt (ML)**: very dark grayish brown [10YR 3/2], poorly-graded, medium stiff, dry, low plasticity, rapid dilatancy, low toughness, low dry strength, odor - no, 5% gravel, 5% sand, 90% silt, HCl reaction - not tested.	sample time: 10:35
					10.8	1		**Silty sand (SM)**: dark grayish brown [10YR 4/2], subangular, poorly-graded, dry, odor - no, 10% gravel, 60% sand, 30% silt, HCl reaction - not tested.	
				C077S246 (2.0 - 2.5)	9.9	2		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/3], subrounded, poorly-graded, dry, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 10:35
					8.1	3			
						4		**TOTAL DEPTH = 4.0 FEET**	sample time: 10:35 in breathing zone: FID=0.34,O2=20.9,LEL=0 in borehole: FID=1.52,O2=20.9,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 13 Alameda	A13SB03

Report form: CTO 077 LOG Time: 5:09:33 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A13SB04

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 13	Alameda	NA	12-14-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,930.0 E 6,042,622.8	Maaike Petrie	NA	12-14-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	12.17	Matthew Waterman	4.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	91	4.0	3.6	C077S247 (1.5 - 2.0)	11.4	1		**Silt (ML)**: olive brown [2.5Y 4/4], poorly-graded, medium stiff, dry, low plasticity, rapid dilatancy, low toughness, no dry strength, Grass in top 2"., odor - no, 5% sand, 95% silt, HCl reaction - not tested.	
					10.2	2		**Poorly graded sand with silt(SP-SM)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, dry, odor - no, 90% sand, 10% silt, HCl reaction - not tested.	sample time: 13:45
				C077S248 (3.5 - 4.0)	8.2	3		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, dry, Some shell fragments., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 13:45
						4		**TOTAL DEPTH = 4.0 FEET**	sample time: 10:35 in breathing zone: FID=0.1,O2=21.1,LEL=0 in borehole: FID=0.1,O2=21.1,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

rm: CTO 077 LOG Time: 5:09:38 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A13SB05

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 13	Alameda	NA	12-14-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,000.1 E 6,042,617.0	Maaike Petrie	NA	12-14-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.51	Matthew Waterman	4.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	75	4.0	3	C077S249 (0.5 - 1.0)	10.7	1		**Silt (ML)**: very dark grayish brown [10YR 3/2], poorly-graded, medium stiff, dry, low plasticity, rapid dilatancy, low toughness, low dry strength, odor - no, 10% sand, 90% silt, HCl reaction - not tested.	sample time: 13:30
				C077S250 (2.0 - 2.5)		2		**Silty sand (SM)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, dry, Some silt lenses., odor - no, 80% sand, 20% silt, HCl reaction - not tested.	sample time: 13:30
					8.5	3		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, dry, Shell fragments near 4' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 13:30 in breathing zone: FID=0.23,O2=21.1,LEL=0 in borehole: FID=0.32,O2=21.1,LEL=0
					7.5	4		**TOTAL DEPTH = 4.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
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SITE and LOCATION	HOLE NO.
AOC 13 Alameda	A13SB05

Report form: CTO 077 LOG Time: 5:09:43 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A13SB06

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 13	Alameda	NA	12-14-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,874.8 E 6,042,558.6	Maaike Petrie	NA	12-14-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.07	Matthew Waterman	4.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	69	3.6	2.5	C077S251 (1.0 - 1.5)	10.7			**Concrete** 100% other.	
					10.2	1		**Poorly graded sand with silt and gravel (SP-SM)**: dark yellowish brown [10YR 4/6], subangular, poorly-graded, moist, odor - no, 15% gravel, 75% sand, 10% silt, HCl reaction - not tested.	sample time: 13:10
					8.8	2		**Silty sand (SM)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, moist, Sand with silt lenses., odor - no, 80% sand, 20% silt, HCl reaction - not tested.	
				C077S252 (3.0 - 3.5)		3		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, moist, With some orangish brown striations., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 13:10
					7.1	4			sample time: 13:10 in breathing zone: FID=0.21,O2=21.2,LEL=0 in borehole: FID=0.21,O2=21.2,LEL=0
								TOTAL DEPTH = 4.0 FEET	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
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Form: CTO 077 LOG Time: 5:09:48 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A13SB07

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 13	Alameda	NA	12-14-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,933.9 E 6,042,581.6	Maaike Petrie	NA	12-14-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.10	Matthew Waterman	4.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	71	4.0	2.8		10.0	1		**Silt (ML)**: very dark grayish brown [10YR 3/2], poorly-graded, medium stiff, dry, low plasticity, rapid dilatancy, low toughness, low dry strength, Grass in top 2-3"., odor - no, 5% gravel, 5% sand, 90% silt, HCl reaction - not tested.	
				C077S253 (1.5 - 2.0)		2			sample time: 13:00
					8.6	3		**Silty sand (SM)**: dark grayish brown [2.5Y 4/2], subrounded, poorly-graded, dry, Lenses of silt., odor - no, 60% sand, 40% silt, HCl reaction - not tested.	
				C077S254 (3.5 - 4.0)	7.1	4		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, dry, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 13:00
								TOTAL DEPTH = 4.0 FEET	sample time: 12:50 in breathing zone: FID=0.0,O2=20.9,LEL=0 in borehole: FID=0.50,O2=20.9,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

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SITE and LOCATION	HOLE NO.
AOC 13 Alameda	A13SB07

Report form: CTO 077 LOG Time: 5:09:52 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A15SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 15	Alameda	NA	12-13-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
GeoProbe 6600	N 2,113,121.6 E 6,043,248.0	Maaike Petrie	NA	12-13-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.62	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	65	3.8	2.5	C077S261 (1.5 - 2.0) C077S262 (2.0 - 2.5)	11.5	0		**Asphalt** 100% other. **Poorly graded sand (SP)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, moist, Shell fragments at 1-1.5' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 11:30 sample time: 11:35
	95	4.0	3.79			4			sample time: 11:10 in breathing zone: FID=0.92,O2=20.9,LEL=0 in borehole: FID=1.10,O2=20.9,LEL=0
				C077S263 (6.5 - 7.0)	5.8	6		**Lean clay (CL)**: very dark greenish gray [5GY 3/1], poorly-graded, soft, moist, low plasticity, slow dilatancy, medium toughness, medium dry strength, Interlayered silts and clays., odor - no, 55% clay, 45% silt, HCl reaction - not tested.	sample time: 11:40
					3.6	8		**TOTAL DEPTH = 8.0 FEET**	sample time: 11:15 in borehole: FID=1.28,O2=20.9,LEL=0

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
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SITE and LOCATION	HOLE NO.
AOC 15 Alameda	A15SB01

rm: CTO 077 LOG Time: 5:08:57 PM

BORECHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A15SB02

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 15	Alameda	NA	12-13-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,137.2 E 6,043,794.3	Maaike Petrie	NA	12-13-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.71	Matthew Waterman	6.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					9.0			**Asphalt** 100% other.	
	76	3.3	2.5		8.8	1		**Poorly graded gravel with clay and sand(GP-GC)**: dark greenish gray [5GY 4/1], subangular, poorly-graded, moist, Base rock., odor - no, 10% clay, 70% gravel, 20% sand, HCl reaction - not tested.	
				C077S264 (1.5 - 2.0)	8.2	2			sample time: 09:30
				C077S265 (2.5 - 3.5)	6.9	3		**Clayey sand (SC)**: very dark greenish gray [5GY 3/1], subrounded, poorly-graded, moist, Mottled with a dark red/brown. Trace gravel, wood chips., odor - no, 35% clay, 5% gravel, 50% sand, 10% silt, HCl reaction - not tested.	sample time: 09:35
	71	2.0	1.42			4		**Silt (ML)**: very dark greenish gray [5GY 3/1], poorly-graded, medium stiff, moist, nonplastic, rapid dilatancy, low toughness, low dry strength, Interlayered clays and silts., odor - no, 100% silt, HCl reaction - not tested.	sample time: 09:15 in borehole: FID=0.42,O2=20.9,LEL=0
				C077S266 (5.0 - 6.0)		5			sample time: 09:40
					3.7	6		**Lean clay (CL)**: very dark greenish gray [5GY 3/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, Interlayered clays and silts., odor - no, 100% clay, HCl reaction - not tested.	

TOTAL DEPTH = 6.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
STATE OF CALIFORNIA
11/07

DRAFT

SITE and LOCATION	HOLE NO.
AOC 15 Alameda	A15SB02

Report form: CTO 077 LOG Time: 5:10:03 PM

BORECHTEL BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A15SB03

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 15	Alameda	NA	12-13-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,989.6 E 6,043,914.0	Maaike Petrie	NA	12-13-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	8.58	Matthew Waterman	6.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					8.3			**Asphalt** 100% other.	
	80	3.7	2.92		7.8	1		**Silt (ML)**: very dark greenish gray [5GY 3/1], poorly-graded, medium stiff, moist, nonplastic, rapid dilatancy, low toughness, low dry strength, Shell fragments at 0.6' bgs., odor - no, 5% clay, 95% silt, HCl reaction - not tested.	
				C077S267 (1.0 - 2.0)					sample time: 10:00
				C077S268 (2.5 - 3.0)		2		**Lean clay (CL)**: very dark greenish gray [5GY 3/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, Interlayered clays and silts., odor - no, 55% clay, 45% silt, HCl reaction - not tested.	sample time: 10:05
						3			
	73	2.0	1.46			4			sample time: 10:15 in breathing zone: FID=0.0,O2=20.9,LEL=0 in borehole: FID=1.2,O2=20.9,LEL=0
						5			
				C077S269 (5.5 - 6.0)	2.9				sample time: 10:10
					2.6	6		**Poorly graded sand (SP)**: very dark greenish gray [5GY 3/1], subrounded, poorly-graded, saturated, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	

TOTAL DEPTH = 6.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 15 Alameda	A15SB03

frm: CTO 077 LOG Time: 5:10:10 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A17SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 17	Alameda	NA	12-13-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe GH40	N 2,112,853.5 E 6,040,914.8	Matthew Waterman	NA	12-13-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.65	Matthew Waterman	10.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	74	3.8	2.83	C077S281 (0.5 - 2.0)	11.5	0		**Asphalt**	
						1		**Well-graded sand with gravel (SW)**: dark greenish gray [10Y 4/1], angular, 25% gravel, 70% sand, 5% silt.	sample time: 09:45
					10.0	2		**Silty Sand (SM)**: light olive brown [2.5Y 5/4], Color transition at 8 ft to 10Y 4/1 dark greenish gray., 85% sand, 15% silt.	
				C077S282 (2.5 - 4.0)		3			sample time: 09:50
	46	4.0	1.83	C077S283 (4.0 - 5.0)		4			sample time: 09:55
						5			Water Sample ID: C077G061 taken at 13:45 from 5 to 10 feet bgs.
						6			
						7			
	100	2.0	2			8			
						9			
					1.7	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION	HOLE NO.
	AOC 17 Alameda	A17SB01

Report form: CTO 077 LOG Time: 5:10:15 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A17SB02

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 17	Alameda	NA	12-13-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe GH40	N 2,112,738.0 E 6,040,901.2	Matthew Waterman	NA	12-13-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.72	Matthew Waterman	10.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	72	3.8	2.75	C077S284 (1.0 - 2.0)	11.6 11.1 10.9 10.2	1		**Asphalt.** **Well-graded sand with clay and gravel (SW-SC)**: light olive brown [2.5Y 5/4], 10% clay, 20% gravel, 70% sand.	sample time: 09:00
						2		**Well-graded sand with clay and gravel (SW-SC)**: black [5Y 2.5/1], 10% clay, 20% gravel, 70% sand. **Sandy lean clay (CL)**: strong brown [7.5YR 4/6], 70% clay, 10% gravel, 20% sand.	
				C077S285 (2.5 - 4.0)		3			sample time: 09:05
	58	4.0	2.33	C077S286 (4.0 - 5.0)	▽	4		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], Color transition at 9 ft to 10Y 4/1 dark greenish gray., 100% sand.	sample time: 09:10
						5			Water Sample ID: C077G062 taken at 13:30 from 5 to 10 feet bgs.
						6			
						7			
	100	2.0	2			8			
						9			
					1.7	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 17 Alameda	A17SB02

frm: CTO 077 LOG Time: 5:10:22 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A17SB03

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 17	Alameda	NA	12-13-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe GH40	N 2,112,645.6 E 6,040,894.3	Matthew Waterman	NA	12-13-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.95	Matthew Waterman	10.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					9.8			**Asphalt**	
								Concrete	
	43	3.1	1.33	C077287 (1.0 - 2.0)	9.0	1		**Poorly graded sand with gravel (SP)**: Color transition to 10Y 4/1 at 8 ft., 20% gravel, 80% sand.	sample time: 08:25
						2			
				C077288 (3.0 - 4.0)		3			sample time: 08:30
	35	4.0	1.08	C077289 (4.0 - 5.0)		4			sample time: 08:35
						5			Water Sample ID: C077G063 & C077G064 taken at 12:55 from 5 to 10 feet bgs.
						6			
						7			
	100	2.0	2			8			
						9			
					0.1 -0.1	10		**Lean clay (CL)**: very dark greenish gray [10Y 3/1], 100% clay.	
								TOTAL DEPTH = 10.0 FEET	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION	HOLE NO.
	AOC 17 Alameda	A17SB03

Report form: CTO 077 LOG Time: 5:10:29 PM

BORECHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A18SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 18	Alameda	NA	12-12-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,245.1 E 6,040,363.0	Matthew Waterman	NA	12-12-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.83	Matthew Waterman	10.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					10.2			**Concrete** 100% other.	Background FID=2.24
	80	3.3	2.67	C077S301 (1.0 - 2.0)		1		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/4], poorly-graded, Fine grained., 100% sand, HCl reaction - not tested.	sample time: 11:25
				C077S302 (2.5 - 4.0)		2			sample time: 11:25
	71	4.0	2.83			3			FID=2.31
				C077S303 (5.0 - 6.0)		4			sample time: 11:30 Water Sample ID: C077G071 & C077G072 taken at 12:45 from 5 to 10 feet bgs.
						5			
						6			
						7			
					3.3			**Poorly graded sand (SP)**: dark grayish brown [2.5Y 4/2], poorly-graded, Fine grained., 100% sand, HCl reaction - not tested.	
	100	2.0	2			8			FID=2.34
						9			
					0.8	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
STATE OF CALIFORNIA
11/07

DRAFT

SITE and LOCATION	HOLE NO.
AOC 18 Alameda	A18SB01

frm: CTO 077 LOG Time: 5:10:35 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A18SB02

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 18	Alameda	NA	12-12-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,215.8 E 6,040,416.6	Matthew Waterman	NA	12-12-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.30	Matthew Waterman	10.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
								Concrete 100% other.	
	82	3.3	2.67	C077S304 (1.0 - 2.0)	10.6	1		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/6], poorly-graded, Fine grained., 100% sand, HCl reaction - not tested.	sample time: 12:40
				C077S305 (3.0 - 4.0)		3			sample time: 12:45
	88	4.0	3.5			4			FID=1.95
						5			Water Sample ID: C077G073 taken at 13:40 from 5 to 10 feet bgs.
				C077S306 (6.0 - 7.0)	5.3	6		**Poorly graded sand (SP)**: dark grayish brown [2.5Y 4/2], poorly-graded, Fine grained., 100% sand, HCl reaction - not tested.	sample time: 12:50
	100	2.0	2		3.3	8		**Poorly graded sand (SP)**: dark greenish gray [10Y 4/1], poorly-graded, Fine grained., 100% sand, HCl reaction - not tested.	FID=2.13
					1.3	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION: AOC 18 Alameda

HOLE NO.: A18SB02

Report form: CTO 077 LOG Time: 5:10:43 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A18SB03

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 18	Alameda	NA	12-12-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,269.4 E 6,040,408.0	Matthew Waterman	NA	12-12-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.20	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
								Concrete 100% other.	FID=1.65
	75	3.3	2.5	C077S307 (1.0 - 2.0)	10.5	1		**Poorly graded sand with silt(SP-SM)**: light olive brown [2.5Y 5/6], poorly-graded, Shell fragments 1-2 mm in size @ 4 ft bgs. Color change @ 7 ft bgs to 10Y 4/1, dark greenish gray., 90% sand, 10% silt, HCl reaction - not tested.	sample time: 12:55
				C077S308 (3.0 - 4.0)		2			
	63	4.0	2.5			3			sample time: 13:00
						4			
						5			
				C077S309 (6.0 - 7.0)		6			sample time: 13:05
						7			
					3.2	8			FID=1.61
								TOTAL DEPTH = 8.0 FEET	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
STATE OF CALIFORNIA

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SITE and LOCATION	HOLE NO.
AOC 18 Alameda	A18SB03

Form: CTO 077 LOG Time: 5:10:48 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A18SB04

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 18	Alameda	NA	12-12-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,303.6 E 6,040,368.3	Matthew Waterman	NA	12-12-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.96	Matthew Waterman	8.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
								Concrete 100% other.	FID=1.61
	71	3.3	2.3	C077S310 (1.0 - 2.0)	10.2	1		**Poorly graded sand with silt(SP-SM)**: light olive brown [2.5Y 5/6], poorly-graded, Fine grained. Color change @ 7 ft bgs to 10Y 4/1, dark greenish gray., 90% sand, 10% silt, HCl reaction - not tested.	sample time: 13:20
				C077S311 (3.0 - 4.0)		3			sample time: 13:25
	67	4.0	2.7			4			
				C077S312 (6.5 - 8.0)		7			sample time: 13:30
					3.0	8			FID=1.88
								TOTAL DEPTH = 8.0 FEET	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

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SITE and LOCATION: AOC 18 Alameda

HOLE NO.: A18SB04

Report form: CTO 077 LOG Time: 5:10:54 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A20SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 20	Alameda	NA	12-13-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe GH40	N 2,112,149.4 E 6,039,927.0	Matthew Waterman	NA	12-13-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.13	Matthew Waterman	10.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	81	3.5	2.8	C077S321 (1.0 - 2.0) C077S322 (2.0 - 3.0)	10.6	1 2 3		**Concrete.** **Poorly graded sand (SP)**: olive brown [2.5Y 4/3], 100% sand.	sample time: 11:00 sample time: 11:05
	73	4.0	2.9	C077S323 (4.0 - 5.0)		4 5 6 7			sample time: 11:10 Water Sample ID: C077G081 & C077G082 taken at 08:40 on 12/14/2005 from 5 to 10 feet bgs.
	100	2.0	2		1.1	8 9 10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
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11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 20 Alameda	A20SB01

frm: CTO 077 LOG Time: 5:10:59 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A20SB02

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 20	Alameda	NA	12-13-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe GH40	N 2,112,130.7 E 6,040,033.1	Matthew Waterman	NA	12-13-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.04	Matthew Waterman	10.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
								Concrete.	
	91	2.9	2.67	C077S324 (1.0 - 2.0)	10.0	1		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], 100% sand.	sample time: 11:35
						2			
				C077S325 (2.5 - 4.0)		3			sample time: 11:40
	77	4.0	3.08	C077S326 (4.0 - 5.0)		4			sample time: 11:45
						5			Water Sample ID: C077G083 & C077G084 taken at 08:15 on 12/14/2005 from 5 to 10 feet bgs.
						6			
						7			
	100	2.0	2			8			
						9			
					1.0	10			
								TOTAL DEPTH = 10.0 FEET	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
STATE OF CALIFORNIA

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SITE and LOCATION: AOC 20 Alameda

HOLE NO.: A20SB02

Report form: CTO 077 LOG Time: 5:11:05 PM

BORECHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A21SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 21	Alameda	NA	12-13-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe GH40	N 2,111,982.6 E 6,040,333.4	Matthew Waterman	NA	12-13-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.76	Matthew Waterman	10.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
								Concrete.	
	82	2.8	2.33	C077S341 (1.5 - 2.0)	8.6	1		**Poorly graded sand (SP)**: yellowish brown [10YR 5/6], Color transition at 2 ft to 10Y 4/1 dark greenish gray. Shell fragments at 8 ft., 100% sand.	sample time: 13:30
				C077S342 (3.0 - 3.5)		2 3			sample time: 13:35
	75	4.0	3			4			
				C077S343 (5.0 - 5.5)		5			sample time: 13:40 Water Sample ID: C077G091 taken at 14:35 from 5 to 10 feet bgs.
						6 7			
	100	2.0	2			8 9			
					-0.2	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION	HOLE NO.
	AOC 21 Alameda	A21SB01

jrm: CTO 077 LOG Time: 5:11:10 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A21SB02

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 21	Alameda	NA	12-13-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe GH40	N 2,111,967.2 E 6,040,402.2	Matthew Waterman	NA	12-13-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.08	Matthew Waterman	10.0	5-23-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
								Concrete.	
	95	3.1	2.92	C077S344 (1.5 - 2.0) C077S345 (2.0 - 2.5)	9.2	1		**Poorly graded sand (SP)**: yellowish brown [10YR 5/6], Color transition to 5Y 4/3 olive at 4 ft. Color transition to 10Y 4/1 dark greenish gray at 7 ft., 100% sand.	sample time: 13:00 sample time: 13:05
	85	4.0	3.42			2 3 4			
				C077S346 (6.0 - 6.5)		5 6			Water Sample ID: C077G092 & C077G093 taken at 15:00 from 5 to 10 feet bgs. sample time: 13:10
	100	2.0	2			7 8 9			
					0.6 0.1	10		**Silty sand (SM)**: saturated, 75% sand, 25% silt.	
								TOTAL DEPTH = 10.0 FEET	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION	HOLE NO.
	AOC 21 Alameda	A21SB02

Report form: CTO 077 LOG Time: 5:11:16 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	11-29-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,438.0 E 6,042,027.0	Maaike Petrie	NA	11-29-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.68	Matthew Waterman	12.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
				C077S361 (0.0 - 2.0)	10.2	0		**Concrete** 100% other.	sample time: 10:30
						1		**Silty sand (SM)**: light olive brown [2.5Y 5/4], rounded, poorly-graded, moist, cored through concrete 7 inches, odor - none, 5% clay, 85% sand, 10% silt, HCl reaction - not tested.	
				C077S362 (2.0 - 4.0)		2			sample time: 10:40
						3			
					6.7	4		**Clayey sand (SC)**: light olive brown [2.5Y 5/4], rounded, poorly-graded, moist, water at about 5 feet, odor - none, 10% clay, 85% sand, 5% silt, HCl reaction - not tested.	sample time: 11:15
						5			
				C077S363 (4.0 - 8.0)	5.2	6		**Poorly graded sand with silt (SP-SM)**: dark gray [2.5Y 4/1], rounded, poorly-graded, wet, wet, odor - none, 90% sand, 10% silt, HCl reaction - not tested.	Water Sample ID: C077G101 & C077G102 taken at 11:40 from 7 to 12 feet bgs.
						7			
						8			
						9			
					0.7	10		**Lean clay (CL)**: very dark greenish gray [5GY 3/1], very soft, wet, medium plasticity, medium dry strength, Bay mud at about 9.5 feet, under 6 " of concrete., odor - none, 90% clay, 10% silt, HCl reaction - not tested.	
						11			
					-1.3	12		**TOTAL DEPTH = 12.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB01

m: CTO 077 LOG Time: 2:12:06 PM

BORECHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB02

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	11-29-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
GeoProbe 6600	N 2,112,355.1 E 6,041,933.9	Jennifer Dean / Matthew Waterman	NA	11-29-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.13	Matthew Waterman	12.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	80	4.0	3.21	C077S364 (0.0 - 2.0)	10.6	1		**Concrete** 100% other.	Reference point begins at base of 6-inch concrete slab
								Poorly graded sand (SP): brown [10YR 5/3], poorly-graded, moist, [FILL], 100% sand.	sample time: 10:50
						2			sample time: 10:55
				C077S365 (2.0 - 4.0)	8.4	3		No Recovery.	
					7.6				
	75	4.0	3			4		**Poorly graded sand with silt (SP-SM)**: brown [10YR 5/3], 90% sand, 10% silt.	sample time: 11:00
					6.6	5		**Poorly graded sand with clay (SP-SC)**: dark gray [5Y 4/1], 10% clay, 90% sand.	
				C077S366 (4.0 - 8.0)		6			
					4.6	7		No Recovery.	Water Sample ID: C077G103 & C077G104 taken at 11:30 from 6 to 11 feet bgs.
					3.6			**Silt with sand (ML)**: dark gray [5Y 4/1], [BAY SEDIMENTS], 20% sand, 80% silt.	Water Sample ID: C077G103A & C077G104A taken at 08:30 on 11/30/2005 from 6 to 11 feet bgs.
	100	3.5	3.5			8			
					2.6	9		**Silty sand (SM)**: dark gray [5Y 4/1], [BAY SEDIMENTS], 80% sand, 20% silt.	
						10			
					0.6	11		**Lean clay (CL)**: dark gray [5Y 4/1], [BAY SEDIMENTS], 100% clay.	
					-0.9	12			

TOTAL DEPTH = 12.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB02

Report form: CTO 077 LOG Time: 2:12:37 PM

BORELOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB03

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	11-29-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,250.3 E 6,042,044.7	Maaike Petrie	NA	11-29-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.39	Matthew Waterman	12.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
				C077S367 (0.0 - 2.0)	9.9	0		**Concrete** 100% other.	sample time: 13:30
						1		**Silty sand (SM)**: light olive brown [2.5Y 5/4], rounded, poorly-graded, moist, odor - no, 5% clay, 85% sand, 10% silt, HCl reaction - not tested.	
				C077S368 (2.0 - 4.0)		2			sample time: 13:40
					6.9 ▽	3			
						4		**Poorly graded sand with clay(SP-SC)**: very dark greenish gray [5GY 3/1], rounded, poorly-graded, wet, Wet at 3.5' bgs., odor - no, 5% clay, 90% sand, 5% silt, HCl reaction - not tested.	in breathing zone: FID=3.2 in borehole: FID=5.7 sample time: 13:50
				C077S369 (4.0 - 8.0)		5			Water Sample ID: C077G105 taken at 08:30 on 11/30/2005 from 5 to 9 feet bgs. Water Sample ID: C077G105A taken at 08:30 on 12/2/2005 from 5 to 9 feet bgs.
						6			
						7			
						8			
					1.9	9		**Lean clay (CL)**: very dark greenish gray [5GY 3/1], very soft, moist, high plasticity, medium toughness, medium dry strength, Some lighter and darker dark greenish-gray mottling., odor - Peaty, 95% clay, 5% silt, HCl reaction - not tested.	
						10			
						11			
					-1.6	12		**TOTAL DEPTH = 12.0 FEET**	

REGISTERED GEOLOGIST
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No. 7096
11/07
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION	HOLE NO.
	AOC 23 Alameda	A23SB03

frm: CTO 077 LOG Time: 2:13:00 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB04

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	11-29-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe 6600	N 2,112,180.6 E 6,041,935.8	Matthew Waterman / Jennifer Dean	NA	11-29-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.89	Matthew Waterman	14.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	88	4.0	3.5	C077S370 (0.0 - 2.0)	10.4	1		**Concrete** 100% other.	sample time: 13:30
								Poorly graded sand (SP): brown [10YR 5/3], 100% sand.	
						2			sample time: 13:40
				C077S371 (2.0 - 4.0)	7.9	3		No Recovery.	
					7.4			**Poorly graded sand with silt (SP-SM)**: brown [10YR 5/3], 90% sand, 10% silt.	
	88	4.0	3.5			4			sample time: 13:50
					6.4			**Silty sand (SM)**: olive gray [5Y 4/2], wet, 80% sand, 20% silt.	
				C077S372 (4.0 - 8.0)		5			Water Sample ID: C077G106 taken at 09:30 on 11/30/2005 from 6 to 11 feet bgs.
						6			
					3.9	7		No Recovery.	
					3.4			**Lean clay (CL)**: very dark gray [N 3/], wet, [BAY SEDIMENTS], 100% clay.	
	88	4.0	3.5			8			
						9			
						10			
					-0.1	11		No Recovery.	
					-0.6			**Silty sand (SM)**: dark gray [N 4/], wet, Numerous shell fragments 1-3mm, angular. BAY SEDIMENTS., 90% sand, 10% silt.	
	100	2.0	2			12			
						13			
					-3.1	14			

TOTAL DEPTH = 14.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION	HOLE NO.
	AOC 23 Alameda	A23SB04

Report form: CTO 077 LOG Time: 2:13:19 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB05

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	11-30-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,045.3 E 6,042,086.9	Maaike Petrie	NA	11-30-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	9.74	Matthew Waterman	12.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	14	3.5	0.5	C077S373 (0.0 - 2.0)	9.2	0		**Concrete** 100% other.	sample time: 08:30
						1		**Poorly graded sand with gravel (SP)**: light olive brown [2.5Y 5/4], subangular, poorly-graded, dry, Liner clogged with gravel fill, 1/4 to 3/4 inch size., odor - no, 25% gravel, 70% sand, 5% silt, HCl reaction - not tested.	
						2			
						3			
	100	4.0	0.2		6.2	4		**Poorly graded sand with gravel (SP)**: very dark gray [5Y 3/1], subangular, poorly-graded, wet, Water at about 5 feet bgs, liner keeps clogging with gravel. Boring in an excavated trench, backfilled. Try drilling 2nd handaugered hole., odor - no, 35% gravel, 60% sand, 5% silt, HCl reaction - not tested.	sample time: 10:30
				C077S375 (4.0 - 8.0)		5			
						6			
						7			
						8			Water Sample ID: C077G107 & C077G108 taken at 13:00 from 8 to 12 feet bgs.
					0.7	9		**Lean clay (CL)**: very dark gray [5Y 3/1], soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, Hit bay mud at 8.5 feet bgs, some trace shell fragments., odor - no, 95% clay, 5% silt, HCl reaction - not tested.	
						10			
						11			
					-2.3	12		**TOTAL DEPTH = 12.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB05

frm: CTO 077 LOG Time: 2:13:35 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB06

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	11-30-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe 6600	N 2,111,981.1 E 6,041,968.2	Matthew Waterman / Jennifer Dean	NA	11-30-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.59	Matthew Waterman	12.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					10.0			**Concrete** 100% other.	sample time: 09:15
	71	3.4	2.42	C077S376 (0.0 - 2.0)		1		**Poorly graded sand (SP)**: brown [10YR 5/3], moist, 100% sand.	
						2			sample time: 09:25
				C077S377 (2.0 - 4.0)	7.6	3		No Recovery.	
	100	4.0	4		6.6 ▽	4		**Poorly graded sand (SP)**: olive gray [5Y 4/2], saturated, 100% sand.	sample time: 09:35
						5			
				C077S378 (4.0 - 8.0)	5.1	6		**Clayey sand (SC)**: olive gray [5Y 4/2], saturated, Shell fragments at 8ft, 20% clay, 80% sand.	Water Sample ID: C077G109 taken at 14:00 from 6 to 11 feet bgs.
						7			
	100	4.0	4		2.6	8		**Lean clay (CL)**: very dark gray [N 3/], saturated, 100% clay.	Water Sample ID: C077G109A taken at 10:30 on 12/2/2005 from 6 to 11 feet bgs.
						9			
						10			
						11			
					-1.4	12		**TOTAL DEPTH = 12.0 FEET**	

REGISTERED GEOLOGIST
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STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB06

Report form: CTO 077 LOG Time: 2:13:58 PM

BOREHOLE LOG

PROJECT and JOB NUMBER: Navy CLEAN 3 — CTO-077		SHEET NO.: 1 of 1	HOLE NO.: A23SB07
DRILLER: Resonant Sonic	SITE and LOCATION: AOC 23 Alameda	OVERBURDEN: NA	BEGUN: 11-30-05
DRILL MAKE AND MODEL: Geoprobe 6600	COORDINATES (NORTHING, EASTING): N 2,112,028.8 E 6,041,632.4	LOGGED BY: Jennifer Dean / Matthew Waterman	ROCK (FT): NA — COMPLETED: 11-30-05
HOLE SIZE DIAMETER (IN): 2 — CORE SIZE DIAMETER (IN): 1.375	GROUND ELEVATION (FT MLLW): 11.29	CHECKED BY: Matthew Waterman	TOTAL DEPTH (FT BGS): 12.0 — UPDATE: 5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	70	4.0	2.79		10.3	1		**Silty sand (SM)**: dark brown [10YR 3/3], moist, [FILL], 70% sand, 30% silt.	
					9.8	2		**Well-graded gravel with sand (GW)**: brown [10YR 5/3], dry, [FILL], 70% gravel, 30% sand. **Poorly graded sand (SP)**: brown [10YR 5/3], moist, 100% sand.	
					8.5	3		No Recovery.	
	90 100	4.0	3.58 4		7.3 ▽	4		**Poorly graded sand (SP)**: brown [10YR 5/3], saturated, 100% sand.	
					5.3	6		**Poorly graded sand (SP)**: olive gray [5Y 4/2], saturated, Shell fragments, 100% sand.	Water Sample ID: C077G110 taken at 13:15 from 6 to 11 feet bgs.
					3.7	7		No Recovery.	
					3.3	8		**Poorly graded sand (SP)**: olive gray [5Y 4/2], saturated, Shell fragments, 100% sand.	
					1.0	10		**Lean clay (CL)**: very dark gray [N 3/], saturated, 100% clay.	
					-0.7	12		**TOTAL DEPTH = 12.0 FEET**	

REGISTERED GEOLOGIST
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11/07
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SITE and LOCATION: AOC 23 Alameda — HOLE NO.: A23SB07

rm: CTO 077 LOG Time: 2:14:17 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB08

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	11-30-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe 6600	N 2,112,451.6 E 6,042,392.8	Matthew Waterman / Jennifer Dean	NA	11-30-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.62	Matthew Waterman	12.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	75	4.0	3		11.1			**Silty sand (SM)**: dark brown [10YR 3/3], dry, Wood fragments, 80% sand, 20% silt.	
					10.6	1		**Poorly graded sand with gravel(SP)**: brown [10YR 5/3], dry, 20% gravel, 80% sand.	
						2		**Poorly graded sand (SP)**: brown [10YR 5/3], moist, 100% sand.	
					8.6	3		No recovery.	
	75	4.0	3		7.6	4			
					7.3			**Poorly graded sand (SP)**: brown [10YR 5/3], 100% sand.	
					6.6	5		**Lean clay (CL)**: olive gray [5Y 4/2], 100% clay.	
						6		**Poorly graded sand (SP)**: brown [10YR 5/3], saturated, 100% sand.	
					4.6	7		No recovery.	Water Sample ID: C077G111 taken at 09:30 on 12/5/2005 from 7 to 12 feet bgs.
	100	4.0	4		3.6	8		**Poorly graded sand with silt(SP-SM)**: olive gray [5Y 4/2], saturated, 90% sand, 10% silt.	
						9			
					2.3			**Lean clay (CL)**: olive gray [5Y 4/2], 100% clay.	
						10			
						11			
					-0.4	12			

TOTAL DEPTH = 12.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

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SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB08

Report form: CTO 077 LOG Time: 2:14:38 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB09

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-5-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,231.4 E 6,042,347.9	Maaike Petrie	NA	12-5-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.19	Matthew Waterman	11.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	56	3.7	2.04	C077S379 (1.0 - 2.0)	10.9	0		**Asphalt** 100% other.	
					9.5	1		**Silty sand with gravel (SM)**: olive brown [2.5Y 4/3], subangular, poorly-graded, dry, Interlayered gravel, sand, and silt. Gravel clogged up sampler., odor - no, 5% clay, 15% gravel, 70% sand, 10% silt, HCl reaction - not tested.	sample time: 14:30
				C077S380 (3.0 - 4.0)		2		**Poorly graded sand with silt (SP-SM)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, moist, Wet around 4.5'. Gets finer grained and grayer near clay layer., odor - no, 90% sand, 10% silt, HCl reaction - not tested.	sample time: 14:40
	42	4.0	1.67			3			Water Sample ID: C077G112 taken at 14:00 on 12/6/2006 from 4 to 9 feet bgs.
						4			
						5			
						6			
				C077S381 (7.0 - 8.0)		7			sample time: 14:50
	100	3.0	3		3.2	8		**Lean clay (CL)**: dark greenish gray [10Y 4/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	
						9			
						10			
					0.2	11		**TOTAL DEPTH = 11.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB09

m: CTO 077 LOG Time: 2:14:56 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB10

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-6-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe 6600	N 2,112,360.1 E 6,042,449.7	Matthew Waterman	NA	12-6-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.92	Matthew Waterman	10.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	58	3.8	2.17	C077S382 (1.0 - 2.0) C077S383 (2.0 - 3.0)	11.7 11.1	1		**Asphalt** **Poorly graded sand with clay and gravel (SP-SC)**: brown [10YR 4/3], angular, dry, 10% clay, 20% gravel, 70% sand.	sample time: 09:30
						2		**Poorly graded sand with clay (SP-SC)**: olive brown [2.5Y 4/4], moist, 10% clay, 90% sand.	sample time: 09:40
	75	4.0	3	C077S384 (4.0 - 5.5)	7.9	4		**Lean clay (CL)**: dark greenish gray [5GY 4/1], saturated, Clay recorded at different depth to surrounding holes., 100% clay.	sample time: 09:50
					6.7	5		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], saturated, 100% sand.	Water Sample ID: C077G113 taken at 10:20 from 5 to 10 feet bgs.
						6			
						7			
					3.9	8		**Lean clay with sand (CL)**: dark greenish gray [5GY 4/1], saturated, 80% clay, 20% sand.	
						9			
					1.9	10			

TOTAL DEPTH = 10.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB10

Report form: CTO 077 LOG Time: 2:15:22 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB11

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-5-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe 6600	N 2,112,313.9 E 6,042,399.1	Matthew Waterman	NA	12-5-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.56	Matthew Waterman	10.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	67	4.0	2.7		11.2	1		**Well-graded gravel with silt and sand(GW-GM)**: light gray [N 7/], angular, Gravel is light gray N7. Sand is brown in color 10YR 5/3., 60% gravel, 30% sand, 10% silt.	
						2		**Poorly graded sand (SP)**: brown [10YR 5/3], Saturated at 5 ft bgs., 100% sand.	
	77	4.0	3.1			3			
						4			
						5			Water Sample ID: C077G114 taken at 10:00 on 12/6/2005 from 5 to 10 feet bgs.
						6			
						7			
					4.3			**Lean clay (CL)**: dark greenish gray [10Y 4/1], saturated, 100% clay.	
	100	2.0	2			8			
						9			
					1.6	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION	HOLE NO.
	AOC 23 Alameda	A23SB11

fm: CTO 077 LOG Time: 2:15:41 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB12

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	11-30-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe 6600	N 2,112,249.6 E 6,042,216.2	Matthew Waterman / Jennifer Dean	NA	11-30-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.62	Matthew Waterman	13.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					10.0			**Asphalt** 100% other.	sample time: 13:30
	85	3.4	2.92	C077S385 (0.0 - 2.0)		1		**Poorly graded sand (SP)**: brown [10YR 5/3], dry, 7 inches of asphalt above reference point., 100% sand.	
						2			sample time: 13:40
				C077S386 (2.0 - 4.0)	7.6	3		No recovery.	
					7.1				
	100	4.0	4			4		**Poorly graded sand (SP)**: olive gray [5Y 4/2], saturated, 100% sand.	sample time: 13:50
						5			
				C077S387 (4.0 - 8.0)	5.1	6		**Silt (ML)**: olive gray [5Y 4/2], Root fragments between 6.5 and 7 ft., 100% silt.	
						7			
					3.1			**Lean clay (CL)**: olive gray [5Y 4/2], Peat at approximately 8 ft, 100% clay.	
	88	4.0	3.5			8			Water Sample ID: C077G115 taken at 08:30 on 12/6/2005 from 8 to 13 feet bgs.
						9			
						10			
						11			
					-0.9			No recovery. Possibly sandy..	
	0	1.0	0			12			
					-2.4	13			

TOTAL DEPTH 13.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB12

Report form: CTO 077 LOG Time: 2:16:02 PM

BORECHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB13

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-6-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,342.7 E 6,042,361.7	Maaike Petrie	NA	12-6-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.16	Matthew Waterman	9.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
		3.8		C077S388 (1.0 - 2.0) C077S389 (2.0 - 3.0)	10.9 10.7	0 1 2 3		**Asphalt** 100% other. **Silty sand with gravel (SM)**: dark grayish brown [2.5Y 4/2], subangular, poorly-graded, moist, Interlayered gravel and clay lenses., odor - no, 10% clay, 20% gravel, 60% sand, 10% silt, HCl reaction - not tested. **Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, moist, Gets grayer and sand becomes finer grained near clay. Wet just above 4' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 14:00 sample time: 14:10
		4.0		C077S390 (4.0 - 5.0)	7.2	4		**Lean clay (CL)**: dark greenish gray [10Y 4/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, Clay lens., odor - no, 100% clay, HCl reaction - not tested.	sample time: 14:20
					5.7	6		**Poorly graded sand (SP)**: dark greenish gray [10Y 4/1], subrounded, poorly-graded, wet, Water at about 4'., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	Water Sample ID: C077G116 & C077G117 taken at 08:00 on 12/7/2005 from 6 to 11 feet bgs.
		1.0			4.7	7		**Lean clay (CL)**: very dark greenish gray [10Y 3/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	
					2.2	9		**TOTAL DEPTH = 9.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
STATE OF CALIFORNIA
11/07

m: CTO 077 LOG Time: 2:16:20 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB14

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-9-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,111,999.2 E 6,042,960.3	Maaike Petrie	NA	12-9-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.80	Matthew Waterman	8.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	76	3.8	2.83	C077S391 (1.0 - 2.0)	11.6	0		**Asphalt** 100% other.	
					9.7	2		**Sandy silt (ML)**: dark yellowish brown [10YR 4/4], poorly-graded, medium stiff, moist, low plasticity, rapid dilatancy, low toughness, low dry strength, odor - no, 5% clay, 5% gravel, 25% sand, 65% silt, HCl reaction - not tested.	sample time: 10:00
				C077S392 (3.0 - 4.0)		3		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, moist, Gets grayer and finer near the clay. Wet at around 3.8'., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	Water Sample ID: C077G118 & C077G119 taken at 10:30 from 2 to 7 feet bgs. sample time: 10:15
	73	4.0	2.92	C077S393 (4.5 - 6.0)	7.5	4		**Lean clay (CL)**: dark greenish gray [10Y 4/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	sample time: 09:48 in breathing zone: FID=0.0,O2=20.9,LEL=0 in borehole: FID=0.3,O2=20.9,LEL=0 sample time: 10:30
					4.2	7			
					3.8	8		**Poorly graded sand (SP)**: very dark gray [2.5Y 3/1], subrounded, poorly-graded, wet, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 09:55 in breathing zone: FID=0.0,O2=20.9,LEL=0 in borehole: FID=0.0,O2=20.9,LEL=0
								TOTAL DEPTH = 8.0 FEET	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB14

Report form: CTO 077 LOG Time: 2:16:45 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB15

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-5-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,141.9 E 6,042,433.5	Maaike Petrie	NA	12-5-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.27	Matthew Waterman	12.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	58	4.0	2.3		10.6			**Concrete** 100% other.	
				C077S394 (1.5 - 2.5)	9.8	1		**Poorly graded sand with silt (SP-SM)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, dry, Clay lenses., odor - no, 10% clay, 5% gravel, 75% sand, 10% silt, HCl reaction - not tested.	sample time: 13:00
				C077S395 (2.5 - 3.5)		2		**Poorly graded sand with silt (SP-SM)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, wet, Wet around 5' bgs., odor - no, 90% sand, 10% silt, HCl reaction - not tested.	sample time: 13:10
	92	4.0	3.7			3			
						4			
						5			
						6			
				C077S396 (6.5 - 7.5)	4.8	7		**Lean clay (CL)**: dark greenish gray [10Y 4/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	sample time: 13:20 Water Sample ID: C077G120 taken at 14:20 from 7 to 12 feet bgs.
	88	4.0	3.5			8			
						9			
						10			
						11			
					-0.4				
					-0.7	12		**Poorly graded sand (SP)**: dark greenish gray [10Y 4/1], subrounded, poorly-graded, wet, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	

TOTAL DEPTH = 12.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB15

m: CTO 077 LOG Time: 2:17:08 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB16

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-5-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,140.7 E 6,042,475.2	Maaike Petrie	NA	12-5-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.59	Matthew Waterman	9.5	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					10.9	0		**Concrete** 100% other.	
	67	3.5	2.3	C077S397 (1.5 - 2.0)		1		**Silty sand (SM)**: dark yellowish brown [10YR 4/4], subangular, poorly-graded, dry, Organic material. Clay lenses and some gravel. Mottling. Gravel clogged up sampler., odor - no, 10% clay, 10% gravel, 70% sand, 10% silt, HCl reaction - not tested.	sample time: 14:00
					9.1	2		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, wet, Wet at around 4' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 14:10
	92	4.0	3.7	C077S398 (3.0 - 4.0)		3			
						4			Screened from 4.5 to 9.5 feet.
						5			
						6			
						7			
					4.3	8		**Lean clay (CL)**: dark greenish gray [10Y 4/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	sample time: 14:20
	100	1.5	1.5	C077S399 (7.5 - 8.0)		9			
					2.1			**TOTAL DEPTH = 9.5 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/09
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION	HOLE NO.
	AOC 23 Alameda	A23SB16

Report form: CTO 077 LOG Time: 2:17:29 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB17

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-8-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,096.3 E 6,042,432.7	Jennifer Dean	NA	12-8-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.49	Matthew Waterman	8.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
								Concrete 100% other.	
	70	3.3	2.33		10.8	1		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/6], subangular, moist, 10% gravel, 85% sand, 5% silt.	
					10.2			**Poorly graded sand (SP)**: light olive brown [2.5Y 5/6], moist, 100% sand.	
						2			
						3			
	79	4.0	3.17			4			sample time: 14:02 in breathing zone: FID=0.0,O2=20.8,LEL=0 in borehole: FID=0.0,O2=20.8,LEL=0
						5			
					5.5	6		**Poorly graded sand with silt (SP-SM)**: dark gray [5Y 4/1], wet, 90% sand, 10% silt.	
					5.0			**Lean clay (CL)**: dark gray [5Y 4/1], soft, wet, 90% clay, 10% silt.	Water Sample ID: C077G121 taken at 15:15 from 7 to 12 feet bgs. sample time: 14:10 in breathing zone: FID=0.0,O2=20.8,LEL=0 in borehole: FID=0.0,O2=20.8,LEL=0
					3.5	7			
						8		**TOTAL DEPTH = 8.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB17

File: CTO 077 LOG Time: 2:17:46 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB18

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-6-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,055.2 E 6,042,328.9	Maaike Petrie	NA	12-6-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.82	Matthew Waterman	8.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					10.2			**Concrete** 100% other.	
	68	3.3	2.25	C077S400 (1.0 - 2.0)	9.7	1		**Clayey sand (SC)**: dark yellowish brown [10YR 4/4], subangular, poorly-graded, dry, Interlayered clay and gravel., odor - no, 20% clay, 5% gravel, 60% sand, 15% silt, HCl reaction - not tested.	sample time: 13:00
						2			
				C077S401 (3.0 - 4.0)		3		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, dry, Wet around 4' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 13:10
	96	4.0	3.83			4			Water Sample ID: C077G122 taken at 13:00 from 3 to 8 feet bgs.
						5			
					5.3	6		**Lean clay (CL)**: very dark greenish gray [10GY 3/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	sample time: 13:20
				C077S402 (6.5 - 8.0)		7			
					2.8	8		**TOTAL DEPTH = 8.0 FEET**	

REGISTERED GEOLOGIST
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DRAFT	SITE and LOCATION	HOLE NO.
	AOC 23 Alameda	A23SB18

Report form: CTO 077 LOG Time: 2:18:00 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB19

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-8-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,013.0 E 6,042,424.9	Jennifer Dean	NA	12-8-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.39	Matthew Waterman	9.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	69	3.8	2.58	C077S403 (0.3 - 1.3)	11.1	0		**Asphalt** 100% other.	
						1		**Poorly graded sand (SP)**: brownish yellow [10YR 6/8], poorly-graded, moist, [FILL], 100% sand.	sample time: 15:30
				C077S404 (2.0 - 3.0)		2			sample time: 15:40
						3			
	73	4.0	2.92	C077S405 (4.0 - 5.0)		4			sample time: 15:50 Water Sample ID: C077G123 taken at 08:00 on 12/9/2005 from 4 to 9 feet bgs.
						5			
					6.1	6		**Poorly graded sand (SP)**: dark gray [5Y 4/1], poorly-graded, wet, [BAY SEDIMENTS], 100% sand.	
					4.6	7		**Lean clay (CL)**: dark gray [5Y 4/1], soft, wet, low plasticity, [BAY SEDIMENTS], 85% clay, 15% silt.	
						8			
					2.4	9		**TOTAL DEPTH = 9.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB19

m: CTO 077 LOG Time: 2:18:13 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB20

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-8-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,111,887.2 E 6,042,313.6	Jennifer Dean	NA	12-8-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.83	Matthew Waterman	9.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
								Concrete 100% other.	in breathing zone: FID=0.37, in borehole: FID=0.25,LEL=0
	74	3.2	2.33		10.0	1		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/6], poorly-graded, moist, [FILL], 100% sand.	
						2			
						3			
	85	4.0	3.42			4			Water Sample ID: C077G124 & C077G125 taken at 08:30 on 12/9/2005 from 4 to 9 feet bgs.
						5			
					5.3			**Silt (ML)**: dark gray [5Y 4/1], poorly-graded, soft, wet, low plasticity, rapid dilatancy, [BAY SEDIMENTS], 15% clay, 85% silt.	
					4.8	6		**Lean clay (CL)**: dark gray [5Y 4/1], wet, low plasticity, [BAY SEDIMENTS], 85% clay, 15% silt.	
	100	1.0	1			7			
						8			
					1.8	9			

TOTAL DEPTH = 9.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB20

Report form: CTO 077 LOG Time: 2:18:33 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB21

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-8-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,111,842.8 E 6,042,438.6	Maaike Petrie	NA	12-8-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.51	Matthew Waterman	8.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					10.9			**Concrete** 100% other.	
	64	3.4	2.17	C077S406 (1.0 - 2.0)	10.1	1		**Sandy silt with gravel (ML)**: light olive brown [2.5Y 5/6], poorly-graded, medium stiff, moist, low plasticity, slow dilatancy, low toughness, low dry strength, odor - no, 15% gravel, 20% sand, 65% silt, HCl reaction - not tested.	sample time: 13:30
				C077S407 (2.5 - 4.0)		2		olive brown [2.5Y 4/3], poorly-graded, moist, Wet around 4', odor - no, HCl reaction - not tested.	sample time: 13:40
	71	4.0	2.83	C077S408 (4.0 - 5.0)		3			sample time: 13:50
						4			sample time: 13:17 in breathing zone: FID=0.0,LEL=0 in borehole: FID=0.2,LEL=0 Water Sample ID: C077G126 taken at 14:50 from 5 to 10 feet bgs.
						5			
					5.3	6			
						7		**Lean clay (CL)**: dark greenish gray [10Y 4/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	
					3.5	8		**TOTAL DEPTH = 8.0 FEET**	sample time: 13:23 FID battery low, put on charge

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB21

m: CTO 077 LOG Time: 2:18:48 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB22

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-8-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,111,791.2 E 6,042,305.2	Maaike Petrie	NA	12-8-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.82	Matthew Waterman	9.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					10.2			**Concrete** 100% other.	
	100	3.4	3.42	C077S409 (1.0 - 2.0)	9.9	1		**Sandy silt (ML)**: dark yellowish brown [10YR 4/4], poorly-graded, medium stiff, moist, low plasticity, slow dilatancy, low toughness, low dry strength, odor - no, 5% clay, 10% gravel, 25% sand, 60% silt, HCl reaction not tested.	sample time: 09:30
					9.0	2			
					8.6			**Lean clay (CL)**: dark greenish gray [10GY 4/1], poorly-graded, medium stiff, dry, low plasticity, slow dilatancy, medium toughness, medium dry strength, Clay layer., odor - no, 100% clay, HCl reaction - not tested.	
				C077S410 (3.0 - 4.0)		3			sample time: 09:40
	96	4.0	3.83			4		**Sandy silt (ML)**: dark yellowish brown [10YR 4/4], poorly-graded, medium stiff, moist, nonplastic, slow dilatancy, low toughness, low dry strength, Small layer., odor - no, 5% clay, 5% gravel, 30% sand, 60% silt, HCl reaction - not tested.	sample time: 09:30 in breathing zone: FID=0.50,LEL=0 in borehole: FID=1.98,LEL=0
				C077S411 (5.0 - 6.0)	5.6	5			Water Sample ID: C077G127 taken at 10:00 from 4 to 9 feet bgs.
						6		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, moist, Wet at around 4' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 09:50
						7		**Lean clay (CL)**: dark greenish gray [10Y 4/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	
	100	1.0	1			8			sample time: 09:40 in breathing zone: FID=0.0,LEL=0 in borehole: FID=0.0,LEL=0
					1.8	9			

TOTAL DEPTH = 9.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB22

Report form: CTO 077 LOG Time: 2:19:04 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB23

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-6-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe 6600	N 2,112,129.6 E 6,042,598.3	Matthew Waterman	NA	12-6-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.86	Matthew Waterman	10.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					11.3			**Concrete** 100% other.	
	76	3.2	2.42		11.0	1		**Well-graded sand with silt and gravel (SW-SM)**: yellowish brown [10YR 5/6], 20% gravel, 70% sand, 10% silt.	
						2		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/6], Saturated at approximately 4.5 ft., 100% sand.	
	77	4.0	3.08			3			
						4			
						5			Water Sample ID: C077G128 & C077G129 taken at 09:00 from 5 to 10 feet bgs.
						6			
					5.0	7		**Silty sand (SM)**: dark greenish gray [5GY 4/1], Gradational change between sand above and clay below., 60% sand, 40% silt.	
	100	2.0	2		4.6	8		**Lean clay (CL)**: dark greenish gray [5GY 4/1], saturated, 100% clay.	
						9			
					1.9	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB23

m: CTO 077 LOG Time: 2:19:18 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB24

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-7-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
GeoProbe 6600	N 2,112,062.9 E 6,042,578.0	Maaike Petrie	NA	12-7-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.33	Matthew Waterman	10.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
								Concrete 100% other.	
	78	3.3	2.58		10.7	1		**Silty sand (SM)**: dark yellowish brown [10YR 4/4], subangular, poorly-graded, dry, odor - no, 5% clay, 10% gravel, 60% sand, 25% silt, HCl reaction - not tested.	
					9.8	2		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, moist, Wet around 5' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	
	98	4.0	3.92			3			
						4			
						5			Water Sample ID: C077G130 & C077G131 taken at 11:20 from 5 to 10 feet bgs.
						6			
					5.1	7		**Lean clay (CL)**: dark greenish gray [10Y 4/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	
	79	2.0	1.58			8			
						9			
					1.3	10			

TOTAL DEPTH = 10.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB24

Report form: CTO 077 LOG Time: 2:19:32 PM

BORELOG

PROJECT and JOB NUMBER: Navy CLEAN 3 — CTO-077		SHEET NO.: 1 of 1	HOLE NO.: A23SB25
DRILLER: Resonant Sonic	SITE and LOCATION: AOC 23 Alameda	OVERBURDEN: NA	BEGUN: 12-7-05
DRILL MAKE AND MODEL: GeoProbe 6600	COORDINATES (NORTHING, EASTING): N 2,111,993.9 E 6,042,579.5	LOGGED BY: Maaike Petrie	ROCK (FT): NA / COMPLETED: 12-7-05
HOLE SIZE DIAMETER (IN): 2 / CORE SIZE DIAMETER (IN): 1.375	GROUND ELEVATION (FT MLLW): 11.01	CHECKED BY: Matthew Waterman	TOTAL DEPTH (FT BGS): 10.0 / UPDATE: 5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					10.3			**Concrete** 100% other.	
	75	3.3	2.5	C077S412 (1.0 - 2.0)	10.1	1		**Silty sand (SM)**: dark yellowish brown [10YR 4/4], subangular, poorly-graded, moist, Some organic material., odor - no, 10% clay, 5% gravel, 60% sand, 25% silt, HCl reaction - not tested.	sample time: 09:00
					9.0	2		**Poorly graded sand (SP)**: dark yellowish brown [10YR 4/4], subrounded, poorly-graded, moist, With some 7.5YR 4/4 spots., odor - no, 95% sand, 5% silt, homogeneous structure, HCl reaction - not tested.	sample time: 09:10
				C077S413 (2.5 - 4.0)		3			
	88	4.0	3.5			4		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, wet, Grayer and finer grained near the clay. Wet around 5' bgs., odor - no, 95% gravel, 5% silt, HCl reaction - not tested.	
				C077S414 (5.0 - 6.0)		5			sample time: 09:20
						6			Water Sample ID: C077G132 taken at 10:30 on 12/8/2005 from 5 to 10 feet bgs.
					4.4	7		dark greenish gray [10Y 4/1], poorly-graded, moist, odor - no, HCl reaction - not tested.	
	83	2.0	1.67			8			
						9			
					1.0	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

m: CTO 077 LOG Time: 2:19:45 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB26

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-8-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,111,927.4 E 6,042,489.6	Maaike Petrie	NA	12-8-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.56	Matthew Waterman	10.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	57	3.7	2.08	C077S415 (0.3 - 1.3)	11.2	0		**Asphalt** Right next to car maintenance area., 100% other.	sample time: 13:00
					9.5	2		**Sandy silt with gravel (ML)**: very dark grayish brown [2.5Y 3/2], poorly-graded, soft, dry, nonplastic, rapid dilatancy, low toughness, low dry strength, Hydrocarbon odor, might be from shop., odor - no, 15% gravel, 20% sand, 65% silt, HCl reaction - not tested.	
				C077S416 (2.5 - 4.0)		3		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, wet, Wet around 4' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 13:10
	29	4.0	1.17	C077S417 (4.0 - 5.0)		4			sample time: 12:35 in breathing zone: FID=1.0,LEL=0 in borehole: FID=2.25,LEL=0
					6.4	5		**Lean clay (CL)**: very dark greenish gray [10Y 3/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	sample time: 13:20 Water Sample ID: C077G133 & C077G134 taken at 14:15 from 5 to 10 feet bgs.
	100	2.0	2			6			
						7			
						8			sample time: 12:40 in breathing zone: FID=0.5,LEL=0 in borehole: FID=2.52,LEL=0
						9			
					1.6	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB26

Report form: CTO 077 LOG Time: 2:19:59 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB27

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-7-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
GeoProbe 6600	N 2,112,076.3 E 6,042,653.8	Maaike Petrie	NA	12-7-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.86	Matthew Waterman	10.5	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					11.4			**Concrete** 100% other.	
	71	3.5	2.5	C077S418 (1.0 - 2.0)		1		**Silty sand with gravel (SM)**: dark yellowish brown [10YR 4/4], subangular, poorly-graded, moist, Interbedded silt, sand, and gravel., odor - no, 5% clay, 15% gravel, 60% sand, 20% silt, HCl reaction - not tested.	sample time: 14:30
						2			
				C077S419 (3.0 - 4.0)		3			sample time: 14:35
					7.9	4			
	71	4.0	2.8			5		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, moist, Wet around 5' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 14:15 in breathing zone: FID=0.2,LEL=0 in borehole: FID=0.6,LEL=0 sample time: 14:40 Water Sample ID: C077G135 taken at 14:30 from 5 to 10 feet bgs.
				C077S420 (5.0 - 6.0)		6			
						7			
						8			
	100	2.5	2.5		3.4	9		**Lean clay (CL)**: dark greenish gray [10Y 4/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	sample time: 14:22 in breathing zone: FID=0.3,LEL=0 in borehole: FID=0.4,LEL=0
					1.4	10			

TOTAL DEPTH = 10.5 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB27

tm: CTO 077 LOG Time: 2:20:11 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB28

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-7-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,052.3 E 6,042,643.1	Maaike Petrie	NA	12-7-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.49	Matthew Waterman	10.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	63	3.6	2.25	C077S421 (1.0 - 2.0)	11.1	0		**Concrete** 100% other.	
					10.6	1		**Silty sand (SM)**: yellowish brown [10YR 5/6], subangular, poorly-graded, moist, Interlayered sand with clay lenses and some darker mottling., odor - no, 10% clay, 10% gravel, 60% sand, 20% silt, HCl reaction - not tested.	sample time: 11:30
					9.5	2		**Poorly graded sand with silt(SP-SM)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, moist, Some clay lenses., odor - no, 5% clay, 90% sand, 5% silt, HCl reaction - not tested.	
				C077S422 (3.0 - 4.0)	8.0	3			sample time: 11:35
	90	4.0	3.58		7.8	4		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, moist, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 11:15 in breathing zone: FID=0.2,LEL=0 in borehole: FID=0.5,LEL=0
				C077S423 (5.0 - 6.5)		5		**Lean clay (CL)**: dark greenish gray [10Y 4/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, Small clay layer., odor - no, 100% clay, HCl reaction - not tested.	sample time: 11:40 Water Sample ID: C077G136 taken at 13:30 from 5 to 10 feet bgs.
					5.3	6		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, moist, Sand grains grayer and finer near the clay. Wet around 4.5' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	
	100	2.0	2			7			sample time: 11:20 in breathing zone: FID=0.0,LEL=0 in borehole: FID=0.2,O2=20.4,LEL=0
						8		**Lean clay (CL)**: dark greenish gray [10Y 4/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	
					1.5	9			
						10			

TOTAL DEPTH = 10.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION	HOLE NO.
	AOC 23 Alameda	A23SB28

Report form: CTO 077 LOG Time: 2:20:27 PM

BORECHOLE LOG

PROJECT and JOB NUMBER: Navy CLEAN 3 — CTO-077		SHEET NO.: 1 of 1	HOLE NO.: A23SB29
DRILLER: Resonant Sonic	SITE and LOCATION: AOC 23 Alameda	OVERBURDEN: NA	BEGUN: 12-7-05
DRILL MAKE AND MODEL: Geoprobe Direct Push Rig	COORDINATES (NORTHING, EASTING): N 2,112,016.4 E 6,042,759.4 / LOGGED BY: Maaike Petrie	ROCK (FT): NA	COMPLETED: 12-7-05
HOLE SIZE DIAMETER (IN): 2 / CORE SIZE DIAMETER (IN): 1.375	GROUND ELEVATION (FT MLLW): 11.75 / CHECKED BY: Matthew Waterman	TOTAL DEPTH (FT BGS): 10.0	UPDATE: 5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					11.3	0		**Concrete** 100% other.	
	57	3.5	2	C077S424 (1.0 - 2.0)		1		**Clayey sand with gravel (SC)**: dark yellowish brown [10YR 4/6], subangular, poorly-graded, moist, Interlayered clay, sand, and gravels., odor - no, 20% clay, 20% gravel, 50% sand, 10% silt, HCl reaction - not tested.	sample time: 15:30
					9.8	2		**Poorly graded sand with silt (SP-SM)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, moist, Gets grayer and finer grained near the clay., odor - no, 90% sand, 10% silt, HCl reaction - not tested.	
				C077S425 (3.0 - 4.0)		3			sample time: 15:35
	92	4.0	3.7			4			sample time: 15:05 in breathing zone: FID=0.0,LEL=0 in borehole: FID=1.2,LEL=0 Water Sample ID: C077G137 & C077G138 taken at 08:00 on 12/8/2005 from 5 to 10 feet bgs.
						5			
				C077S426 (6.0 - 7.0)		6			
						7			
	100	2.0	2		3.8	8		**Lean clay (CL)**: very dark greenish gray [10Y 3/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, Wet around 5' bgs., odor - no, 100% clay, HCl reaction - not tested.	sample time: 15:40
						9			
					1.8	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION: AOC 23 Alameda

HOLE NO.: A23SB29

m: CTO 077 LOG Time: 2:20:38 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB30

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-8-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,140.5 E 6,042,262.0	Jennifer Dean	NA	12-8-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.73	Matthew Waterman	9.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					10.0	1		**Concrete** 100% other.	
								Poorly graded sand with gravel(SP): reddish yellow [5YR 6/8], angular, dry, [FILL], 15% gravel, 80% sand, 5% silt.	
					8.9	2		**Poorly graded sand (SP)**: brown [10YR 4/3], moist, [FILL], 100% sand.	
						3			
						4			sample time: 15:45 in borehole: FID=1.2,O2=20.9,LEL=0 Water Sample ID: C077G139 & C077G140 taken at 09:00 on 12/9/2005 from 4 to 9 feet bgs.
					6.2	5		**Silty sand (SM)**: dark gray [5Y 4/1], poorly-graded, wet, [BAY SEDIMENTS], 55% sand, 45% silt.	
						6			
					4.2	7		**Lean clay (CL)**: dark gray [5Y 4/1], soft, wet, low plasticity, [BAY SEDIMENTS], 95% clay, 5% silt.	
						8			sample time: 15:50 in borehole: O2=20.9,LEL=0
					1.7	9		**TOTAL DEPTH = 9.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB30

Report form: CTO 077 LOG Time: 2:20:49 PM

BORECHOLE LOG

PROJECT and JOB NUMBER: Navy CLEAN 3 — CTO-077		SHEET NO.: 1 of 1	HOLE NO.: A23SB31
DRILLER: Resonant Sonic	SITE and LOCATION: AOC 23 Alameda	OVERBURDEN: NA	BEGUN: 12-8-05
DRILL MAKE AND MODEL: Geoprobe Direct Push Rig	COORDINATES (NORTHING, EASTING): N 2,111,933.6 E 6,042,159.9	LOGGED BY: Maaike Petrie	ROCK (FT): NA / COMPLETED: 12-8-05
HOLE SIZE DIAMETER (IN): 2 / CORE SIZE DIAMETER (IN): 1.375	GROUND ELEVATION (FT MLLW): 10.15	CHECKED BY: Matthew Waterman	TOTAL DEPTH (FT BGS): 8.0 / UPDATE: 5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	76	4.0	3.04		9.7			**Concrete** 100% other.	
				C077S427 (1.0 - 2.0)	9.0	1		**Silty sand (SM)**: dark grayish brown [2.5Y 4/2], subangular, poorly-graded, moist, odor - no, 10% gravel, 60% sand, 30% silt, HCl reaction - not tested.	sample time: 11:00
				C077S428 (2.5 - 3.5)		2		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, moist, Gets grayer and finer grained near the clay lenses b/w 1.5 and 2., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 11:10 Water Sample ID: C077G141 taken at 12:50 from 3 to 8 feet bgs.
	77	4.0	3.08			3			
						4			sample time: 10:50 in breathing zone: FID=0.2,LEL=0 in borehole: FID=0.7,LEL=0
						5			
					4.3	6			
				C077S429 (7.0 - 8.0)		7			sample time: 11:20
					2.2	8			sample time: 11:03 in breathing zone: FID=0.2,LEL=0 in borehole: FID=0.4,LEL=0
								TOTAL DEPTH = 8.0 FEET	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION: AOC 23 Alameda	HOLE NO.: A23SB31

Filename: CTO 077 LOG Time: 2:21:02 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB32

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-8-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,111,807.3 E 6,042,147.3	Maaike Petrie	NA	12-8-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.03	Matthew Waterman	9.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	38	3.6	1.38		9.6	0		**Concrete** 100% other.	
						1		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, moist, Some clay lenses near top and some dark mottling. Wet around 4' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	
						2			
						3			
	47	4.0	1.88			4			sample time: 10:03 in breathing zone: FID=0.21,LEL=0 in borehole: FID=0.47,LEL=0 Water Sample ID: C077G142 taken at 10:30 from 4 to 9 feet bgs.
					4.8	5			
						6		**Lean clay (CL)**: dark greenish gray [10Y 4/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	
						7			
	100	1.0	1			8			
					1.0	9			
								TOTAL DEPTH = 9.0 FEET	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB32

Report form: CTO 077 LOG Time: 2:21:19 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB33

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-2-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,111,736.6 E 6,042,221.0	Maaike Petrie	NA	12-2-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.76	Matthew Waterman	11.5	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					10.2	0		Concrete..	
	83	3.4	2.83	C077S430 (1.0 - 2.0)		1		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, moist, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 14:40
				C077S431 (3.0 - 4.0)		2			sample time: 14:50
	85	4.0	3.42			3			
						4			
					5.8	5		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, moist, shell fragments start at 4.5' bgs to about 6' bgs., odor - no, 90% sand, 5% silt, 5% other, HCl reaction - not tested.	
				C077S432 (6.0 - 7.5)	4.8	6			sample time: 15:00
					4.3			**Silty sand (SM)**: dark greenish gray [10Y 4/1], subrounded, poorly-graded, wet, Wet around 6' bgs., odor - no, 10% clay, 80% sand, 10% silt, HCl reaction - not tested.	Water Sample ID: C077G143 & C077G144 taken at 08:00 on 12/3/2005 from 6.5 to 11.5 feet bgs.
					3.8	7		**Poorly graded sand (SP)**: very dark greenish gray [10Y 3/1], subrounded, poorly-graded, wet, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	
						8			
						9		**Lean clay (CL)**: very dark bluish gray [5B 3/1], poorly-graded, soft, moist, medium plasticity, medium toughness, medium dry strength, odor - no, 95% clay, 5% silt, HCl reaction - not tested.	
						10			
					-0.2	11		**Clayey gravel (GC)**: very dark bluish gray [5B 3/1], subrounded, poorly-graded, moist, Shell fragments at 11' bgs., odor - no, 25% clay, 70% sand, 5% other, HCl reaction - not tested.	
					-0.7				

TOTAL DEPTH = 11.5 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION: AOC 23 Alameda

HOLE NO.: A23SB33

R:\...\CTO 077 LOG Time: 2:21:30 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB34

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-2-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe 6600	N 2,111,607.6 E 6,042,139.8	Matthew Waterman	NA	12-2-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.77	Matthew Waterman	12.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					10.2			**Asphalt** 100% other.	
	100	3.4	3.42	C077S433 (1.0 - 2.0)	9.2	1		**Clayey sand (SC)**: light yellowish brown [10YR 6/4], dry, 20% clay, 80% sand.	sample time: 14:00
				C077S434 (2.0 - 3.0)		2		**Poorly graded sand (SP)**: light yellowish brown [10YR 6/4], saturated, 100% sand.	sample time: 14:10
	100	4.0	4			3			
				C077S435 (5.0 - 6.0)		4			sample time: 14:30
						5			
						6			
					4.0	7		**Poorly graded sand with silt (SP-SM)**: dark greenish gray [10Y 4/1], saturated, Transition from 4ft description is gradual with green color through to noted dark greenish gray color., 90% sand, 10% silt.	Water Sample ID: C077G145 & C077G146 taken at 08:00 on 12/3/2005 from 7 to 12 feet bgs.
	100	4.0	4		2.7	8		**Lean clay (CL)**: bluish black [5B 2.5/1], saturated, 100% clay.	
						9			
						10			
						11			
					-1.2	12			

TOTAL DEPTH = 12.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB34

Report form: CTO 077 LOG Time: 2:21:44 PM

BORECHOLE LOG

PROJECT and JOB NUMBER: Navy CLEAN 3 CTO-077		SHEET NO.: 1 of 1	HOLE NO.: A23SB35
DRILLER: Resonant Sonic	SITE and LOCATION: AOC 23 Alameda	OVERBURDEN: NA	BEGUN: 12-2-05
DRILL MAKE AND MODEL: Geoprobe 6600	COORDINATES (NORTHING, EASTING): N 2,111,493.2 E 6,042,136.0	LOGGED BY: Matthew Waterman	ROCK (FT): NA / COMPLETED: 12-2-05
HOLE SIZE DIAMETER (IN): 2 / CORE SIZE DIAMETER (IN): 1.375	GROUND ELEVATION (FT MLLW): 9.87	CHECKED BY: Matthew Waterman	TOTAL DEPTH (FT BGS): 11.0 / UPDATE: 5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					9.3	0		**Asphalt** 100% other.	sample time: 09:00
	56	3.4	1.92	C077S436 (0.0 - 2.0)		1		**Poorly graded sand (SP)**: yellowish brown [10YR 5/6], moist, [7 inches of asphalt above reference point.], 100% sand.	
					7.4	2			sample time: 09:30
				C077S437 (2.0 - 4.0)		3		No recovery.	
	81	4.0	3.25		5.9	4		**Well-graded sand with gravel (SW)**: yellowish brown [10YR 5/6], subangular, saturated, 20% gravel, 80% sand.	sample time: 10:00
					5.4	5		**Poorly graded sand with silt (SP-SM)**: very dark greenish gray [10Y 3/1], saturated, 90% sand, 10% silt.	
				C077S438 (4.0 - 8.0)	3.9	6		**Lean clay with sand (CL)**: very dark greenish gray [10Y 3/1], saturated, 80% clay, 20% sand.	Water Sample ID: C077G147 taken at 10:00 from 6 to 11 feet bgs.
					2.6	7		No recovery.	
	94	3.0	2.83		1.9	8		**Lean clay (CL)**: very dark greenish gray [10Y 3/1], saturated, 100% clay.	
					0.5	9			
						10		**Poorly graded sand with silt (SP-SM)**: very dark greenish gray [10Y 3/1], saturated, Shell fragments throughout..	
					-1.0	11		No recovery.	
					-1.1			**TOTAL DEPTH = 11.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION: AOC 23 Alameda

HOLE NO.: A23SB35

m: CTO 077 LOG Time: 2:21:56 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB36

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-2-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe 6600	N 2,111,486.9 E 6,042,221.3	Matthew Waterman	NA	12-2-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.15	Matthew Waterman	12.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	56	4.0	2.25	C077S439 (1.0 - 2.0) C077S440 (2.0 - 3.0)	10.7	1		**Sandy lean clay (CL)**: yellowish brown [10YR 5/6], dry, 70% clay, 30% sand. **Clayey sand (SC)**: light olive brown [2.5Y 5/4], dry, 15% clay, 85% sand.	sample time: 12:30
					8.9	2		No recovery.	sample time: 13:00
	60	4.0	2.42	C077S441 (4.5 - 6.0)	7.2	4		**Sandy lean clay (CL)**: dark grayish brown [2.5Y 4/2], moist, 70% clay, 10% gravel, 20% sand.	sample time: 13:30
					6.2	5		**Poorly graded sand with silt (SP-SM)**: dark greenish gray [10GY 4/1], saturated, Shell fragments, 90% sand, 10% silt.	Water Sample ID: C077G148 & C077G149 taken at 13:00 from 7 to 12 feet bgs.
					4.7	7		No recovery.	
	100	4.0	4		3.2	8		**Lean clay (CL)**: very dark greenish gray [10Y 3/1], saturated, 100% clay.	
					-0.9	12		**TOTAL DEPTH = 12.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB36

Report form: CTO 077 LOG Time: 2:22:10 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB37

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-8-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,111,727.6 E 6,042,362.9	Maaike Petrie	NA	12-8-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.86	Matthew Waterman	10.0	5-25-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					10.2			**Concrete** 100% other.	
	83	3.3	2.75	C077S442 (1.0 - 2.0) C077S443 (2.0 - 3.5)	9.9	1 2 3		**Silty sand with gravel (SM)**: dark yellowish brown [10YR 4/4], subangular, poorly-graded, moist, odor - no, 15% clay, 20% gravel, 50% sand, 15% silt, HCl reaction - not tested. **Poorly graded sand (SP)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, moist, Wet at around 4' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 09:00 sample time: 09:10
	83	4.0	3.33	C077S444 (5.0 - 6.5)		4 5 6			sample time: 08:45 in breathing zone: FID=0.2,LEL=0 in borehole: FID=2.4,LEL=0 sample time: 09:20 Water Sample ID: C077G150 taken at 09:15 from 5 to 10 feet bgs.
					4.7			**Lean clay (CL)**: dark greenish gray [10Y 4/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	
	75	2.5	1.88			7 8 9			sample time: 08:55 in breathing zone: FID=0.5,LEL=0 in borehole: FID=1.7,LEL=0
					0.9	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB37

m: CTO 077 LOG Time: 1:29:58 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB38

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-2-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe 6600	N 2,111,543.4 E 6,042,292.0	Matthew Waterman	NA	12-2-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.30	Matthew Waterman	12.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					10.7			**Clay** 100% other.	sample time: 10:30
	66	3.4	2.25	C077S445 (0.0 - 2.0)	10.5	1		**Well-graded sand with gravel (SW)**: very dark greenish gray [10Y 3/1], angular, moist, [7 inches of asphalt above reference point.], 20% gravel, 80% sand.	
					10.0			**Sandy lean clay (CL)**: dark yellowish brown [10YR 4/4], moist, 70% clay, 5% gravel, 25% sand.	sample time: 10:40
				C077S446 (2.0 - 4.0)	8.5	3		**Poorly graded sand (SP)**: yellowish brown [10YR 5/4], 100% sand.	
								No recovery.	
	81	4.0	3.25		7.3	4		**Well-graded sand with gravel (SW)**: yellowish brown [10YR 5/4], angular, dry, Brick fragments., 20% gravel, 80% sand.	sample time: 10:50
					6.6 ▽ 6.3	5		**Lean clay (CL)**: olive [5Y 4/4], dry, 100% clay.	
				C077S447 (4.0 - 8.0)	5.8	6		**Poorly graded sand (SP)**: yellowish brown [10YR 5/4], saturated, 100% sand.	
								Poorly graded sand with silt (SP-SM): dark greenish gray [5GY 4/1], saturated, 90% sand, 10% silt.	
					4.3	7		**Lean clay with sand (CL)**: dark greenish gray [5GY 4/1], saturated, 80% clay, 20% sand.	Water Sample ID: C077G151 & C077G152 taken at 11:45 from 7 to 12 feet bgs.
					4.1			No recovery.	
	100	4.0	4		3.3	8		**Lean clay (CL)**: very dark gray [N 3/], saturated, 100% clay.	
						9			
						10			
						11			
					-0.7	12			

TOTAL DEPTH = 12.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

Report form: CTO 077 LOG Time: 2:22:42 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB39

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-2-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig		Maaike Petrie	NA	12-2-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375		Matthew Waterman	11.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
				C077S448 (0.0 - 2.0)		1		Core through tile.. Concrete core.. **Poorly graded sand with silt (SP-SM)**: dark yellowish brown [10YR 4/4], subrounded, poorly-graded, dry, Some gravel, some mica., odor - no, 10% gravel, 80% sand, 10% silt, HCl reaction - not tested.	sample time: 10:15
				C077S449 (2.0 - 4.0)		2 3		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, moist, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 10:45
						4 5		**Clayey sand (SC)**: dark grayish brown [10YR 4/2], subrounded, poorly-graded, moist, Clay lenses. Geiger Muller tube reading on higher end of background in the hand auger hole, but not statistically significant., odor - no, 15% clay, 80% sand, 5% silt, HCl reaction - not tested.	sample time: 11:15
				C077S450 (4.0 - 8.0)		6		**Lean clay (CL)**: light olive brown [2.5Y 5/3], poorly-graded, stiff, moist, low plasticity, slow dilatancy, medium toughness, medium dry strength, Organic material, shell fragments., odor - no, 95% clay, 5% sand, HCl reaction - not tested.	
						7 8		**Poorly graded sand (SP)**: dark greenish gray [10G 4/1], subrounded, poorly-graded, wet, Water around 7' bgs., odor - no, 5% gravel, 90% sand, 5% silt, HCl reaction - not tested.	Water Sample ID: C077G154 taken at 12:30 from 7 to 12 feet bgs.
						9 10		**Poorly graded sand (SP)**: dark greenish gray [5G 4/1], subrounded, poorly-graded, wet, Wet., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	
						11		**Lean clay (CL)**: very dark greenish gray [10G 3/1], poorly-graded, very soft, wet, medium plasticity, medium toughness, medium dry strength, odor - no, 95% clay, 5% silt, HCl reaction - not tested.	

TOTAL DEPTH = 11.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB39

m: CTO 077 LOG Time: 2:22:56 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A23SB40

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 23	Alameda	NA	12-6-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,347.3 E 6,042,415.3	Maaike Petrie	NA	12-6-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	12.61	Matthew Waterman	11.0	5-25-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
		3.3		C077S451 (1.0 - 2.0) C077S452 (2.0 - 3.0)	11.9 11.1	1 2		**Asphalt** 100% other. **Poorly graded sand with silt and gravel (SP-SM)**: olive brown [2.5Y 4/3], subangular, poorly-graded, dry, Interbedded sand, silt, and gravel., odor - no, 20% gravel, 50% sand, 30% silt, HCl reaction - not tested.	sample time: 15:00 sample time: 15:10
		4.0			8.9 8.5	3 4 5		**Clayey sand (SC)**: dark yellowish brown [10YR 4/4], subrounded, poorly-graded, dry, Sand with clay lenses., odor - no, 20% clay, 80% sand, HCl reaction - not tested. **Silt (ML)**: greenish gray [10Y 5/1], poorly-graded, medium stiff, dry, nonplastic, rapid dilatancy, low toughness, low dry strength, Small dry silt layer., odor - no, 100% silt, HCl reaction - not tested.	
					7.1	6		**Lean clay (CL)**: very dark greenish gray [10Y 3/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	Water Sample ID: C077G155 taken at 13:00 on 12/7/2005 from 6 to 11 feet bgs.
		4.0		C077S453 (7.0 - 8.0)		7 8		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, wet, Wet around 5' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 15:15
					4.2	9 10		**Lean clay (CL)**: very dark greenish gray [10Y 3/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	
					1.6	11		**TOTAL DEPTH = 11.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 23 Alameda	A23SB40

Report form: CTO 077 LOG Time: 1:30:06 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A24SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 24	Alameda	NA	12-14-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,054.8 E 6,043,804.5	Maaike Petrie	NA	12-14-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	12.11	Matthew Waterman	6.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	48	3.8	1.83	C077S461 (1.0 - 2.0)	11.9	0		**Asphalt** 100% other.	
					11.1	1		**Gravelly silt (ML)**: very dark grayish brown [2.5Y 3/2], poorly-graded, hard, dry, nonplastic, rapid dilatancy, medium toughness, low dry strength, odor - no, 30% gravel, 5% sand, 65% silt, HCl reaction - not tested.	sample time: 09:10 Water Sample ID: C077G161 taken at 11:00 from 1 to 6 feet bgs.
					10.5	2		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, moist, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	
				C077S462 (3.0 - 4.0)		3		**Gravelly silt (ML)**: yellow [10YR 7/6], poorly-graded, dry, odor - no, 30% gravel, 70% silt, HCl reaction - not tested.	sample time: 09:15
	75	2.0	1.5		8.3 ▽	4		**Poorly graded sand (SP)**: olive gray [5Y 4/2], subrounded, poorly-graded, moist, Wet around 4' bgs. Gets grayer and finer grained near clay., odor - no, 100% sand, HCl reaction - not tested.	sample time: 09:10 in breathing zone: FID=1.8,O2=20.9,LEL=0 in borehole: FID=2.7,O2=20.9,LEL=0
				C077S463 (5.0 - 6.0)	6.8	5			sample time: 09:30
					6.1	6		**Lean clay (CL)**: very dark greenish gray [10Y 3/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, Bay mud, black organic material., odor - no, 85% clay, 5% sand, 10% other, HCl reaction - not tested.	

TOTAL DEPTH = 6.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 24 Alameda	A24SB01

frm: CTO 077 LOG Time: 2:23:46 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A25SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 25	Alameda	NA	12-19-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,111,468.4 E 6,043,631.9	Maaike Petrie	NA	12-19-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.51	Matthew Waterman	10.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	82	3.8	3.08	C077S481 (1.0 - 1.5)	10.3	0		**Asphalt** 100% other.	
					9.9			**Poorly graded gravel (GP)**: subangular, poorly-graded, wet, odor - no, 90% gravel, 10% sand, HCl reaction - not tested.	
					9.6	1			sample time: 09:20
				C077S482 (2.0 - 2.5)		2		**Silt (ML)**: yellowish brown [10YR 5/8], poorly-graded, stiff, dry, low plasticity, rapid dilatancy, low toughness, low dry strength, odor - no, 100% silt, HCl reaction - not tested.	sample time: 09:25
						3		**Sandy lean clay (CL)**: dark greenish gray [5GY 4/1], poorly-graded, medium stiff, dry, low plasticity, slow dilatancy, medium toughness, medium dry strength, Interbedded fine sand and clays., odor - no, 60% clay, 40% sand, HCl reaction - not tested.	
	90	4.0	3.58		6.7	4		**Lean clay (CL)**: Bay mud, mottled dark and light gray, organic deposits., 100% clay.	sample time: 08:55 in breathing zone: FID=0.02,O2=20.9,LEL=7 in borehole: FID=0.28,O2=20.9,LEL=8 Water Sample ID: C077G171 taken at 09:30 from 5 to 10 feet bgs.
						5			
						6			
					4.0			**Lean clay (CL)**: very dark grayish brown [10YR 3/2], poorly-graded, medium stiff, dry, low plasticity, slow dilatancy, medium toughness, medium dry strength, Lots of organic material., odor - organic, 95% clay, 5% other, HCl reaction - not tested.	
				C077S483 (7.5 - 8.0)	3.3	7			sample time: 09:30
	96	2.0	1.92			8			
						9		**Silty sand (SM)**: very dark gray [2.5Y 3/1], subrounded, poorly-graded, wet, odor - no, 85% sand, 15% silt, HCl reaction - not tested.	
					0.5	10			

TOTAL DEPTH = 10.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
STATE OF CALIFORNIA
8/07

DRAFT

SITE and LOCATION	HOLE NO.
AOC 25 Alameda	A25SB01

Report form: CTO 077 LOG Time: 2:24:06 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A25SB02

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 25	Alameda	NA	12-19-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,111,441.4 E 6,043,680.5	Maaike Petrie	NA	12-19-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.46	Matthew Waterman	10.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					10.0			**Asphalt** 100% other.	
	74	3.5	2.58		9.3	1		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, moist, odor - no, 100% sand, HCl reaction - not tested.	
				C077S484 (1.5 - 2.0)		2		**Clayey sand (SC)**: dark greenish gray [5GY 4/1], subrounded, poorly-graded, wet, Interbedded sands and clays. Organic material., odor - no, 45% clay, 55% sand, HCl reaction - not tested.	sample time: 09:40
					7.5	3			
				C077S485 (3.5 - 4.0)	7.2	4		greenish black [10Y 2.5/1], poorly-graded, wet, Marsh Crust., odor - no, 100% other, HCl reaction - not tested.	sample time: 09:45
	60	4.0	2.42			5		**Sandy lean clay (CL)**: bluish black [5B 2.5/1], poorly-graded, medium stiff, moist, low plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 60% clay, 40% sand, HCl reaction - not tested.	
					5.0	6		**Poorly graded sand with clay (SP-SC)**: very dark greenish gray [10Y 3/1], subrounded, poorly-graded, wet, odor - no, 10% clay, 90% sand, HCl reaction - not tested.	Water Sample ID: C077G172 taken at 11:10 from 5 to 10 feet bgs.
					3.3	7			
				C077S486 (7.5 - 8.0)	2.7	8		**Lean clay (CL)**: very dark grayish brown [10YR 3/2], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, Organic material., odor - no, 90% clay, 10% sand, HCl reaction - not tested.	sample time: 09:50
		2.0				9			
					0.5	10		**Poorly graded sand with clay (SP-SC)**: very dark gray [2.5Y 3/1], subrounded, poorly-graded, wet, odor - no, 10% clay, 90% sand, HCl reaction - not tested.	

TOTAL DEPTH = 10.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
2/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
AOC 25 Alameda	A25SB02

m: CTO 077 LOG Time: 2:24:29 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A25SB03

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 25	Alameda	NA	12-19-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,111,425.6 E 6,043,632.3	Matthew Waterman	NA	12-19-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.56	Matthew Waterman	7.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					9.8	0		**Asphalt** 100% other.	
	54	3.3	1.75		9.6	1		**Sandy silt (ML)**: black [5Y 2.5/1], 40% sand, 60% silt.	
				C077S487 (1.5 - 2.0)		2		**Sandy lean clay (CL)**: very dark gray [2.5Y 3/1], 60% clay, 40% sand.	sample time: 09:55 Water Sample ID: C077G173 taken at 11:00 from 2 to 7 feet bgs.
				C077S488 (3.5 - 4.0)		3			sample time: 10:00
	78	3.0	2.33		6.6	4		**Lean clay with sand (CL)**: very dark greenish gray [10Y 3/1], Interbedded clay and sand., 75% clay, 25% sand.	
						5			
						6			
				C077S489 (6.5 - 7.0)		7			sample time: 10:05
					3.6			**TOTAL DEPTH = 7.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION	HOLE NO.
	AOC 25 Alameda	A25SB03

Report form: CTO 077 LOG Time: 2:24:47 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	A25SB04

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	AOC 25	Alameda	NA	12-19-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,111,153.4 E 6,043,883.5	Maaike Petrie	NA	12-19-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.64	Matthew Waterman	8.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	59	3.8	2.25		11.5			**Asphalt** 100% other.	
					10.6	1		**Poorly graded sand with silt and gravel (SP-SM)**: olive brown [2.5Y 4/3], subangular, poorly-graded, moist, odor - no, 30% gravel, 60% sand, 10% silt, HCl reaction - not tested.	
						2		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, moist, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	
						3			Water Sample ID: C077G174 taken at 12:55 from 3 to 8 feet bgs. sample time: 10:47 in borehole: O2=20.9,LEL=0
	76	4.0	3.04		7.6 ▽	4		**Poorly graded sand with clay (SP-SC)**: very dark gray [2.5Y 3/1], subrounded, poorly-graded, wet, Wet at around 4' bgs. Color gets lighter near 8' bgs., odor - no, 10% clay, 90% sand, HCl reaction - not tested.	
						5			
						6			
						7			
					3.6	8			sample time: 10:51 in borehole: O2=20.9,LEL=0
								TOTAL DEPTH = 8.0 FEET	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

m: CTO 077 LOG Time: 2:25:00 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	D78SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	EBS 078	Alameda	NA	12-3-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,429.8 E 6,041,710.0	Maaike Petrie	NA	12-3-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.49	Matthew Waterman	11.5	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	48	4.0	1.92	C077S501 (0.0 - 1.0)	11.3	1		**Asphalt** odor - no. **Silty sand with gravel (SM)**: brown [10YR 4/3], subangular, poorly-graded, dry, Some organic material., odor - no, 20% gravel, 60% sand, 20% silt, HCl reaction - not tested.	sample time: 12:20
					9.2	2			
				C077S502 (3.0 - 4.0)	8.7	3		**Sandy silt (ML)**: dark yellowish brown [10YR 4/4], poorly-graded, medium stiff, dry, nonplastic, low toughness, low dry strength, odor - no, 10% gravel, 20% sand, 70% silt, HCl reaction - not tested.	sample time: 12:30
	65	4.0	2.58	C077S503 (4.0 - 5.0)		4		**Poorly graded sand with silt (SP-SM)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, moist, Wet at approximately 6.5' bgs. Twigs, organic material at 4' bgs., odor - no, 90% sand, 10% silt, HCl reaction - not tested.	sample time: 12:40
						5			
						6	▽		
					4.5	7		**Poorly graded sand (SP)**: dark greenish gray [10Y 4/1], subrounded, poorly-graded, wet, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	Water Sample ID: C077G181 & C077G182 taken at 13:00 from 6.5 to 11.5 feet bgs.
	88	4.0	3.5			8			
					2.3	9		**Lean clay (CL)**: very dark greenish gray [10Y 3/1], poorly-graded, very soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 95% clay, 5% sand, HCl reaction - not tested.	
						10			
					0.0	11			

TOTAL DEPTH = 11.5 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
EBS 078 Alameda	D78SB01

Report form: CTO 077 LOG Time: 2:25:58 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	D78SB02

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	EBS 078	Alameda	NA	12-3-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,415.3 E 6,041,824.9	Maaike Petrie	NA	12-3-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.83	Matthew Waterman	11.5	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					11.6			Concrete..	
				C077S504 (1.0 - 2.0)	10.3	1		**Silt with gravel (ML)**: brown [10YR 4/3], poorly-graded, medium stiff, dry, nonplastic, low dry strength, Some dark organics., odor - no, 15% gravel, 10% sand, 75% silt, HCl reaction - not tested.	sample time: 10:50
				C077S505 (2.5 - 3.5)	9.3	2		**Silt with sand (ML)**: dark grayish brown [2.5Y 4/2], poorly-graded, medium stiff, dry, nonplastic, low dry strength, odor - no, 5% gravel, 15% sand, 80% silt, HCl reaction - not tested.	sample time: 10:55
						3		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, wet, Wet at approximately 5.5' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	
				C077S506 (5.0 - 6.0)		4			sample time: 11:05
						5			
						6			Water Sample ID: C077G183 & C077G184 taken at 10:30 from 6.5 to 11.5 feet bgs.
						7			
						8			
					3.3	9		**Poorly graded sand with silt (SP-SM)**: dark greenish gray [10Y 4/1], subrounded, poorly-graded, wet, odor - no, 90% sand, 10% silt, HCl reaction - not tested.	
						10			
					1.3	11		**Lean clay (CL)**: very dark greenish gray [10Y 3/1], poorly-graded, very soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 95% clay, 5% sand, HCl reaction - not tested.	
					0.3				

TOTAL DEPTH = 11.5 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION: EBS 078 Alameda

HOLE NO.: D78SB02

tm: CTO 077 LOG Time: 2:26:24 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	D78SB03

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	EBS 078	Alameda	NA	12-3-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,296.0 E 6,041,718.1	Maaike Petrie	NA	12-3-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	13.16	Matthew Waterman	13.0	5-25-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	67	4.0	2.67	C077S507 (1.0 - 2.0)	12.9	1		**Gravelly silt (ML)**: brown [10YR 4/3], poorly-graded, very stiff, dry, low dry strength, Grass and woodchips in top 3". Organic material throughout., odor - no, 20% gravel, 10% sand, 70% silt, HCl reaction - not tested.	sample time: 08:30
				C077S508 (2.0 - 3.0)	11.0	2		**Silt with gravel (ML)**: dark yellowish brown [10YR 4/4], poorly-graded, stiff, dry, nonplastic, low toughness, low dry strength, Organic material., odor - no, 15% gravel, 10% sand, 75% silt, HCl reaction - not tested.	sample time: 08:40
					10.4	3		**Poorly graded sand with silt (SP-SM)**: dark yellowish brown [10YR 4/4], subrounded, 10% gravel, 80% sand, 10% silt.	
	69	4.0	2.75		9.7	4		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, dry, Organic material., odor - no, 90% sand, 5% silt, 5% other, HCl reaction - not tested.	
				C077S509 (6.0 - 7.5)		6	▽	**Poorly graded sand (SP)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, moist, Wet at 6' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 08:50
					5.7	7			
	73	4.0	2.92			8		**Poorly graded sand (SP)**: dark greenish gray [10Y 4/1], subrounded, poorly-graded, wet, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	Water Sample ID: C077G185 & C077G186 taken at 09:30 from 8 to 13 feet bgs.
						9			
						10			
						11			
	100	1.0	1		1.2	12			
					0.2	13		**Lean clay (CL)**: very dark greenish gray [10Y 3/1], poorly-graded, very soft, moist, low plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 90% clay, 10% sand, HCl reaction - not tested.	

TOTAL DEPTH = 13.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
EBS 078 Alameda	D78SB03

Report form: CTO 077 LOG Time: 1:30:12 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	D78SB04

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	EBS 078	Alameda	NA	12-3-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,303.2 E 6,041,825.5	Maaike Petrie	NA	12-3-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	12.67	Matthew Waterman	12.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	25	4.0	1	C077S510 (0.5 - 1.5)	12.4	1		**Silt with sand (ML)**: brown [10YR 4/3], poorly-graded, medium stiff, dry, nonplastic, low toughness, low dry strength, Organic material and grass., odor - no, 10% gravel, 10% sand, 80% silt, HCl reaction - not tested.	sample time: 09:30
				C077S511 (2.0 - 3.0)	10.2	2		**Silt with gravel (ML)**: dark yellowish brown [10YR 4/4], poorly-graded, medium stiff, dry, nonplastic, low dry strength, Some organic material., odor - no, 15% gravel, 10% sand, 75% silt, HCl reaction - not tested.	sample time: 09:40
	71	4.0	2.83			3		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, moist, Wet around 6' bgs., odor - no, 5% gravel, 90% sand, 5% silt, HCl reaction - not tested.	
				C077S512 (5.0 - 6.5)		5			sample time: 09:50
						6			
						7			
	98	4.0	3.92		5.2	8		**Poorly graded sand (SP)**: dark greenish gray [10Y 4/1], subrounded, poorly-graded, wet, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	Water Sample ID: C077G187 & C077G188 taken at 10:00 from 7 to 12 feet bgs.
						9			
					3.2	10		**Lean clay (CL)**: very dark greenish gray [10Y 3/1], poorly-graded, very soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 95% clay, 5% sand, HCl reaction - not tested.	
						11			
					0.7	12			

TOTAL DEPTH = 12.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION: EBS 078 Alameda

HOLE NO.: D78SB04

m: CTO 077 LOG Time: 2:27:06 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	D79SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	EBS 079	Alameda	NA	12-3-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,390.4 E 6,041,910.1	Maaike Petrie	NA	12-3-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	12.02	Matthew Waterman	11.5	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	63	4.0	2.5	C077S521 (1.0 - 2.0)	11.8	1		**Asphalt** 100% other. **Silty sand with gravel (SM)**: brown [10YR 4/3], subangular, poorly-graded, dry, odor - no, 20% gravel, 60% sand, 20% silt, HCl reaction - not tested.	sample time: 12:50
					9.5	2			
				C077S522 (3.0 - 4.0)		3		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, moist, Wet around 6' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 13:00
	83	4.0	3.33			4			
				C077S523 (4.5 - 5.5)		5			sample time: 13:10
						6			
						7			Water Sample ID: C077G191 & C077G192 taken at 13:30 from 6.5 to 11.5 feet bgs.
					4.5	8		**Poorly graded sand (SP)**: dark greenish gray [10Y 4/1], subrounded, poorly-graded, wet, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	
	90	4.0	3.58			9			
					2.8	10		**Lean clay (CL)**: very dark greenish gray [10Y 3/1], poorly-graded, very soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	
					0.5	11			

TOTAL DEPTH = 11.5 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
1/07
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION	HOLE NO.
	EBS 079 Alameda	D79SB01

Report form: CTO 077 LOG Time: 2:27:28 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	D79SB02

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	EBS 079	Alameda	NA	12-5-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,387.1 E 6,042,026.9	Maaike Petrie	NA	12-5-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	12.67	Matthew Waterman	12.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	77	4.0	3.08	C077S524 (0.0 - 1.0)	12.5			**Asphalt** 100% other.	sample time: 08:20
					11.9	1		**Poorly graded sand with silt (SP-SM)**: dark yellowish brown [10YR 3/4], subrounded, poorly-graded, dry, odor - no, 5% gravel, 85% sand, 10% silt, HCl reaction - not tested.	
						2		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, dry, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	
				C077S525 (3.0 - 4.0)		3			sample time: 08:30
	83	4.0	3.33			4			
						5			
				C077S526 (5.5 - 6.5)					sample time: 08:40
					6.7	6		**Silty sand (SM)**: dark yellowish brown [10YR 4/4], subrounded, poorly-graded, moist, Wet at 6.5'.Some organic material., odor - no, 5% gravel, 80% sand, 15% silt, HCl reaction - not tested.	
					5.7	7		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, wet, Wet. Turns grayer near bottom., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	Water Sample ID: C077G193 taken at 10:00 from 7 to 12 feet bgs.
	85	4.0	3.42			8			
						9			
					2.9	10		**Lean clay (CL)**: dark greenish gray [5GY 4/1], poorly-graded, soft, wet, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	
						11			
					0.7	12		**TOTAL DEPTH = 12.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
EBS 079 Alameda	D79SB02

frm: CTO 077 LOG Time: 2:27:58 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	D79SB03

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	EBS 079	Alameda	NA	12-5-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,285.2 E 6,041,911.9	Maaike Petrie	NA	12-5-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	12.37	Matthew Waterman	12.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	73	4.0	2.92	C077S527 (0.0 - 1.0)	12.2	0		**Asphalt** 100% other.	sample time: 10:10
					11.7	1		**Poorly graded sand with silt (SP-SM)**: dark brown [10YR 3/3], subrounded, poorly-graded, dry, odor - no, 5% gravel, 85% sand, 10% silt, HCl reaction - not tested.	
				C077S528 (2.0 - 3.0)		2		**Poorly graded sand with silt (SP-SM)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, dry, Trace gravel., odor - no, 90% sand, 10% silt, HCl reaction - not tested.	sample time: 10:20
						3			
					8.6	4		**Poorly graded sand with silt (SP-SM)**: dark yellowish brown [10YR 4/6], subangular, poorly-graded, moist, Some organic material., odor - no, 10% gravel, 80% sand, 10% silt, HCl reaction - not tested.	
	60	4.0	2.42	C077S529 (4.0 - 5.5)	7.6	5		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, moist, Wet around 6.5' bgs. Sand gets grayer and finer grained near the clay layer., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 10:30
						6			
						7			Water Sample ID: C077G194 & C077G195 taken at 13:00 from 7 to 12 feet bgs.
	90	4.0	3.58			8			
						9			
					2.9	10		**Lean clay (CL)**: dark greenish gray [10Y 4/1], poorly-graded, soft, moist, medium plasticity, rapid dilatancy, low toughness, low dry strength, odor - no, 100% clay, HCl reaction - not tested.	
						11			
					0.4	12		**TOTAL DEPTH = 12.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
EBS 079 Alameda	D79SB03

Report form: CTO 077 LOG Time: 2:28:31 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	D79SB04

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	EBS 079	Alameda	NA	12-5-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,224.7 E 6,042,023.8	Maaike Petrie	NA	12-5-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	12.78	Matthew Waterman	12.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	65	4.0	2.58	C077S530 (1.0 - 2.0) C077S531 (2.0 - 3.0)	12.6 11.9	0 1		**Asphalt** 100% other. **Poorly graded sand with silt (SP-SM)**: dark brown [10YR 3/3], subrounded, poorly-graded, dry, Very fine sand., odor - no, 5% gravel, 85% sand, 10% silt, HCl reaction - not tested.	sample time: 09:10
						2 3		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, moist, Some organic material., odor - no, 5% gravel, 90% sand, 5% silt, HCl reaction - not tested.	sample time: 09:20
		4.0			8.8 7.8	4 5		**Poorly graded sand with silt (SP-SM)**: dark yellowish brown [10YR 4/4], subangular, poorly-graded, moist, Some organic material., odor - no, 10% gravel, 80% sand, 10% silt, HCl reaction - not tested.	
				C077S532 (6.5 - 8.0)		6 7		**Poorly graded sand (SP)**: olive brown [2.5Y 4/4], subrounded, poorly-graded, wet, Turns grayer near the clay layer and sand gets finer with depth. Wet around 6' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 09:30 Water Sample ID: C077G196 taken at 10:20 from 7 to 12 feet bgs.
		4.0				8 9			
					3.6	10 11		**Lean clay (CL)**: dark greenish gray [10Y 4/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, Some organics., odor - no, 100% clay, HCl reaction - not tested.	
					0.8	12		**TOTAL DEPTH = 12.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
EBS 079 Alameda	D79SB04

Form: CTO 077 LOG Time: 2:29:05 PM

BOREHOLE LOG

PROJECT and JOB NUMBER: Navy CLEAN 3 CTO-077		SHEET NO.: 1 of 1	HOLE NO.: D205SB01
DRILLER: Resonant Sonic	SITE and LOCATION: EBS 205 Alameda	OVERBURDEN: NA	BEGUN: 12-13-05
DRILL MAKE AND MODEL: Geoprobe GH40	COORDINATES (NORTHING, EASTING): N 2,111,729.2 E 6,039,637.1	LOGGED BY: Matthew Waterman	ROCK (FT): NA / COMPLETED: 12-13-05
HOLE SIZE DIAMETER (IN): 2 / CORE SIZE DIAMETER (IN): 1.375	GROUND ELEVATION (FT MLLW): 9.20	CHECKED BY: Matthew Waterman	TOTAL DEPTH (FT BGS): 10.0 / UPDATE: 5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					8.2	1		**Concrete.**	
	83	3.0	2.5	C077S541 (1.5 - 2.0) C077S542 (2.0 - 3.5)		2 3		**Poorly graded sand (SP)**: dark yellowish brown [10YR 4/4], 3 inch silt lens at 3.5 ft. Color transition at 4 ft to 5Y 4/4 olive., 100% sand.	sample time: 14:25
	85	4.0	3.4			4 5 6			sample time: 14:30 Water Sample ID: C077G201 taken at 09:45 on 12/14/2005 from 5 to 10 feet bgs.
	100	2.0	2	C077543 (7.0 - 8.0)		7 8 9			sample time: 14:35
					-0.8	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
1/07
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION: EBS 205 Alameda	HOLE NO.: D205SB01

Report form: CTO 077 LOG Time: 2:26:16 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	D205SB02

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	EBS 205	Alameda	NA	12-13-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe GH40	N 2,111,706.6 E 6,039,721.4	Matthew Waterman	NA	12-13-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	8.94	Matthew Waterman	10.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					8.4	0		**Concrete.**	
	76	3.5	2.67	C077S544 (1.0 - 2.0) C077S545 (2.0 - 3.0)		1 2 3		**Poorly graded sand (SP)**: brown [10YR 4/3], Color transition at 3.25 ft to 10Y 4/1 dark greenish gray. Shell fragments between 3.25 and 10 ft, approximately 1 to 2 mm in size and angular., 100% sand.	sample time: 15:15 sample time: 15:20
	85	4.0	3.42			4 5 6			Water Sample ID: C077G202 taken at 09:30 on 12/14/2005 from 5 to 10 feet bgs.
	100	2.0	2	C077S546 (7.0 - 8.0)		7 8 9			sample time: 15:25
					-1.1	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
EBS 205 Alameda	D205SB02

m: CTO 077 LOG Time: 2:25:34 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	S016SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	SWMU 016	Alameda	NA	12-16-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,953.5 E 6,041,175.7	Maaike Petrie	NA	12-16-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.06	Matthew Waterman	10.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	67	4.0	2.67	C077S561 (1.0 - 2.0)	8.9	1		**Silt (ML)**: dark olive brown [2.5Y 3/3], poorly-graded, medium stiff, dry, low plasticity, rapid dilatancy, low toughness, low dry strength, Roots in top 2-3"., odor - no, 10% sand, 90% silt, HCl reaction - not tested.	sample time: 13:05
				C077S562 (2.5 - 4.0)		2		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, dry, Wet around 4' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 13:05
	64	4.0	2.54			3			
						4			sample time: 13:05 in breathing zone: FID=2.57,O2=20.9,LEL=0 in borehole: FID=3.03,O2=20.9,LEL=0 Water Sample ID: C077G211 & C077G212 taken at 13:30 from 5 to 10 feet bgs.
						5			
						6			
						7			
	100	2.0	2			8			sample time: 13:10 in borehole: FID=2.77,O2=20.9,LEL=0
						9			
					0.1	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT	SITE and LOCATION	HOLE NO.
	SWMU 016 Alameda	S016SB01

Report form: CTO 077 LOG Time: 2:29:39 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	S017SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	SWMU 017	Alameda	NA	12-16-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,760.5 E 6,041,666.8	Maaike Petrie	NA	12-16-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	12.34	Matthew Waterman	11.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	70	3.6	2.5	C077S581 (1.0 - 2.0)	11.9	0		**Concrete** 100% other.	
						1		**Poorly graded sand with silt (SP-SM)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, moist, odor - no, 90% sand, 10% silt, HCl reaction - not tested.	sample time: 13:45
				C077S582 (3.0 - 4.0)		2			
						3			sample time: 13:45
	67	4.0	2.67			4			sample time: 13:45 in breathing zone: FID=0.0,O2=20.9,LEL=0 in borehole: FID=0.17,O2=20.9,LEL=0
						5			
						6			Water Sample ID: C077G221 & C077G222 taken at 14:30 from 6 to 11 feet bgs.
					5.8 ▽				
					5.0	7		**Sandy silt (ML)**: yellowish red [5YR 4/6], poorly-graded, medium stiff, wet, low plasticity, rapid dilatancy, medium toughness, medium dry strength, Wet, odor - no, 10% gravel, 30% sand, 60% silt, HCl reaction - not tested.	
	100	3.0	3			8		**Poorly graded sand (SP)**: dark greenish gray [10Y 4/1], subrounded, poorly-graded, wet, odor - no, 100% sand, HCl reaction - not tested.	sample time: 13:55 in borehole: FID=0.77,O2=20.9,LEL=0
						9			
						10			
					1.8				
					1.3	11		**Lean clay (CL)**: dark greenish gray [5GY 4/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 70% clay, 30% silt, HCl reaction - not tested.	

TOTAL DEPTH = 11.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
SWMU 017 Alameda	S017SB01

m: CTO 017 LOG Time: 2:30:02 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	S039SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	SWMU 039	Alameda	NA	12-16-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,112,156.7 E 6,040,799.8	Maaike Petrie	NA	12-16-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	10.80	Matthew Waterman	10.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
					9.8	0		**Concrete** 100% other.	
	78	3.0	2.33	C077S601 (1.0 - 2.0)		1		**Poorly graded sand (SP)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, moist, Wet at 4' bgs. Color change to 2.5 Y 5/6 @ 4' bgs, to 5 Y 4/2 @ 7.5' bgs., odor - no, 100% sand, HCl reaction - not tested.	sample time: 14:40
				C077S602 (2.5 - 4.0)		2			sample time: 14:40
		4.0				3			
						4			sample time: 14:40 in breathing zone: FID=02.0,O2=20.9,LEL=0 in borehole: FID=2.8,O2=20.9,LEL=0 Water Sample ID: C077G231 taken at 15:10 from 5 to 10 feet bgs.
						5			
						6			
						7			
						8			
						9			
					0.8	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
SWMU 039 Alameda	S039SB01

Report form: CTO 077 LOG Time: 2:30:31 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	S152SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	SWMU 152	Alameda	NA	12-13-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
GeoProbe 6600	N 2,113,190.4 E 6,043,665.7	Maaike Petrie	NA	12-13-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.26	Matthew Waterman	10.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	67	3.6	2.42	C077S621 (1.0 - 2.0)	10.8	1		**Concrete** 100% other. **Poorly graded sand with silt (SP-SM)**: olive brown [2.5Y 4/3], subrounded, poorly-graded, moist, Silt in lenses. Shell fragments near top, gets finer grained with depth. Color changes to gray near 5' bgs., odor - no, 90% sand, 10% silt, HCl reaction - not tested.	sample time: 08:30
				C077S622 (3.0 - 4.0)		2			
	65	4.0	2.58			3			sample time: 08:40 Water Sample ID: C077G241 taken at 09:00 from 3.5 to 8.5 feet bgs.
						4			sample time: 08:41 in breathing zone: FID=0.49,O2=20.9,LEL=0 in borehole: FID=0.79,O2=20.9,LEL=0
						5			
					5.8	6		**Silt (ML)**: very dark greenish gray [10Y 3/1], poorly-graded, medium stiff, wet, nonplastic, rapid dilatancy, low toughness, low dry strength, Small layer., odor - no, 100% silt, HCl reaction - not tested.	
					5.3	7		**Lean clay (CH)**: very dark greenish gray [10Y 3/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	
	100	2.0	2		3.5	8			sample time: 08:45 in borehole: FID=0.62,O2=20.9,LEL=0
					3.3	9		**Silt (ML)**: very dark greenish gray [10Y 3/1], poorly-graded, medium stiff, wet, nonplastic, rapid dilatancy, low toughness, low dry strength, Interlayered clays and silts between 5.5 and 8 feet bgs., odor - no, 100% silt, HCl reaction - not tested.	
					1.3	10		**Poorly graded sand (SP)**: dark greenish gray [10Y 4/1], subrounded, poorly-graded, saturated, odor - no, 95% sand, 5% silt, HCl reaction - not tested.	

TOTAL DEPTH = 10.0 FEET

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

.tm: CTO 077 LOG Time: 2:30:53 PM

BORECHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	S173SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	SWMU 173	Alameda	NA	12-19-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,111,672.6 E 6,043,836.3	Maaike Petrie	NA	12-19-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	11.72	Matthew Waterman	10.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	58	4.0	2.33	C077S641 (1.0 - 2.0)	11.6	1		**Silt with sand (ML)**: very dark grayish brown [10YR 3/2], poorly-graded, medium stiff, wet, low plasticity, rapid dilatancy, low toughness, low dry strength, Roots in top inch. Hydrocarbon odor coming off borehole., odor - no, 15% sand, 85% silt, HCl reaction - not tested.	sample time: 08:00
					10.2	2		**Silty gravel with sand (GM)**: very dark grayish brown [10YR 3/2], subangular, poorly-graded, moist, odor - no, 45% gravel, 40% sand, 15% silt, HCl reaction - not tested.	
				C077S642 (3.0 - 4.0)		3			sample time: 08:05
	35	4.0	1.42		7.7	4		**Sandy silt with gravel (ML)**: brown [10YR 4/3], poorly-graded, stiff, moist, low plasticity, rapid dilatancy, low toughness, low dry strength, Wet around 3.5' bgs., odor - no, 15% gravel, 25% sand, 60% silt, HCl reaction - not tested.	sample time: 07:57 in breathing zone: FID=0.47,O2=20.9,LEL=0 in borehole: FID=0.52,O2=20.9,LEL=7 Water Sample ID: C077G251 & C077G252 taken at 08:40 from 5 to 10 feet bgs.
						5			
						6		**Poorly graded sand with silt (SP-SM)**: very dark greenish gray [10Y 3/1], subrounded, poorly-graded, wet, odor - Strong hydrocarbon, 90% sand, 10% silt, HCl reaction - not tested.	
						7			
					4.2				
	0	2.0	0		3.7	8		**Poorly graded gravel with silt (GP-GM)**: very dark greenish gray [10Y 3/1], subangular, poorly-graded, wet, odor - Hydrocarbon, 80% gravel, 10% sand, 10% silt, HCl reaction - not tested. No recovery, driller thinks it was all gravel..	sample time: 08:05 in breathing zone: FID=0.4,O2=20.9,LEL=7 in borehole: FID=500,O2=20.9,LEL=7
						9			
					1.7	10		**TOTAL DEPTH = 10.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
4/07
STATE OF CALIFORNIA

DRAFT

SITE and LOCATION	HOLE NO.
SWMU 173 Alameda	S173SB01

Report form: CTO 077 LOG Time: 2:31:10 PM

BOREHOLE LOG

PROJECT and JOB NUMBER		SHEET NO.	HOLE NO.
Navy CLEAN 3	CTO-077	1 of 1	S392SB01

DRILLER	SITE and LOCATION		OVERBURDEN	BEGUN
Resonant Sonic	SWMU 392	Alameda	NA	12-16-05
DRILL MAKE AND MODEL	**COORDINATES (NORTHING, EASTING)**	**LOGGED BY:**	**ROCK (FT)**	**COMPLETED**
Geoprobe Direct Push Rig	N 2,113,287.0 E 6,042,201.5	Maaike Petrie	NA	12-16-05
HOLE SIZE DIAMETER (IN) / CORE SIZE DIAMETER (IN)	**GROUND ELEVATION (FT MLLW)**	**CHECKED BY:**	**TOTAL DEPTH (FT BGS)**	**UPDATE**
2 / 1.375	13.06	Matthew Waterman	12.0	5-24-06

Organic Vapor Reading (ppm)	Core / Soil Recovery (%)	Core Length / Sampler Advance	Blow Counts or Recovery (ft)	Sampler Type / BEIDMS No.	Elevation (ft. MLLW)	Depth in Feet (below ground surface)	Graphics	Description and Classification	Remarks:
	68	3.9	2.7	C077S661 (1.0 - 2.0)	13.0 12.7	1		**Asphalt** 100% other. **Poorly graded sand with silt and gravel (SP-SM)**: dark grayish brown [2.5Y 4/2], subangular, poorly-graded, moist, odor - no, 15% gravel, 75% sand, 10% silt, HCl reaction - not tested.	sample time: 11:10
				C077S662 (3.0 - 4.0)		2 3		**Poorly graded sand (SP)**: light olive brown [2.5Y 5/4], subrounded, poorly-graded, moist, Wet at 6.2' bgs., odor - no, 95% sand, 5% silt, HCl reaction - not tested.	sample time: 11:10
	75	4.0	3			4 5 6			sample time: 11:05 in breathing zone: FID=2.02,O2=20.9,LEL=0 in borehole: FID=2.88,O2=20.9,LEL=0
	92	4.0	3.7			7 8 9			Water Sample ID: C077G261 taken at 13:00 from 7 to 12 feet bgs. sample time: 11:10 in borehole: FID=1.65,O2=20.9,LEL=0
					3.8	10 11		**Lean clay (CL)**: dark greenish gray [5GY 4/1], poorly-graded, soft, moist, medium plasticity, slow dilatancy, medium toughness, medium dry strength, odor - no, 100% clay, HCl reaction - not tested.	
					1.1	12		**TOTAL DEPTH = 12.0 FEET**	

REGISTERED GEOLOGIST
MATTHEW K. WATERMAN
No. 7096
11/07
STATE OF CALIFORNIA

m: CTO 077 LOG Time: 2:31:31 PM

DRAFT

SITE and LOCATION	HOLE NO.
SWMU 392 Alameda	S392SB01

APPENDIX E

GEOTECHNICAL DATA

Table E-1
Geotechnical Analysis Results

Sample ID/Boring ID	Depth (feet bgs)	Soil Type[a]	Liquid Limit[b]	Plastic Limit[b]	Plasticity Index[b]	Dry Density (pcf)[c]	Moisture Content (percent)[d]	Effective Confined Pressure (psi)[e]	Saturated Hydraulic Conductivity (cm/sec)[e]	Effective Air Permeability (millidarcy)[f]	Air Conductivity (cm/sec)[f]	Total Porosity (dimensionless)[g]	Effective Porosity (dimensionless)[g]	Total Organic Carbon (percent)[h]
C077S026/A02SB02	4–4.5	SM	NP	NP	NP	108.9	13.7	3	9.6E-06	33.21	2.1E-06	0.350	0.350	1.38
C077S028/A02SB03	2.5–4.0	SM	17	14	3	112.1	10.6	3	9.8E-06	703.43	4.5E-05	0.335	0.335	1.64
C077S178/A11SB03	2.5–4.0	SP-SM	NP	NP	NP	98.5	6.6	3	1.3E-03	706.44	4.6E-05	0.416	0.416	0.47
C077S179/A11SB03	6.5–8.0	SP-SM	NP	NP	NP	103.3	16.5	4	1.3E-04	691.21	4.5E-05	0.387	0.387	0.52
C077S265/A15SB02	2.5–3.5	SC	19	12	7	114.4	15.2	3	8.6E-06	37.82	2.4E-06	0.319	0.319	1.81
C077S266/A15SB02	5–6	CL	47	23	24	66.2	54.1	3	5.4E-08	0.152	9.9E-09	0.607	0.607	4.50
C077S281/A17SB01	0.5–2.0	SM	NP	NP	NP	107.5	10.0	3	2.5E-04	606.88	3.9E-05	0.378	0.378	0.64
C077S282/A17SB01	2.5–4.0	SM	NP	NP	NP	102.8	7.6	3	8.6E-04	567.31	3.7E-05	0.389	0.389	0.47
C077S308/A18SB03	2.5–3.0	SP-SM	NP	NP	NP	103.8	6.3	3	1.4E-03	711.52	4.7E-05	0.385	0.385	0.16
C077S311/A18SB04	2.5–3.0	SP-SM	NP	NP	NP	96.5	8.3	3	2.1E-03	513.94	3.3E-05	0.428	0.428	0.33
C077S395/A23SB15	2.5–3.5	SP-SM	NP	NP	NP	102.7	10.8	3	1.7E-03	496.91	3.2E-05	0.390	0.390	0.60
C077S396/A23SB15	6.5–7.5	CL	38	16	22	74.7	49.9	3.6	1.7E-07	0.53	3.5E-08	0.564	0.564	2.87
C077S443/A23SB37	2.0–3.5	SP-SM	NP	NP	NP	103.2	9.5	3	3.6E-04	536.41	3.5E-05	0.390	0.39	0.47
C077S444/A23SB37	5.0–6.5	SM	NP	NP	NP	98.9	26.9	3.3	1.1E-05	181.35	1.2E-05	0.411	0.411	1.83

Notes:
[a] analyzed by SWRCB method
[b] analyzed by ASTM Method D4318
[c] analyzed by ASTM Method D2937
[d] analyzed by ASTM Method D2216
[e] analyzed by ASTM Method D5084
[f] analyzed by API RP40
[g] analyzed by SWRCB method
[h] analyzed by Walkley-Black method

Acronyms/Abbreviations:
API RP – American Petroleum Institute Recommended Practice
ASTM – American Society for Testing and Materials
bgs – below ground surface
CL – inorganic clay of low to medium plasticity; lean clay
cm/sec – centimeters per second
NA – no analysis performed
NP – nonplastic
pcf – pounds per cubic foot
psi – pounds per square inch
SC – clayey sand; sand-clay mixture
SM – silty sand
SP – sand, poorly sorted
SWRCB – (California) State Water Resources Control Board

ATTACHMENT E1

GEOTECHNICAL LABORATORY RESULTS

SUMMARY OF PERMEABILITY TEST RESULTS

PROJECT NAME: IR Site 35, Alameda Point, Alameda, California

EGL JOB NO.: 05-089-004

PROJECT NO.: CTO-0077

CLIENT: Bechtel

DATE: 01-19-06

SUMMARIZED BY: VW

BORING NO	SAMPLE NO	DEPTH (ft)	MOISTURE CONTENT ASTM D2216 (%)	DRY DENSITY ASTM D2937 (pcf)	EFFECTIVE CONFINED PRESSURE (psi)	SATURATED HYDRAULIC CONDUCTIVITY ASTM D5084 (cm/sec)
A02SB02	C077S026	4-4.5	13.7	108.9	3	9.6E-006
A02SB03	C077S028	2.5-4.0	10.6	112.1	3	9.8E-006
A11SB03	C077S178	2.5-4.0	6.6	98.5	3	1.3E-003
A11SB03	C077S179	6.5-8.0	16.5	103.3	4	1.3E-004
A15SB02	C077S265	2.5-3.5	15.2	114.4	3	8.6E-006
A15SB02	C077S266	5-6	54.1	66.2	3	5.4E-008
A17SB01	C077S281	0.5-2.0	10.0	107.5	3	2.5E-004
A17SB01	C077S282	2.5-4.0	7.6	102.8	3	8.6E-004
A18SB03	C077S308	2.5-3.0	6.3	103.8	3	1.4E-003
A18SB04	C077S311	2.5-3.0	8.3	96.5	3	2.1E-003
A23SB15	C077S395	2.5-3.5	10.8	102.7	3	1.7E-003
A23SB15	C077S396	6.5-7.5	49.9	74.7	3.6	1.7E-007
A23SB37	C077S443	2.0-3.5	9.5	103.2	3	3.6E-004
A23SB37	C077S444	5.0-6.5	26.9	98.9	3.3	1.1E-005

SUMMARY OF AIR PERMEABILITY TEST RESULTS

PROJECT NAME: IR Site 35, Alameda Point, California

EGL JOB NO.: 05-089-004

CTO No.: 0072

CLIENT: Betchel

DATE: 02-07-06

SUMMARIZED BY: VW.

BORING NO	SAMPLE NO	MOISTURE CONTENT ASTM D2216	NATIVE STATE AIR PERMEABILITY API RP 40	
			EFFECTIVE PERMEABILITY	AIR CONDUCTIVITY
	(ft)	(%)	(milidarcy)	(cm/sec)
A02SB02	C077S026	13.7	33.21	2.1E-006
A02SB03	C077S028	10.6	703.43	4.5E-005
A11SB03	C077S178	6.6	706.44	4.6E-005
A11SB03	C077S179	16.5	691.21	4.5E-005
A15SB02	C077S265	15.2	37.82	2.4E-006
A15SB02	C077S266	54.1	0.152	9.9E-009
A17SB01	C077S281	10	606.88	3.9E-005
A17SB01	C077S282	7.6	567.31	3.7E-005
A18SB03	C077S308	6.3	711.52	4.7E-005
A18SB04	C077S311	8.4	513.94	3.3E-005
A23SB15	C077S395	2.5-3.5	496.91	3.2E-005
A23SB15	C077S396	6.5-7.5	0.53	3.5E-008
A23SB37	C077S443	2.0-3.5	536.41	3.5E-005
A23SB37	C077S444	5.0-6.5	181.35	1.2E-005

SUMMARY OF LABORATORY TEST RESULTS
ATTERBERG LIMIT

PROJECT NAME: IR Ste 35, Alameda Point, Alameda, California

EGL Project No. 05-089-004

Job No.: CTO-0077

Client: Bechtel

DATE: 01-23-06

Summarized by: VW

BORING NO	SAMPLE NO	DEPTH (ft)	ATTERBERG LIMITS ASTM D 4318 *(LL,PL,PI)
A02SB02	C077S026	4-4.5	NP
A02SB03	C077S028	2.5-4.0	17,14,3
A11SB03	C077S178	2.5-4.0	NP
A11SB03	C077S179	6.5-8.0	NP
A15SB02	C077S265	2.5-3.0	19,12,7
A15SB02	C077S266	5-6	47,23,24
A17SB01	C077S281	0.5-2.0	NP
A17SB01	C077S282	2.5-4.0	NP
A18SB03	C077S308	2.5-3.0	NP
A18SB04	C077S311	2.5-3.0	NP
A23SB15	C077S395	2.5-3.5	NP
A23SB15	C077S396	6.5-7.5	38,16,22
A23SB37	C077S443	2.0-3.5	NP
A23SB37	C077S444	5.0-6.5	NP

*LL,PL,PI = Liquid Limit, Plastic Limit, Plasticity Index, NP = Non-plastic

SUMMARY OF LABORATORY TEST RESULTS
TOTAL ORGANIC CARBON

PROJECT NAME: IR Ste 35, Alameda Point,
Alameda, California

EGL Project No. 05-089-004

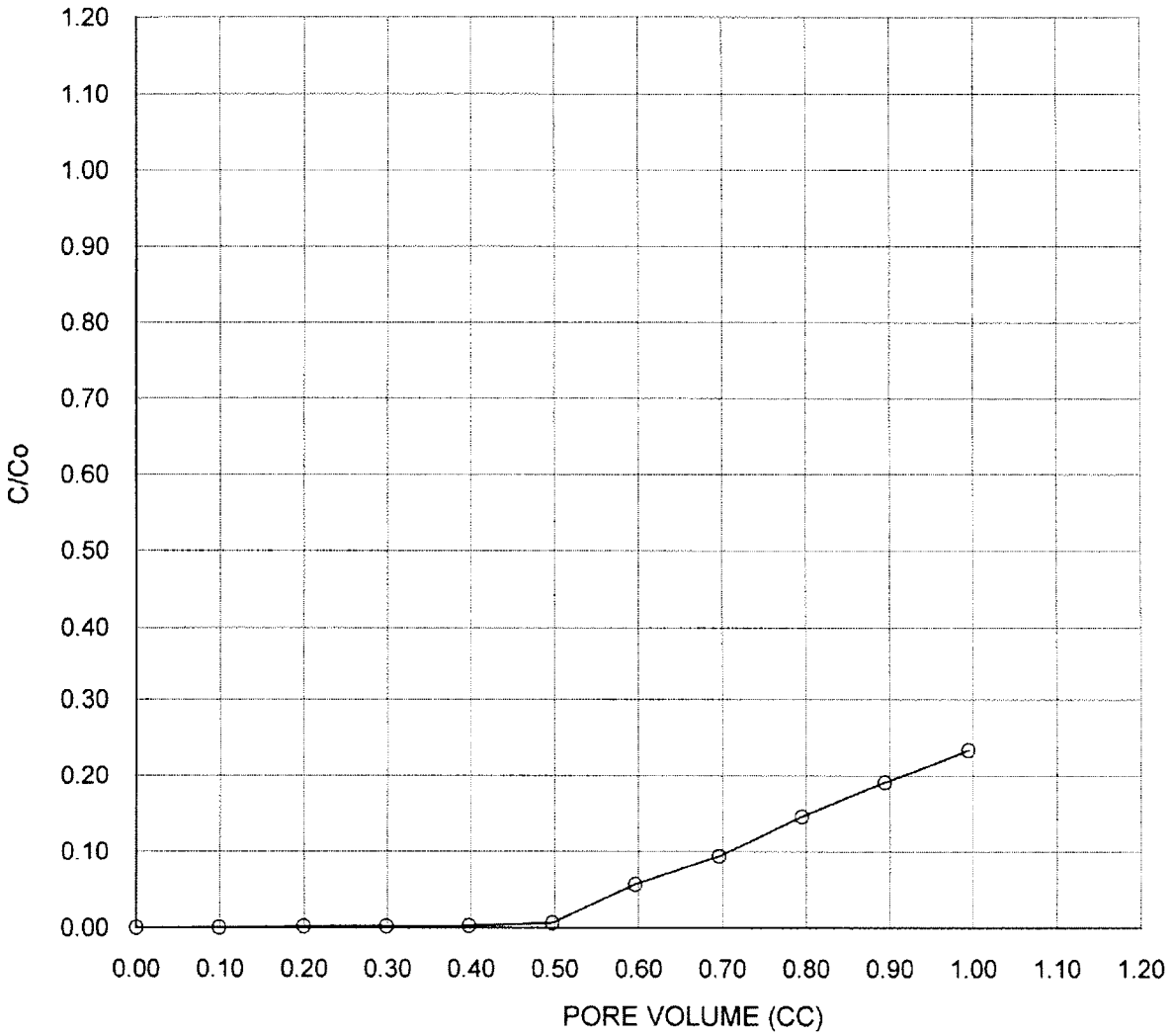
Job No.: CTO-0077

Client: Bechtel

DATE: 01-23-06

Summarized by: VW

BORING NO.	SAMPLE NO	DEPTH (ft)	TOTAL ORGANIC (Walkley-Black) (%)
A02SB02	C077S026	4-4.5	1.38
A02SB03	C077S028	2.5-4.0	1.64
A11SB03	C077S178	2.5-4.0	0.47
A11SB03	C077S179	6.5-8.0	0.52
A15SB02	C077S265	2.5-3.0	1.81
A15SB02	C077S266	5-6	4.50
A17SB01	C077S281	0.5-2.0	0.64
A17SB01	C077S282	2.5-4.0	0.47
A18SB03	C077S308	2.5-3.0	0.16
A18SB04	C077S311	2.5-3.0	0.33
A23SB15	C077S395	2.5-3.5	0.60
A23SB15	C077S396	6.5-7.5	2.87
A23SB37	C077S443	2.0-3.5	0.47
A23SB37	C077S444	5.0-6.5	1.83



SYMBOL	SAMPLE ID	DEPTH (FT)	SOIL TYPE	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	TOTAL POROSITY	EFFECTIVE POROSITY
○	A02SB02/ C077S026	4-4.5	SM	108.9	13.7	0.350	**0.350**

Environmental Geotechnology Laboratory

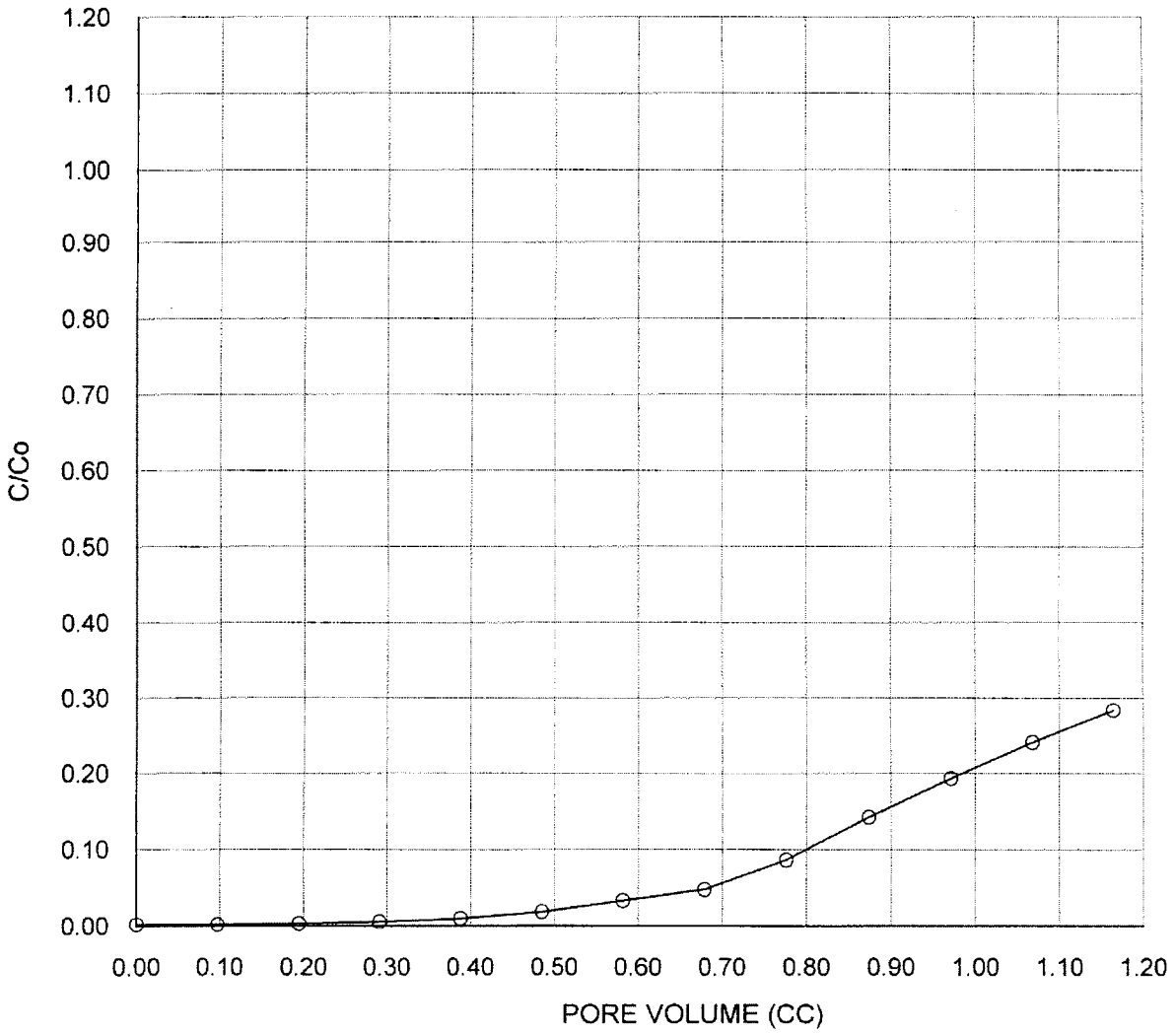
PROJECT NAME: IR Site 35
Alameda Point, Alameda, CA
Client: Bechtel
Job No.: CTO-0077
EGL Project No.: 05-089-004

BROMIDE BREAKTHROUGH METHOD

(SWRCB)

01/06

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SOIL TYPE	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	TOTAL POROSITY	EFFECTIVE POROSITY
○	A02SB03/ C077S028	2.5-4.0	SM	112.1	10.6	0.335	**0.335**

Environmental Geotechnology Laboratory

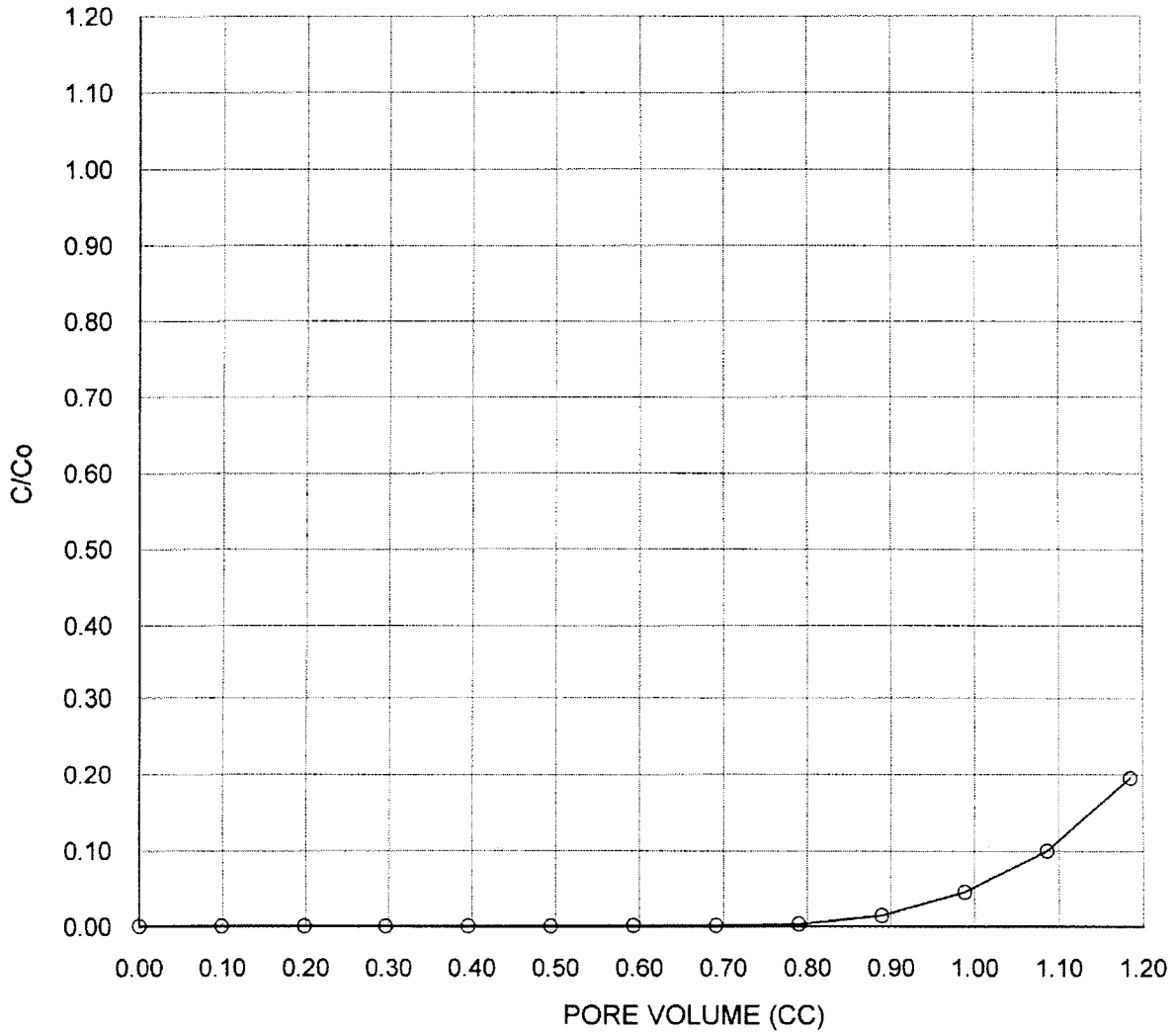
PROJECT NAME: IR Site 35
Alameda Point, Alameda, CA
Client: Bechtel
Job No.: CTO-0077
EGL Project No.: 05-089-004

BROMIDE BREAKTHROUGH METHOD

(SWRCB)

01/06

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SOIL TYPE	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	TOTAL POROSITY	EFFECTIVE POROSITY
○	A11SB03/ C077S178	2.5-4.0	SP-SM	98.5	6.6	0.416	**0.416**

Environmental Geotechnology Laboratory

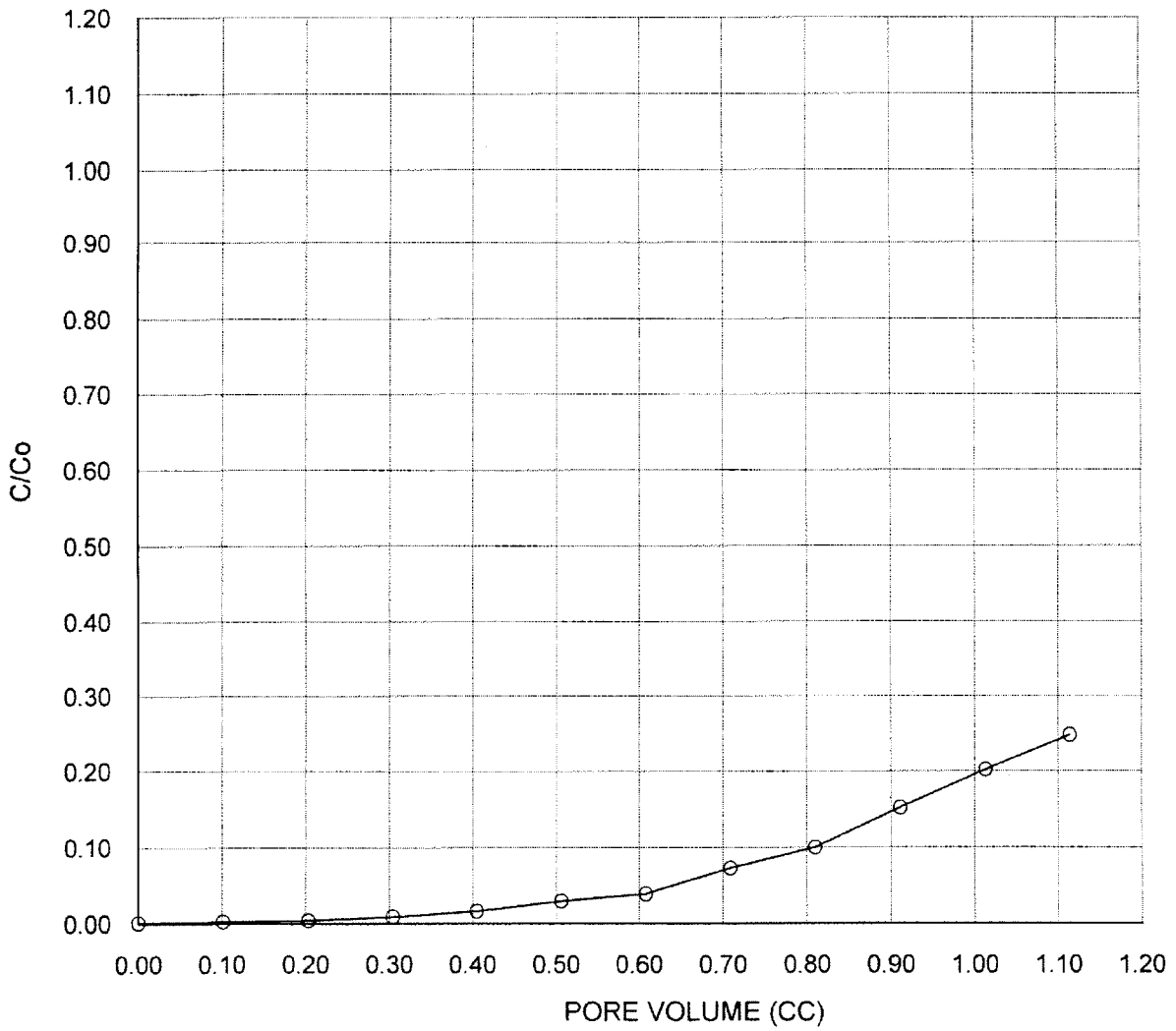
PROJECT NAME: IR Site 35
Alameda Point, Alameda, CA
Client: Bechtel
Job No.: CTO-0077
EGL Project No.: 05-089-004

BROMIDE BREAKTHROUGH METHOD

(SWRCB)

01/06

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SOIL TYPE	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	TOTAL POROSITY	EFFECTIVE POROSITY
○	A11SB03/ C077S179	6.5-8.0	SP-SM	103.3	16.5	0.387	**0.387**

Environmental Geotechnology Laboratory

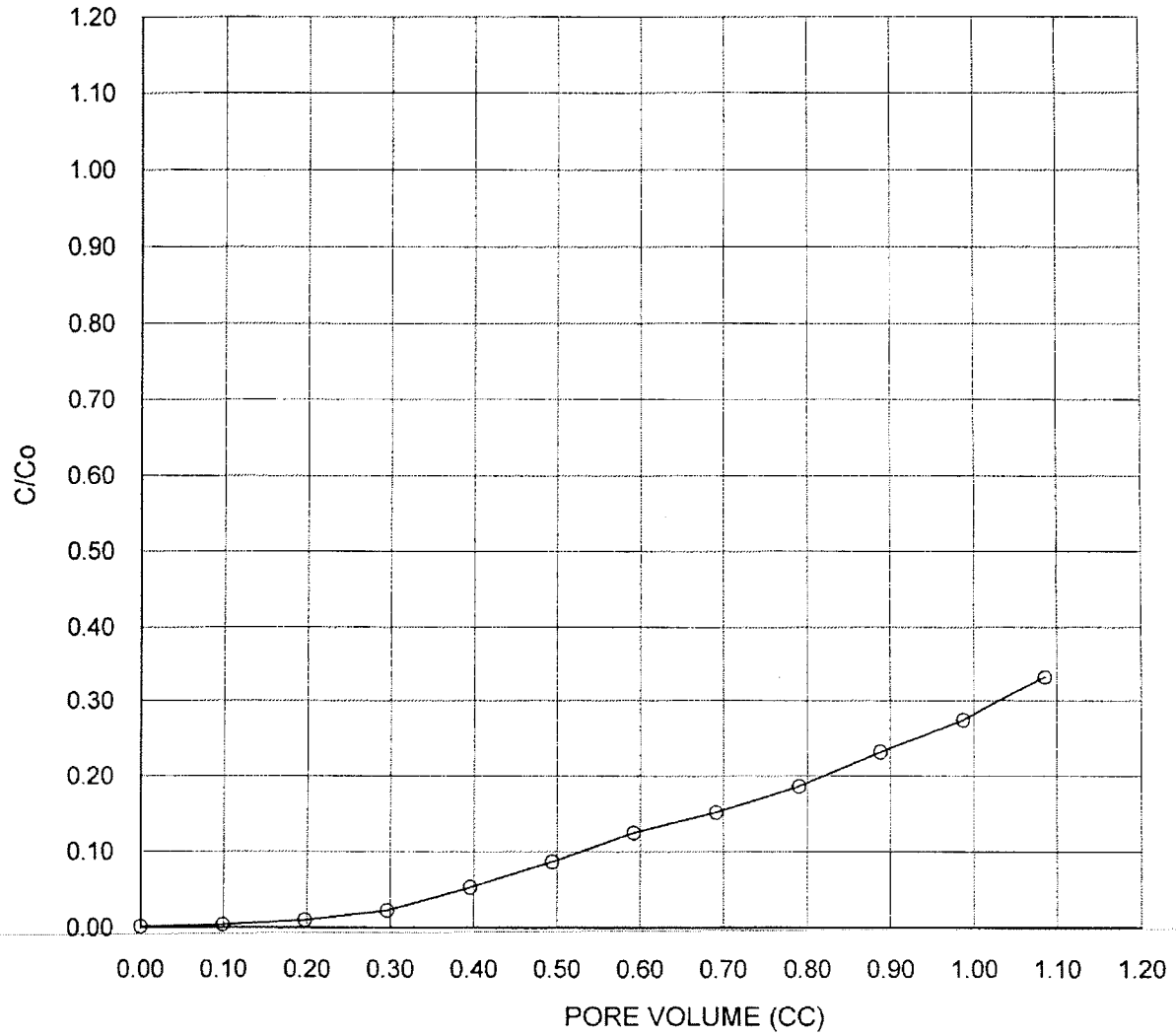
PROJECT NAME: IR Site 35
Alameda Point, Alameda, CA
Client: Bechtel
Job No.: CTO-0077
EGL Project No.: 05-089-004

BROMIDE BREAKTHROUGH METHOD

(SWRCB)

01/06

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SOIL TYPE	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	TOTAL POROSITY	EFFECTIVE POROSITY
○	A15SB02/ C077S265	2.5-3.5	SC	15.2	114.4	0.319	**0.319**

Environmental Geotechnology Laboratory

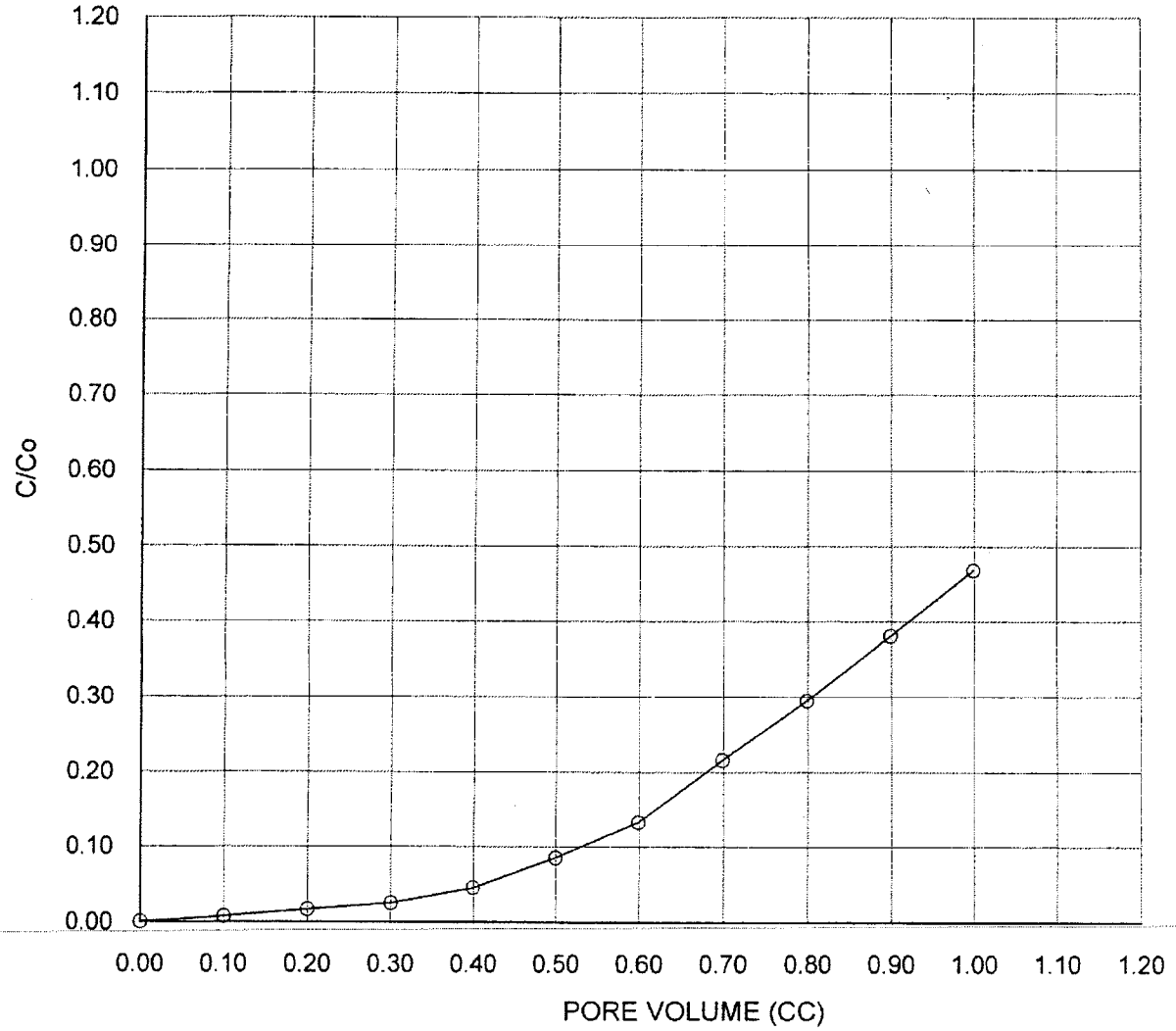
PROJECT NAME: IR Site 35
Alameda Point, Alameda, CA
Client: Bechtel
Job No.: CTO-0077
EGL Project No.: 05-089-004

BROMIDE BREAKTHROUGH METHOD

(SWRCB)

02/06

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SOIL TYPE	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	TOTAL POROSITY	EFFECTIVE POROSITY
O	A15SB02/ C077S266	5-6	CL	66.2	54.1	0.607	**0.607**

Environmental Geotechnology Laboratory

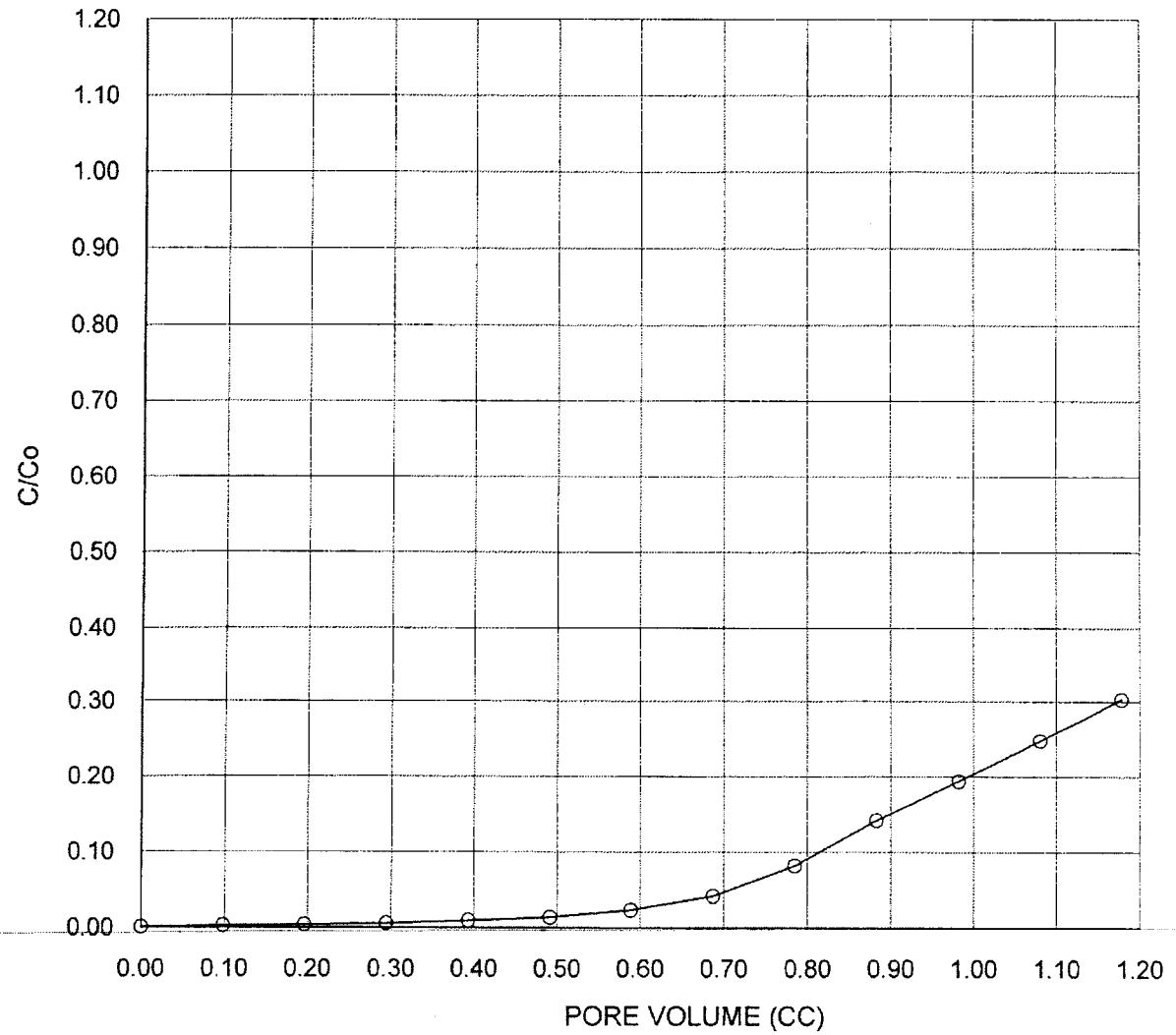
PROJECT NAME: IR Site 35
Alameda Point, Alameda, CA
Client: Bechtel
Job No.: CTO-0077
EGL Project No.: 05-089-004

BROMIDE BREAKTHROUGH METHOD

(SWRCB)

02/06

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SOIL TYPE	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	TOTAL POROSITY	EFFECTIVE POROSITY
○	A17SB01/ C077S281	0.5-2.0	SM	107.5	10.0	0.378	**0.378**

Environmental Geotechnology Laboratory

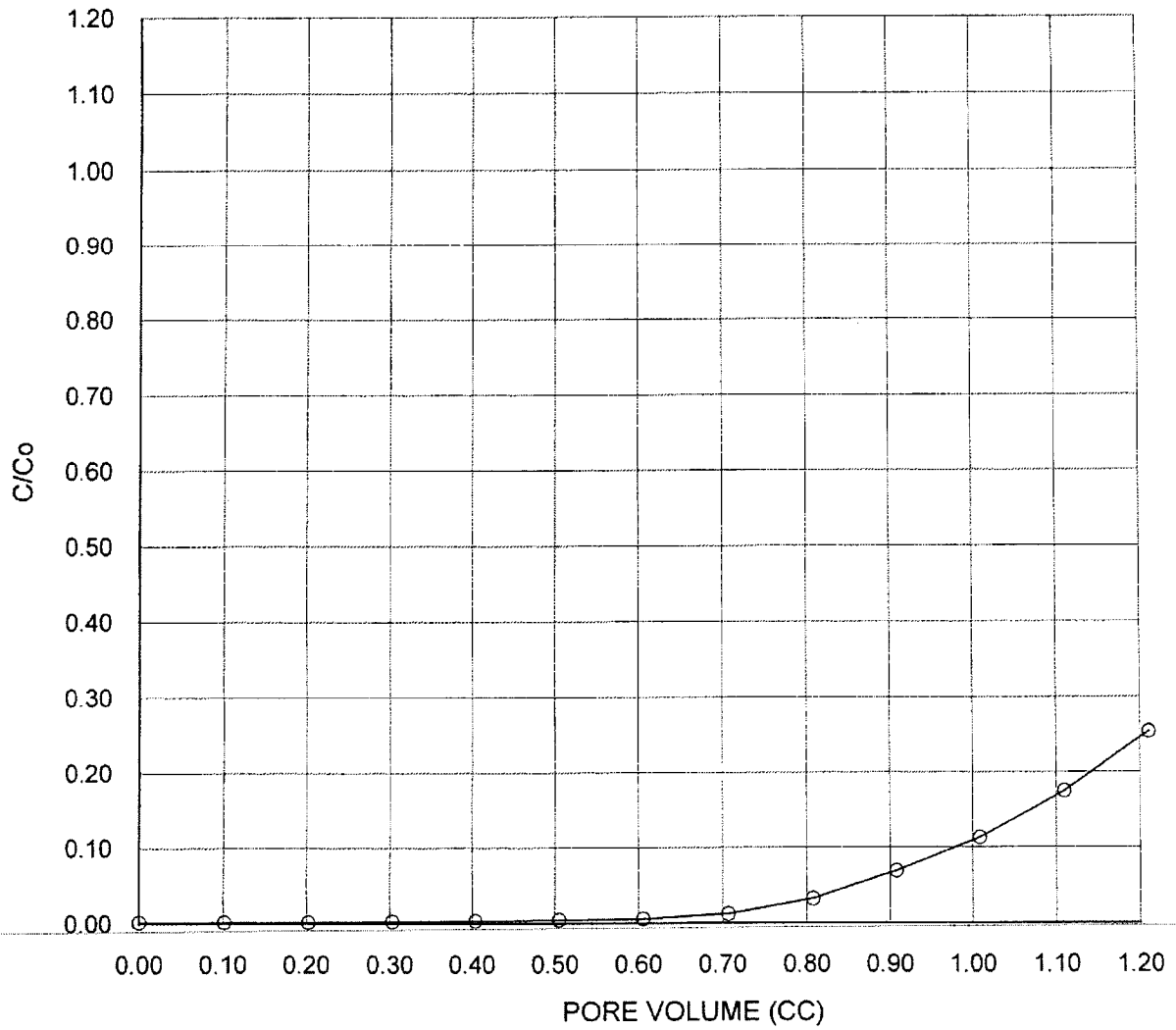
PROJECT NAME: IR Site 35
Alameda Point, Alameda, CA
Client: Bechtel
Job No.: CTO-0077
EGL Project No.: 05-089-004

BROMIDE BREAKTHROUGH METHOD

(SWRCB)

01/06

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SOIL TYPE	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	TOTAL POROSITY	EFFECTIVE POROSITY
○	A17SB01/ C077S282	2.5-4.0	SM	102.8	7.6	0.389	**0.389**

Environmental Geotechnology Laboratory

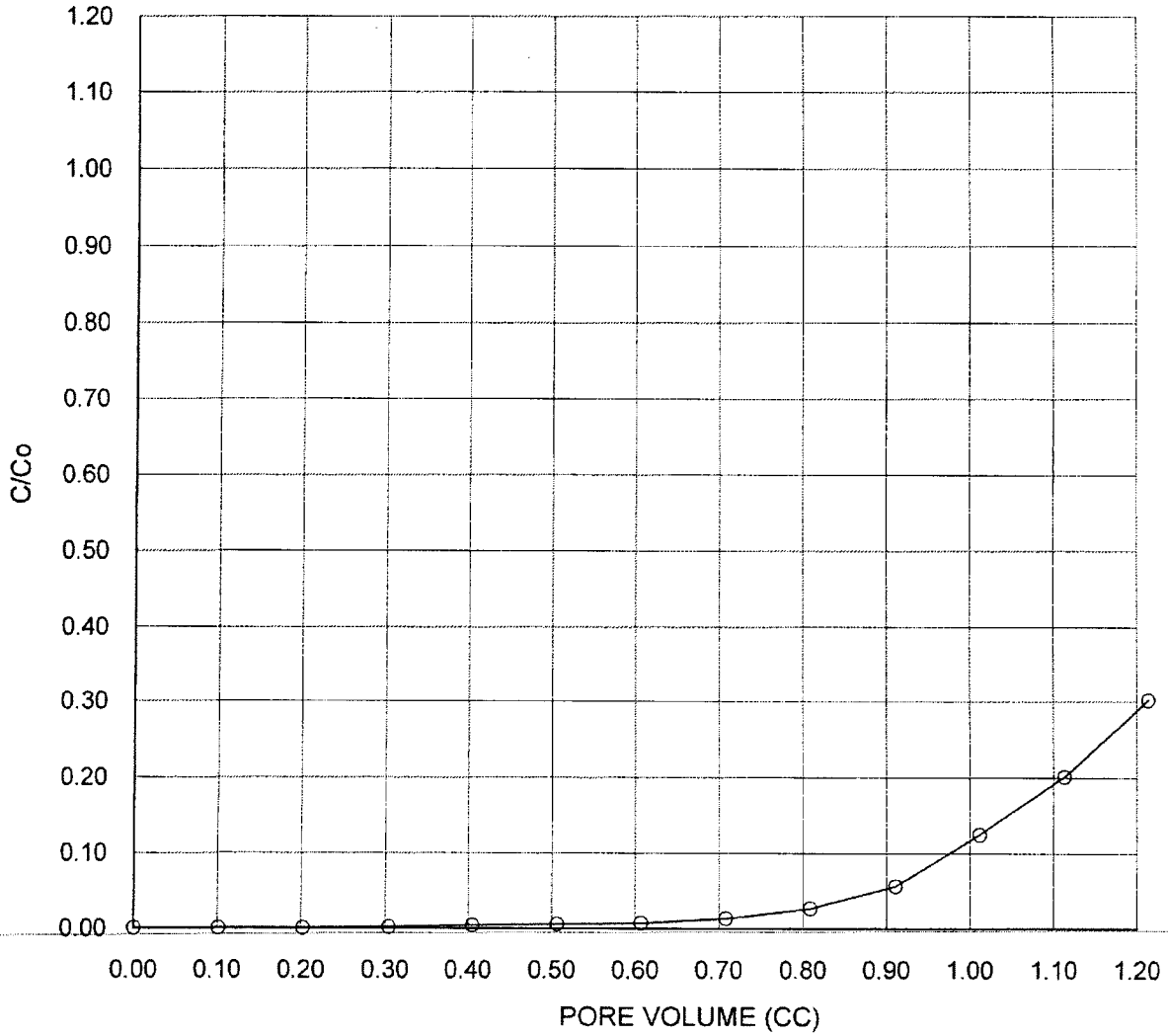
PROJECT NAME: IR Site 35
Alameda Point, Alameda, CA
Client: Bechtel
Job No.: CTO-0077
EGL Project No.: 05-089-004

BROMIDE BREAKTHROUGH METHOD

(SWRCB)

01/06

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SOIL TYPE	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	TOTAL POROSITY	EFFECTIVE POROSITY
○	A18SB03/ C077S308	2.5-3.0	SP-SM	103.8	6.3	0.385	**0.385**

Environmental Geotechnology Laboratory

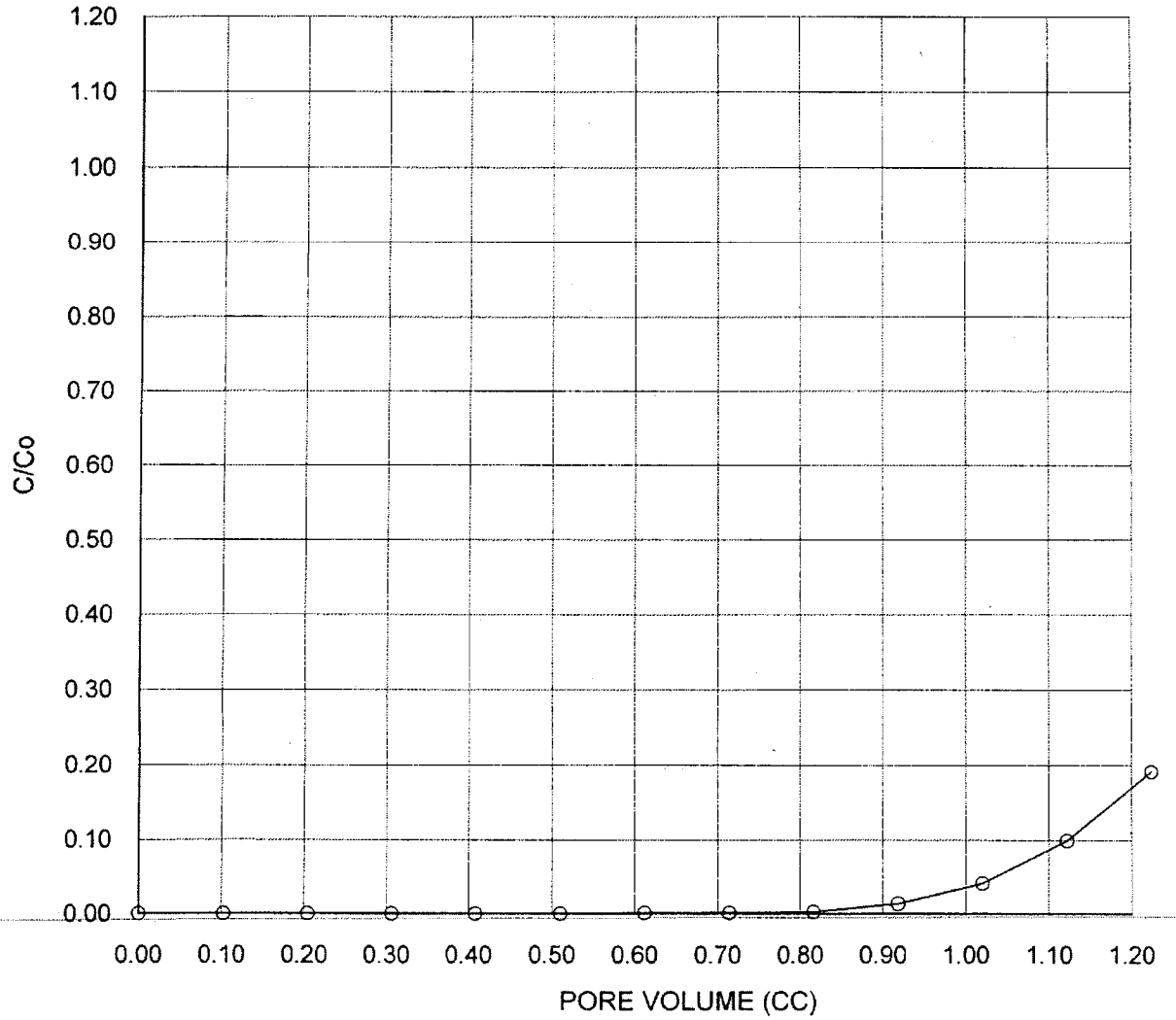
PROJECT NAME: IR Site 35
Alameda Point, Alameda, CA
Client: Bechtel
Job No.: CTO-0077
EGL Project No.: 05-089-004

BROMIDE BREAKTHROUGH METHOD

(SWRCB)

01/06

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SOIL TYPE	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	TOTAL POROSITY	EFFECTIVE POROSITY
○	A18SB04/ C077S311	2.5-3.0	SP-SM	96.5	8.3	0.428	**0.428**

Environmental Geotechnology Laboratory

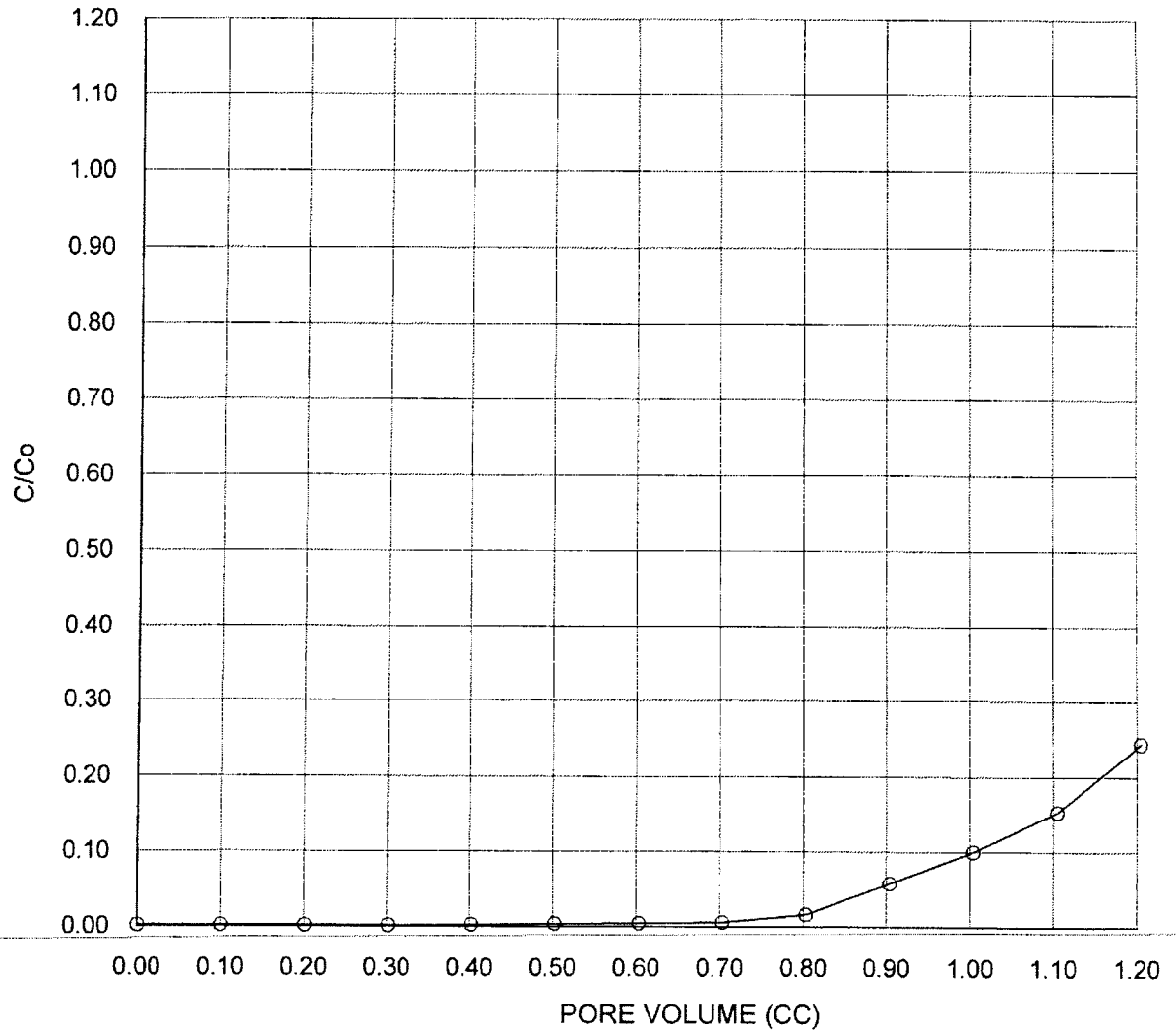
PROJECT NAME: IR Site 35
Alameda Point, Alameda, CA
Client: Bechtel
Job No.: CTO-0077
EGL Project No.: 05-089-004

BROMIDE BREAKTHROUGH METHOD

(SWRCB)

01/06

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SOIL TYPE	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	TOTAL POROSITY	EFFECTIVE POROSITY
○	A23SB15/ C077S395	2.5-3.5	SP-SM	102.7	10.8	0.390	**0.390**

Environmental Geotechnology Laboratory

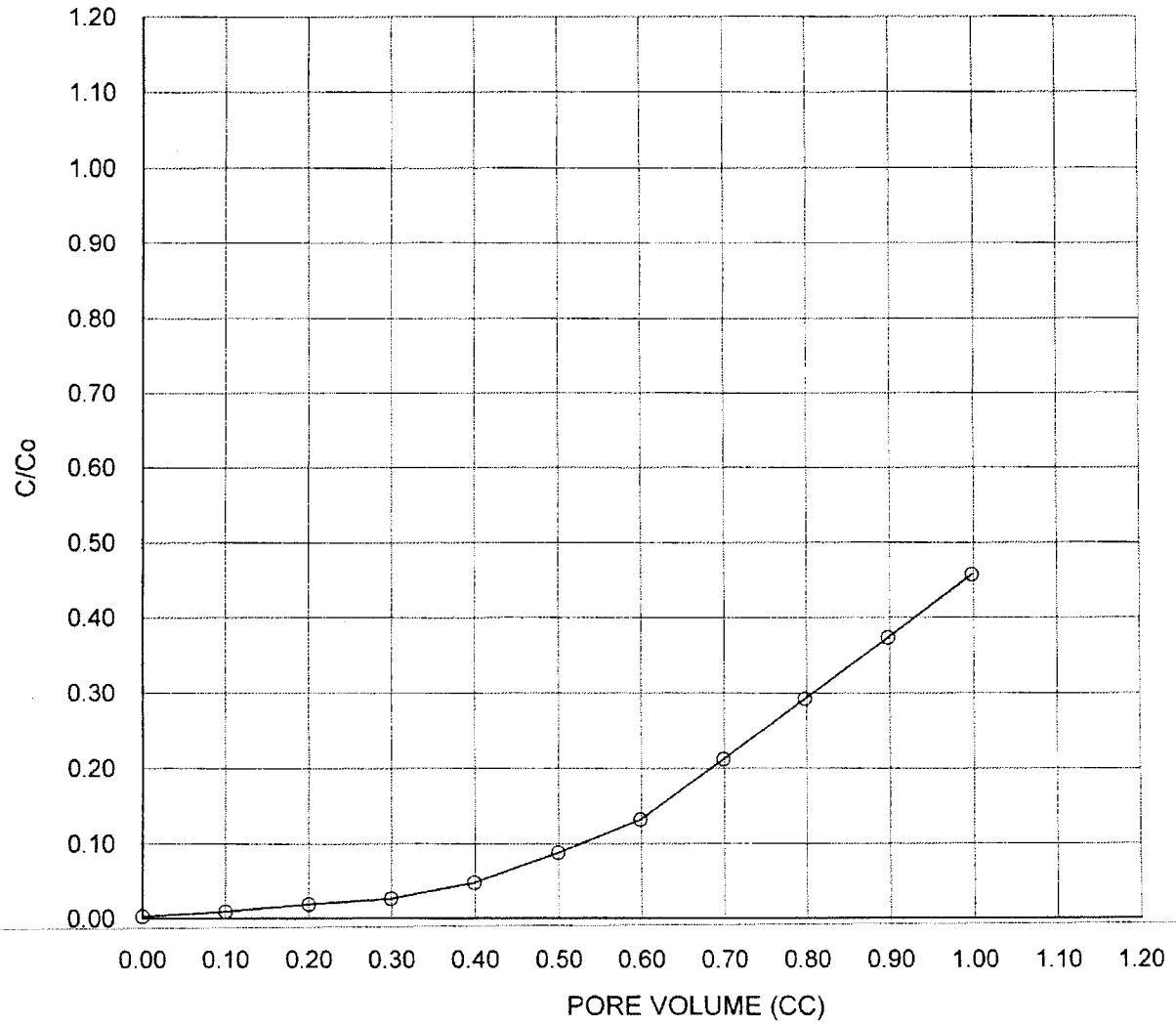
PROJECT NAME: IR Site 35
Alameda Point, Alameda, CA
Client: Bechtel
Job No.: CTO-0077
EGL Project No.: 05-089-004

BROMIDE BREAKTHROUGH METHOD

(SWRCB)

01/06

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SOIL TYPE	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	TOTAL POROSITY	EFFECTIVE POROSITY
O	A23SB15/ C077S396	6.5-7.5	CL	74.7	49.9	0.564	**0.564**

Environmental Geotechnology Laboratory

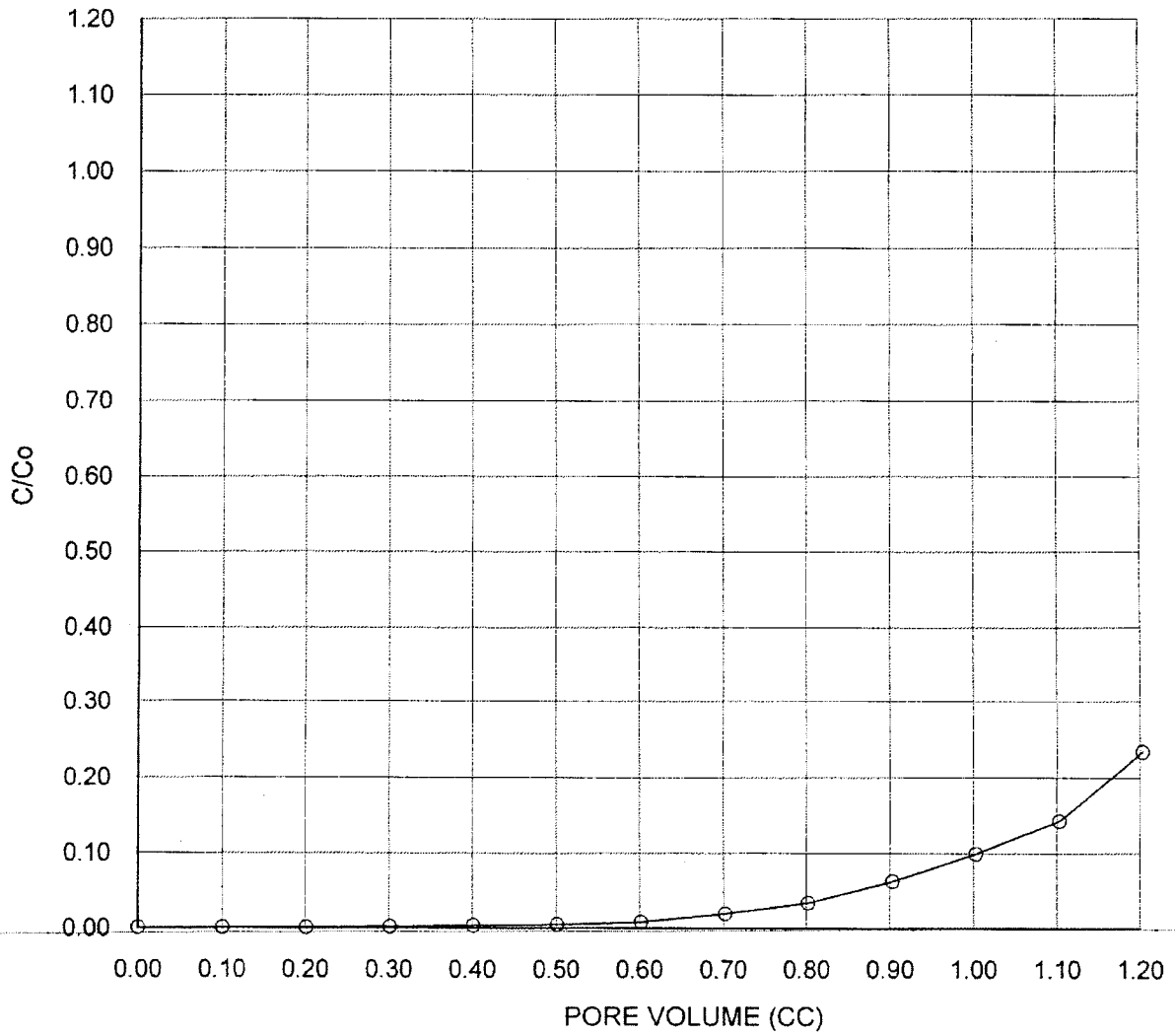
PROJECT NAME: IR Site 35
Alameda Point, Alameda, CA
Client: Bechtel
Job No.: CTO-0077
EGL Project No.: 05-089-004

BROMIDE BREAKTHROUGH METHOD

(SWRCB)

01/06

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SOIL TYPE	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	TOTAL POROSITY	EFFECTIVE POROSITY
○	A23SB37/ C077S443	2.0-3.5	SP-SM	103.2	9.5	0.390	**0.39**

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Job No.: CTO-0077
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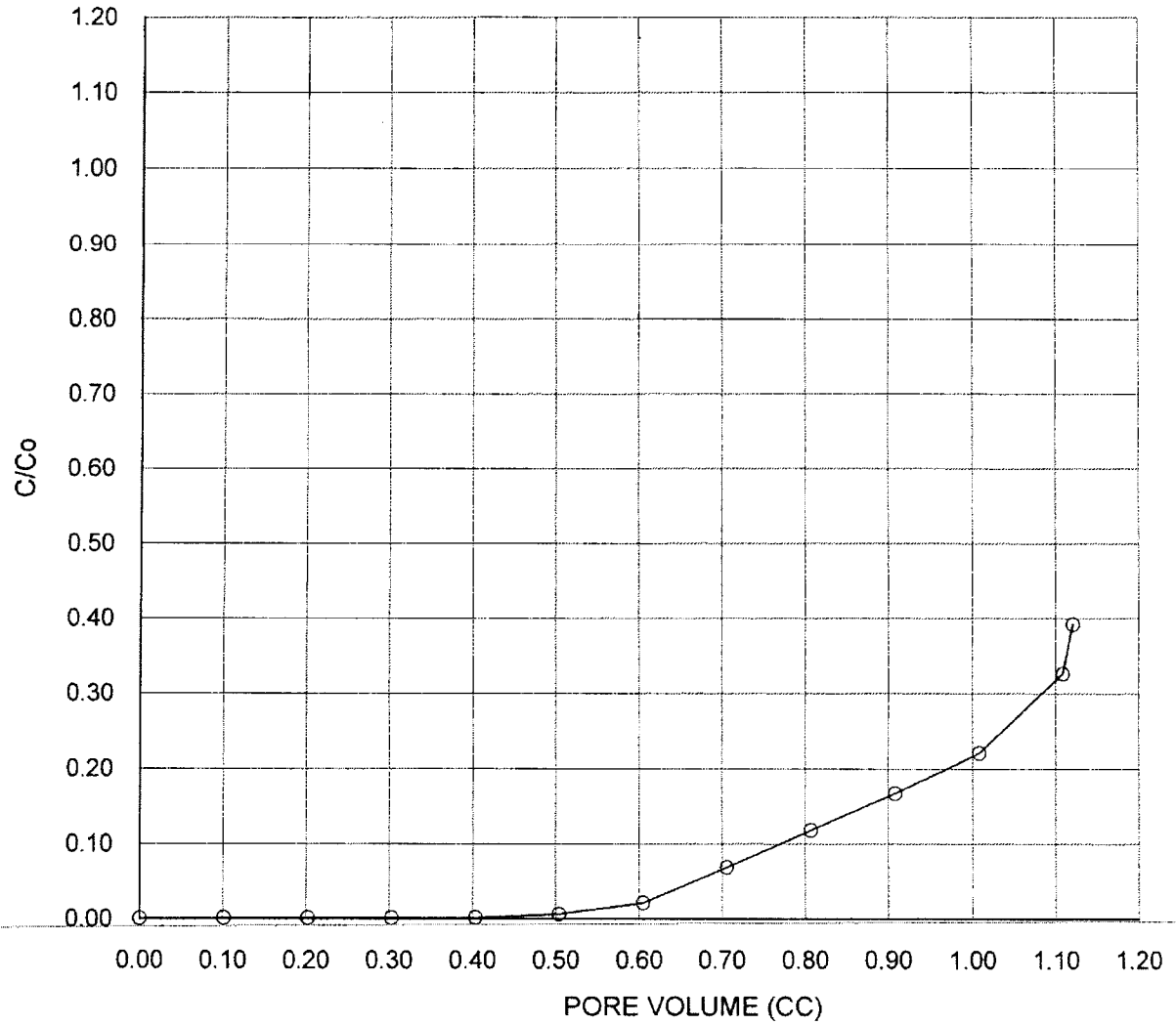
BROMIDE BREAKTHROUGH METHOD

(SWRCB)

01/06

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SOIL TYPE	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	TOTAL POROSITY	EFFECTIVE POROSITY
○	A23SB37/ C077S444	5.0-6.5	SM	98.9	26.9	0.411	**0.411**

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PROJECT NAME: IR Site 35
Alameda Point, Alameda, CA
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Job No.: CTO-0077
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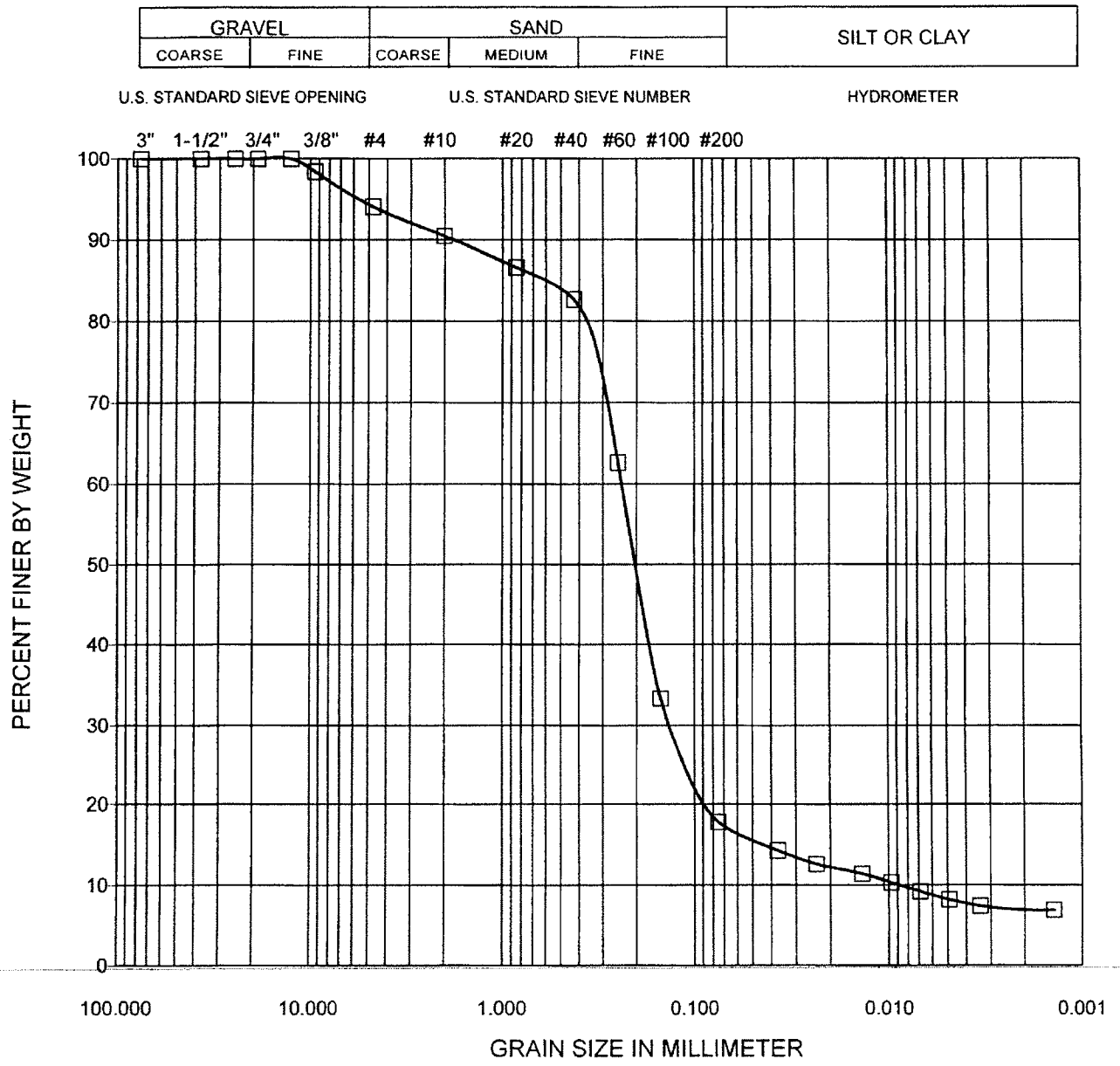
BROMIDE BREAKTHROUGH METHOD

(SWRCB)

01/06

FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	A02SB02	C077S026	4-4.5	TUBE	SM	NP	NP

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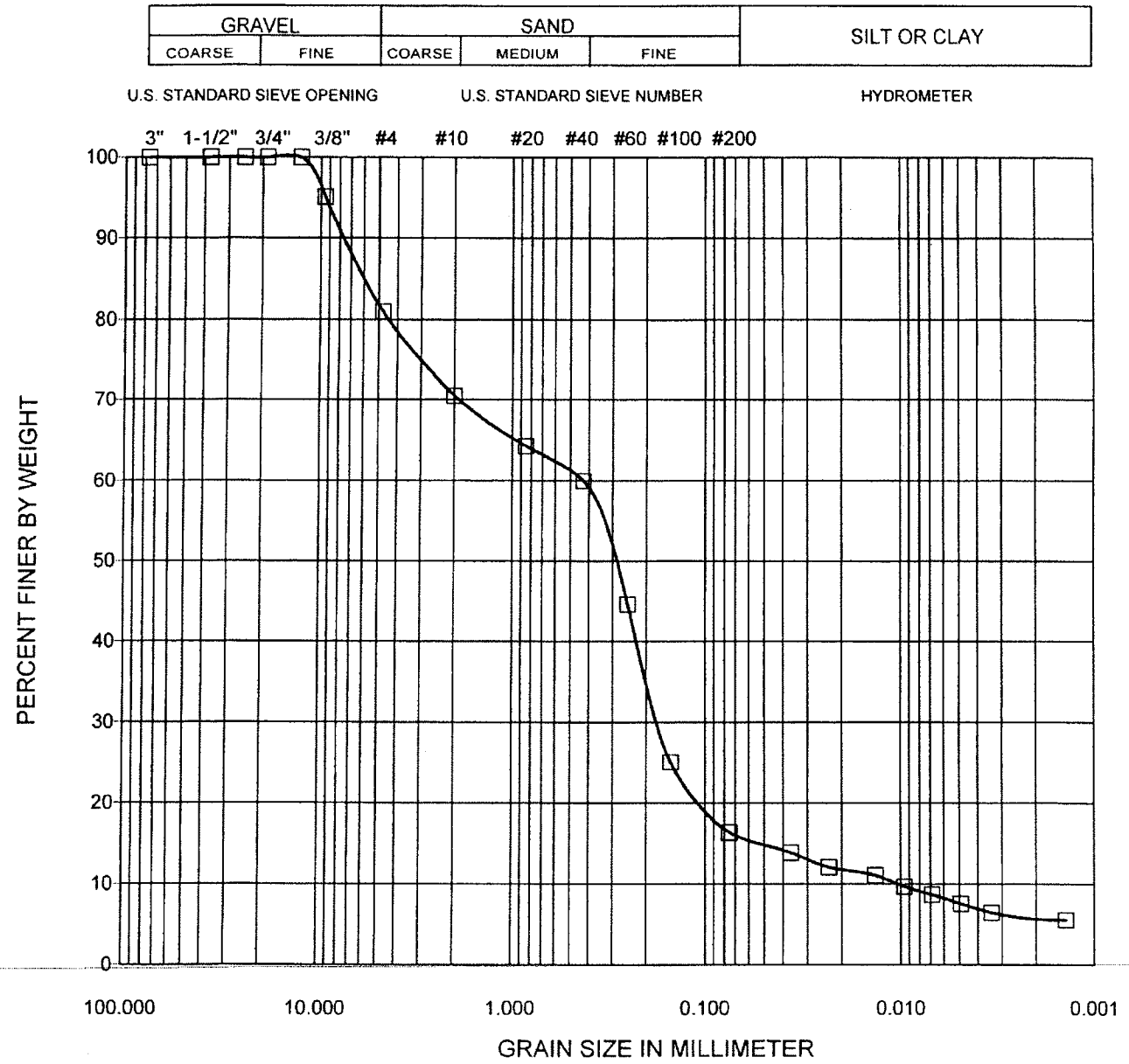
GRAIN SIZE DISTRIBUTION CURVE

(ASTM D422)

01/06

FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	A02SB03	C077S028	2.5-4.0	BULK	SM	17	3

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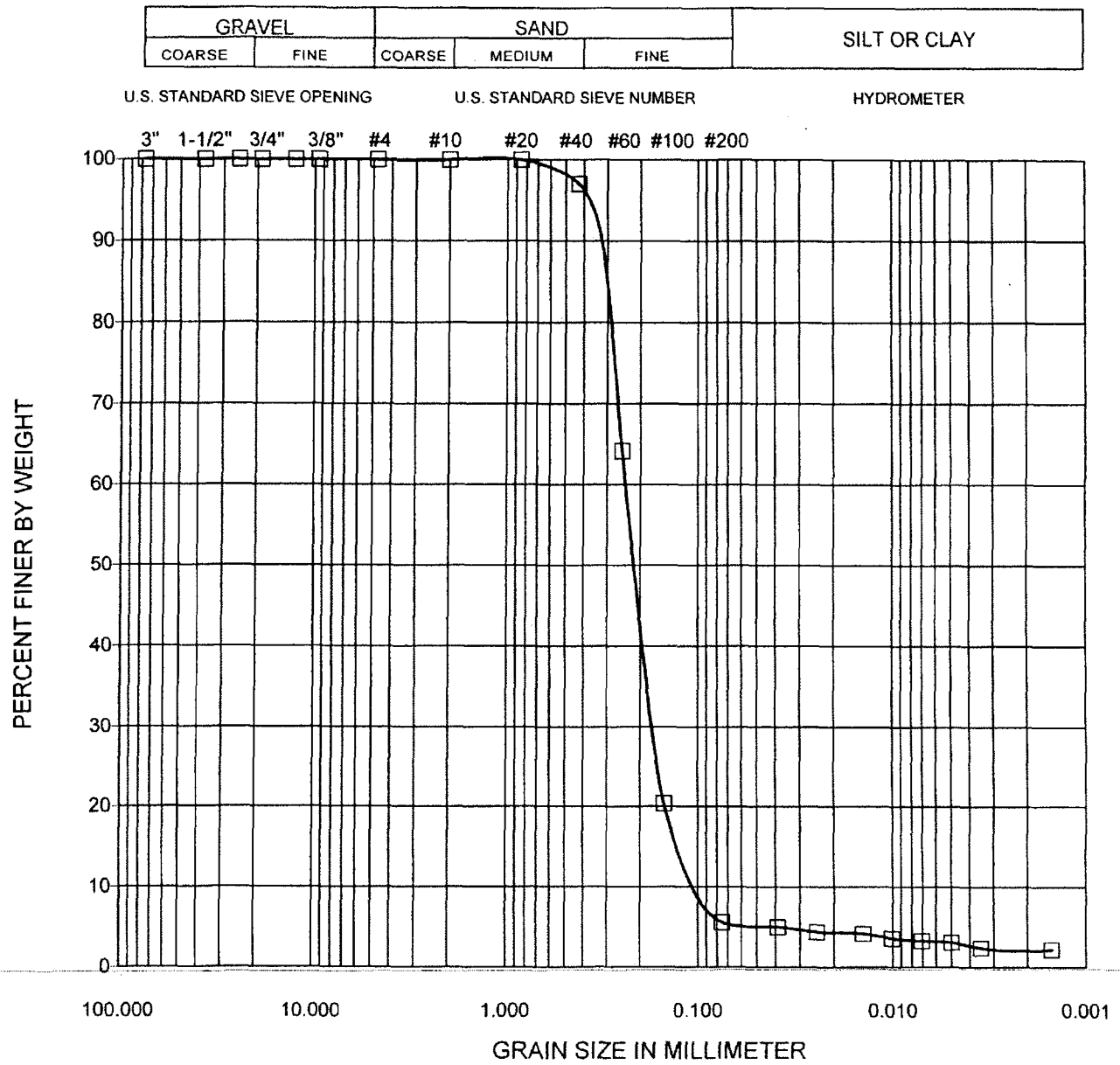
Client: Bechtel
Job No. CTO-0077
EGL Project No.: 05-089-004

GRAIN SIZE DISTRIBUTION CURVE

(ASTM D422)

02/06

FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	A11SB03	C077S178	2.5-4.0	BULK	SP-SM	NP	NP

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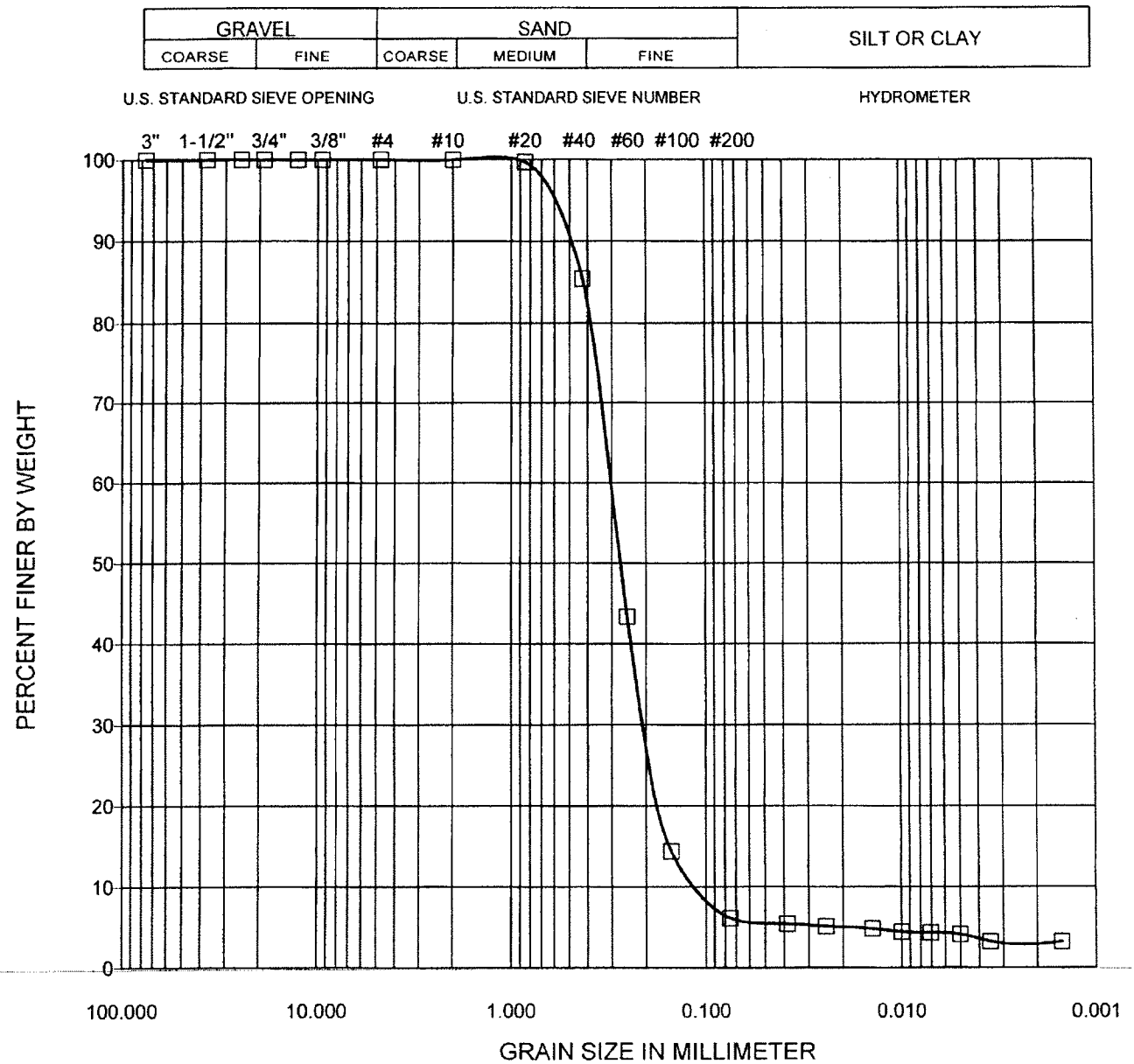
Job No. CTO-0077
EGL Project No.: 05-089-004

GRAIN SIZE DISTRIBUTION CURVE

(ASTM D422)

01/06

FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	A11SB03	C077S179	6.5-8.0	TUBE	SP-SM	NP	NP

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EGL Project No.: 05-089-004

GRAIN SIZE DISTRIBUTION CURVE

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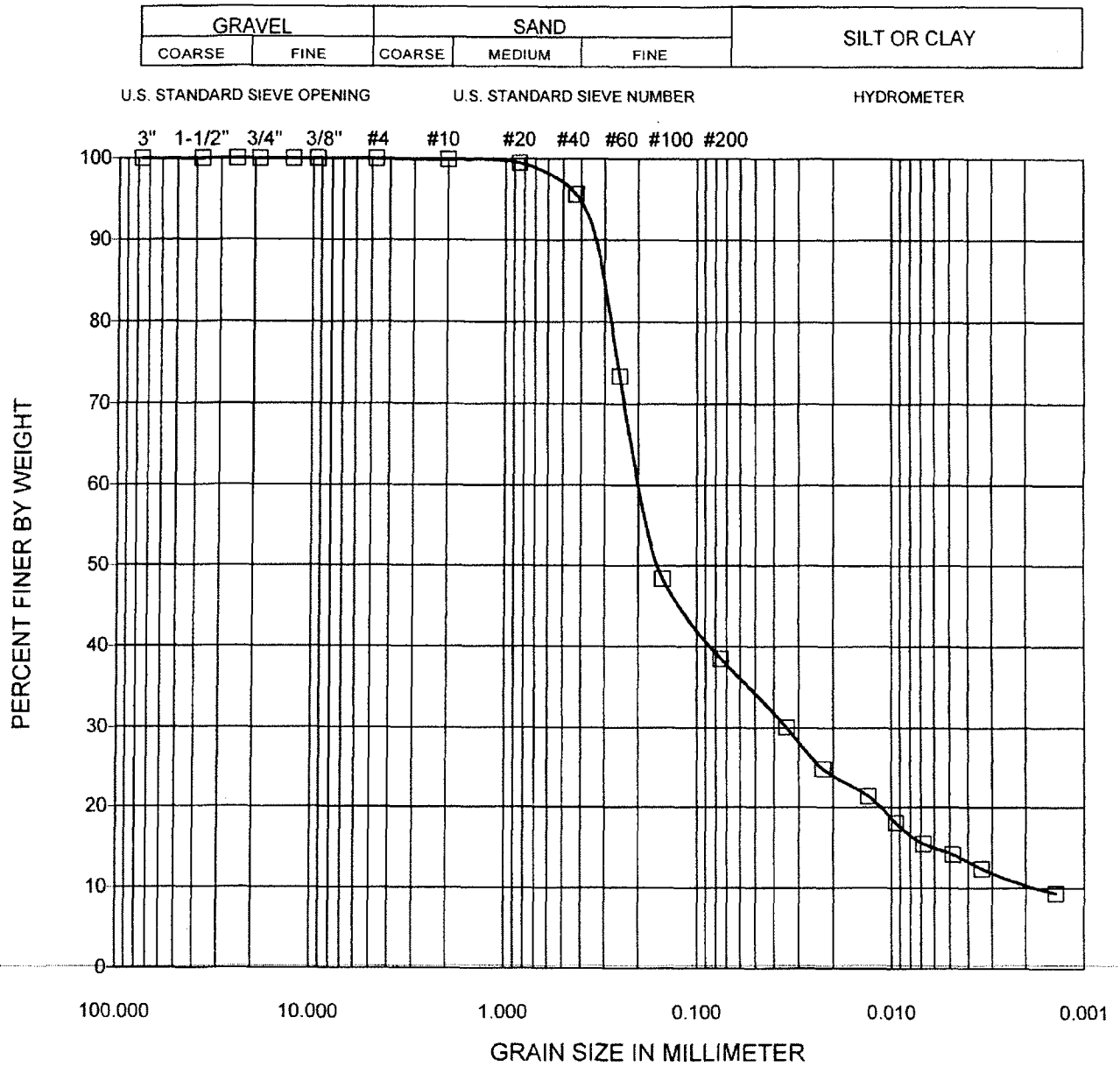
FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	A15SB02	C077S265	2.5-3.5	TUBE	SC	19	7

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EGL Project No.: 05-089-004

GRAIN SIZE DISTRIBUTION CURVE

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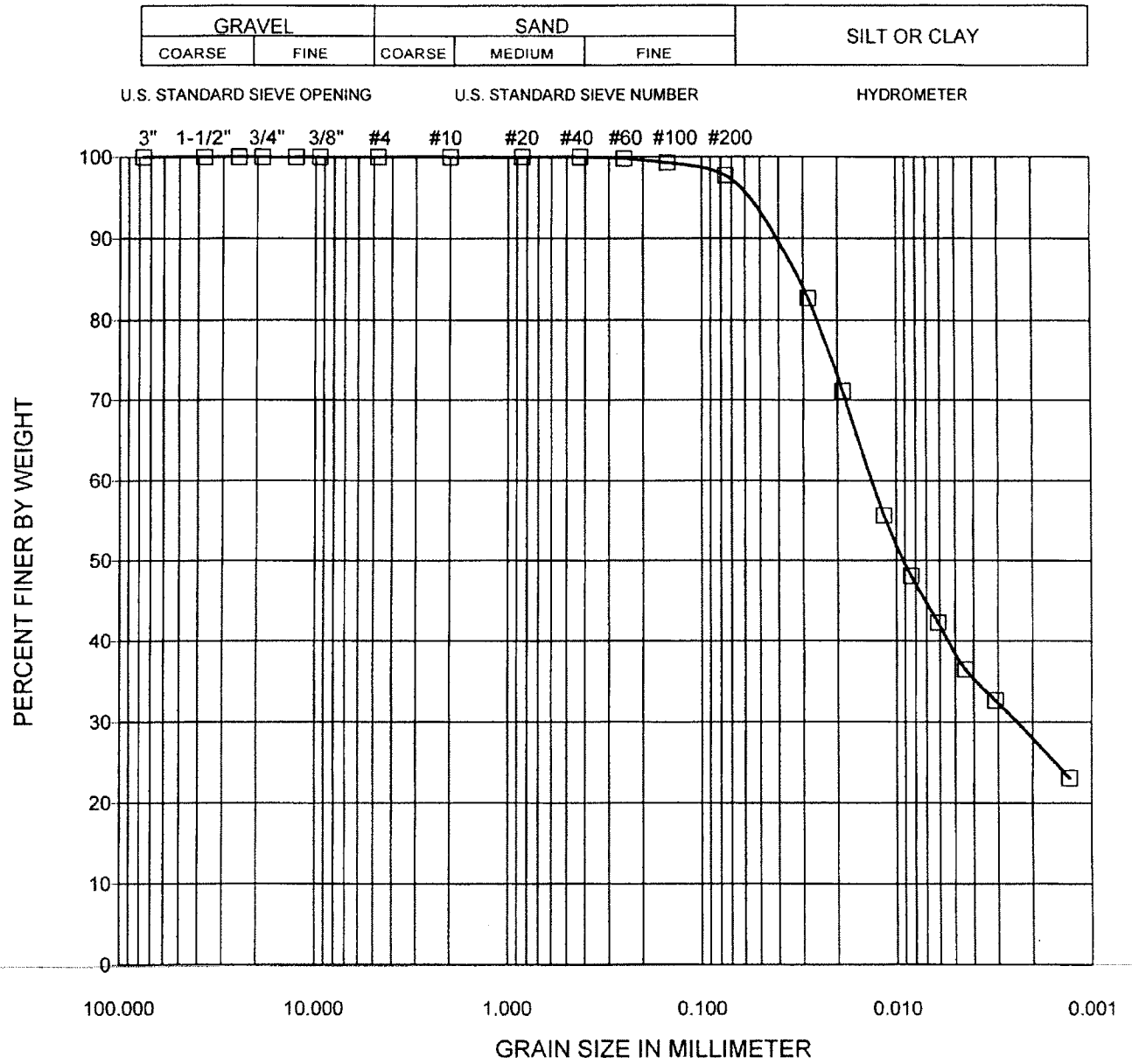
FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	A15SB02	C077S266	5-6	TUBE	CL	47	24

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GRAIN SIZE DISTRIBUTION CURVE

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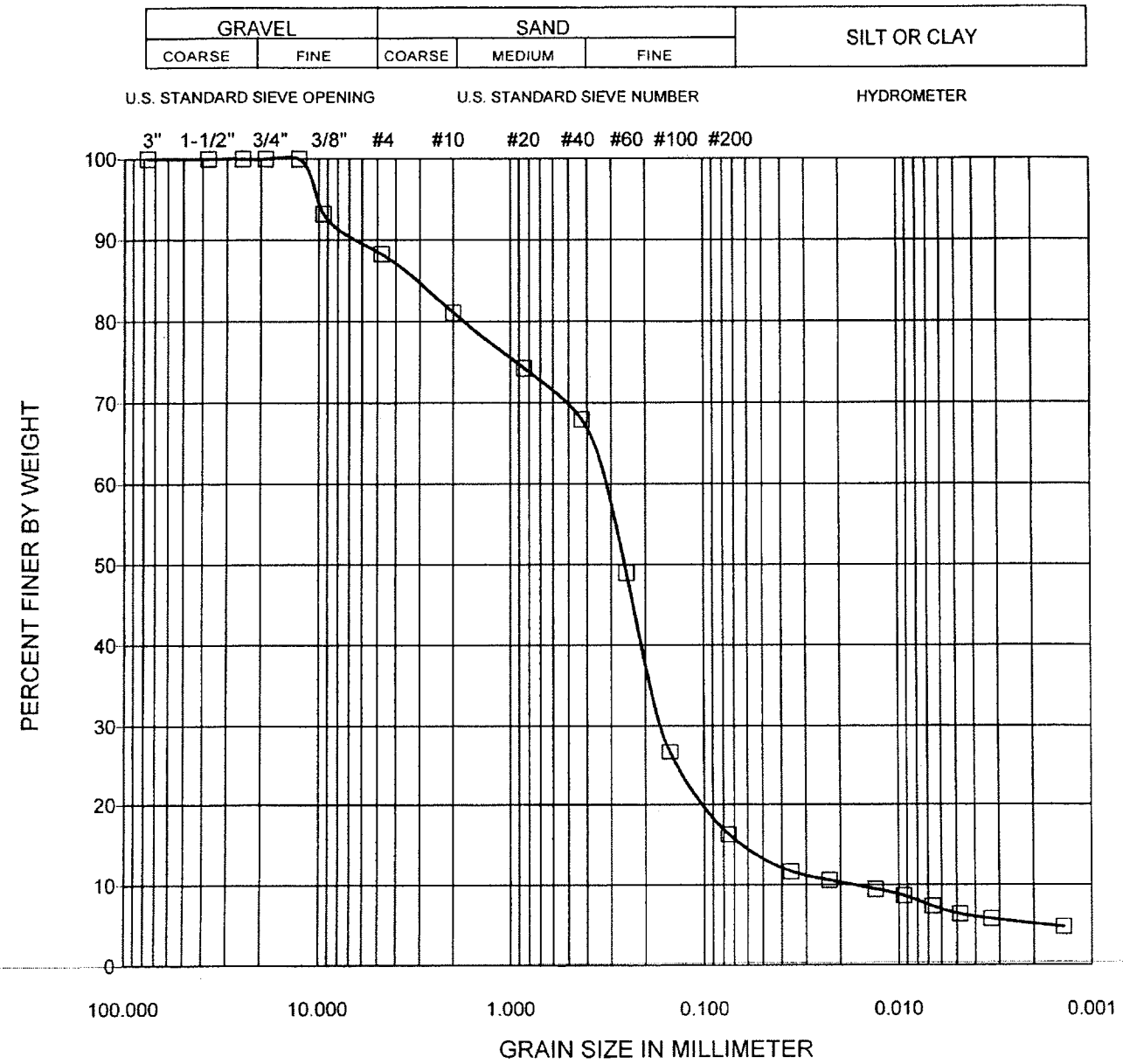
FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	A17SB01	C077S281	0.5-2.0	TUBE	SM	NP	NP

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EGL Project No.: 05-089-004

GRAIN SIZE DISTRIBUTION CURVE

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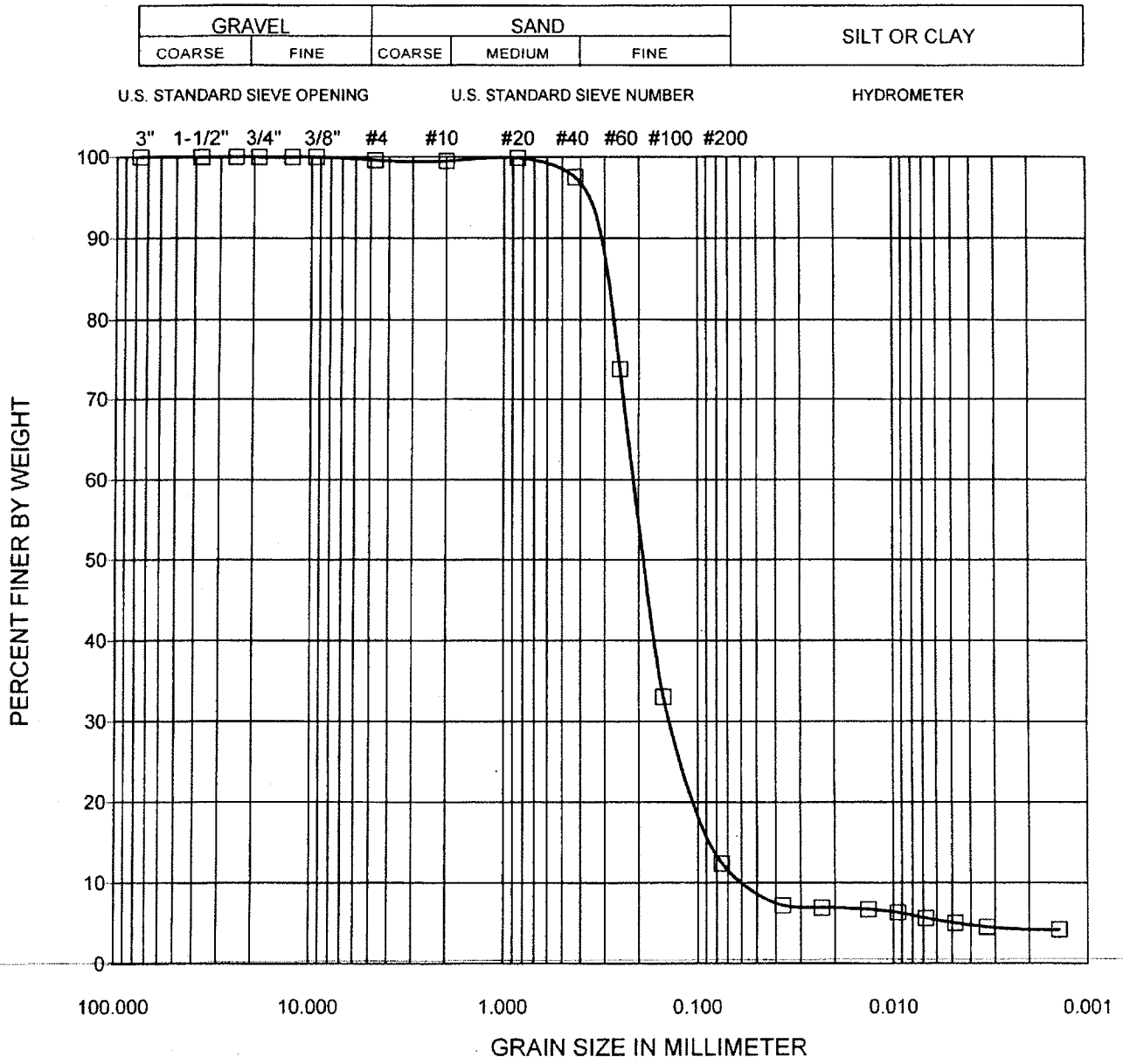
FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	A17SB01	C077S282	2.5-4.0	TUBE	SM	NP	NP

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EGL Project No.: 05-089-004

GRAIN SIZE DISTRIBUTION CURVE

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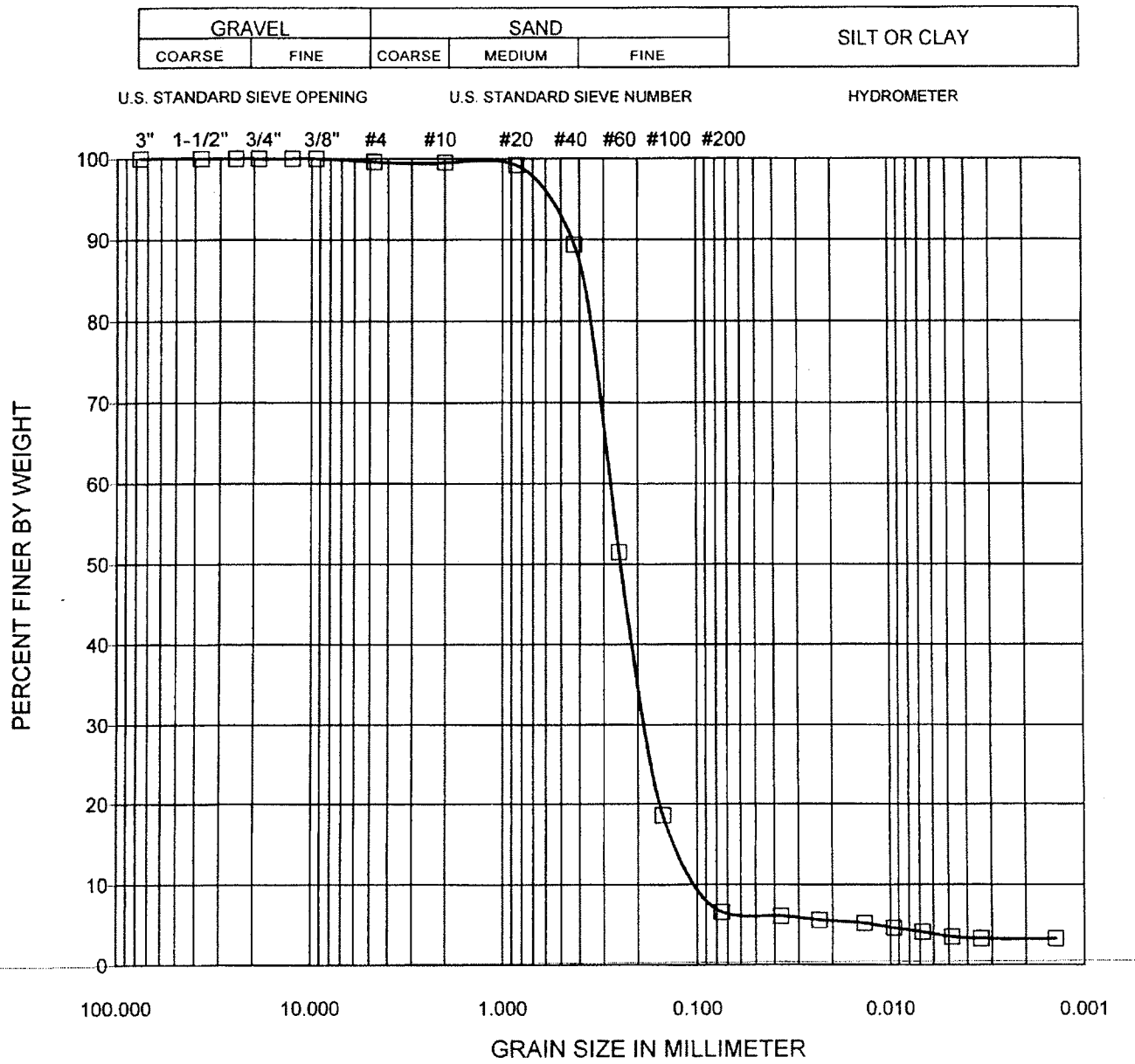
FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	A18SB03	C077S308	2.5-3.0	TUBE	SP-SM	NP	NP

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GRAIN SIZE DISTRIBUTION CURVE

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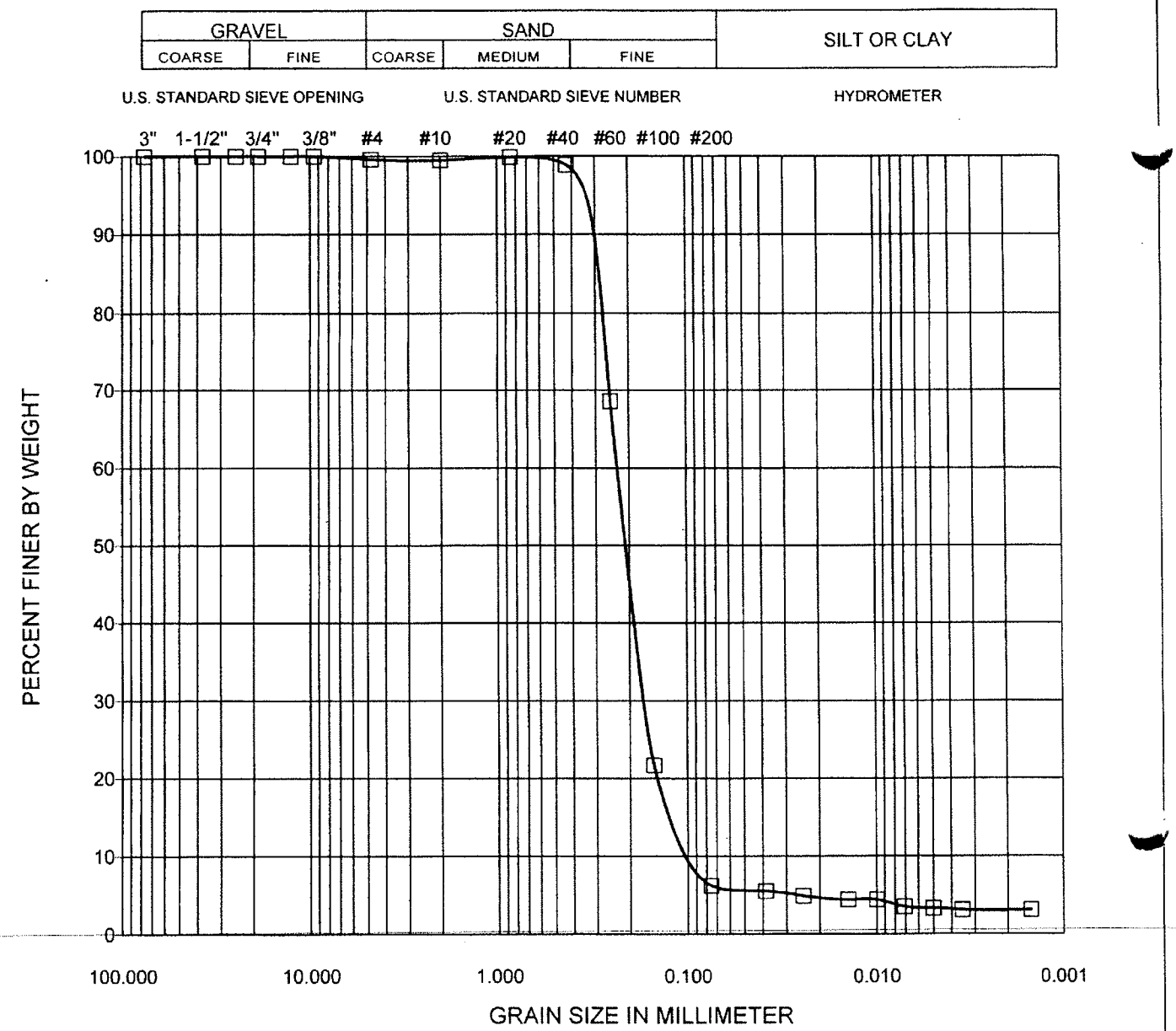

SYMBOL	BORING NO	SAMPLE ID	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	A18SB04	C077S311	2.5-3.0	TUBE	SP-SM	NP	NP

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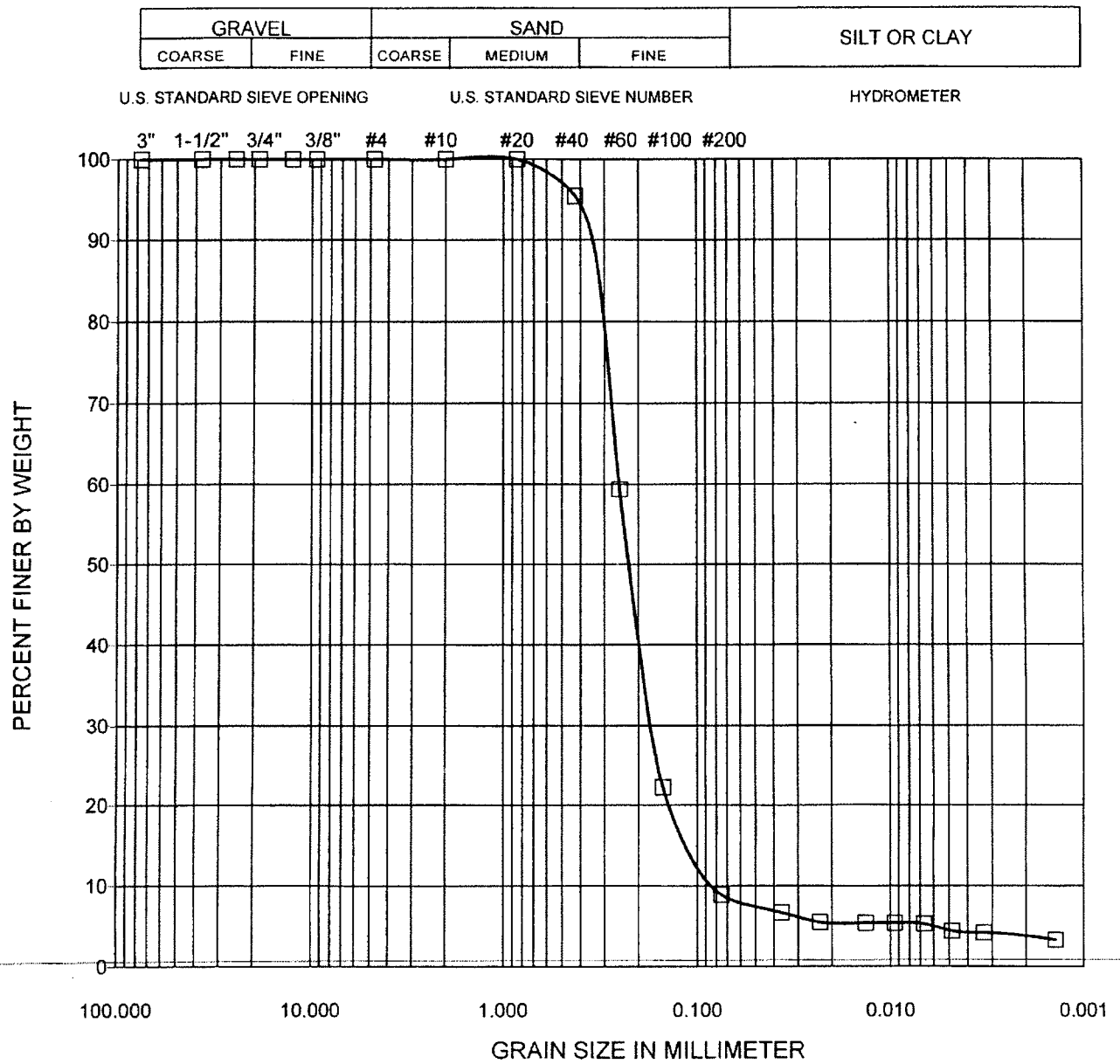
FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	A23SB15	C077S395	2.5-3.5	TUBE	SP-SM	NP	NP

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GRAIN SIZE DISTRIBUTION CURVE

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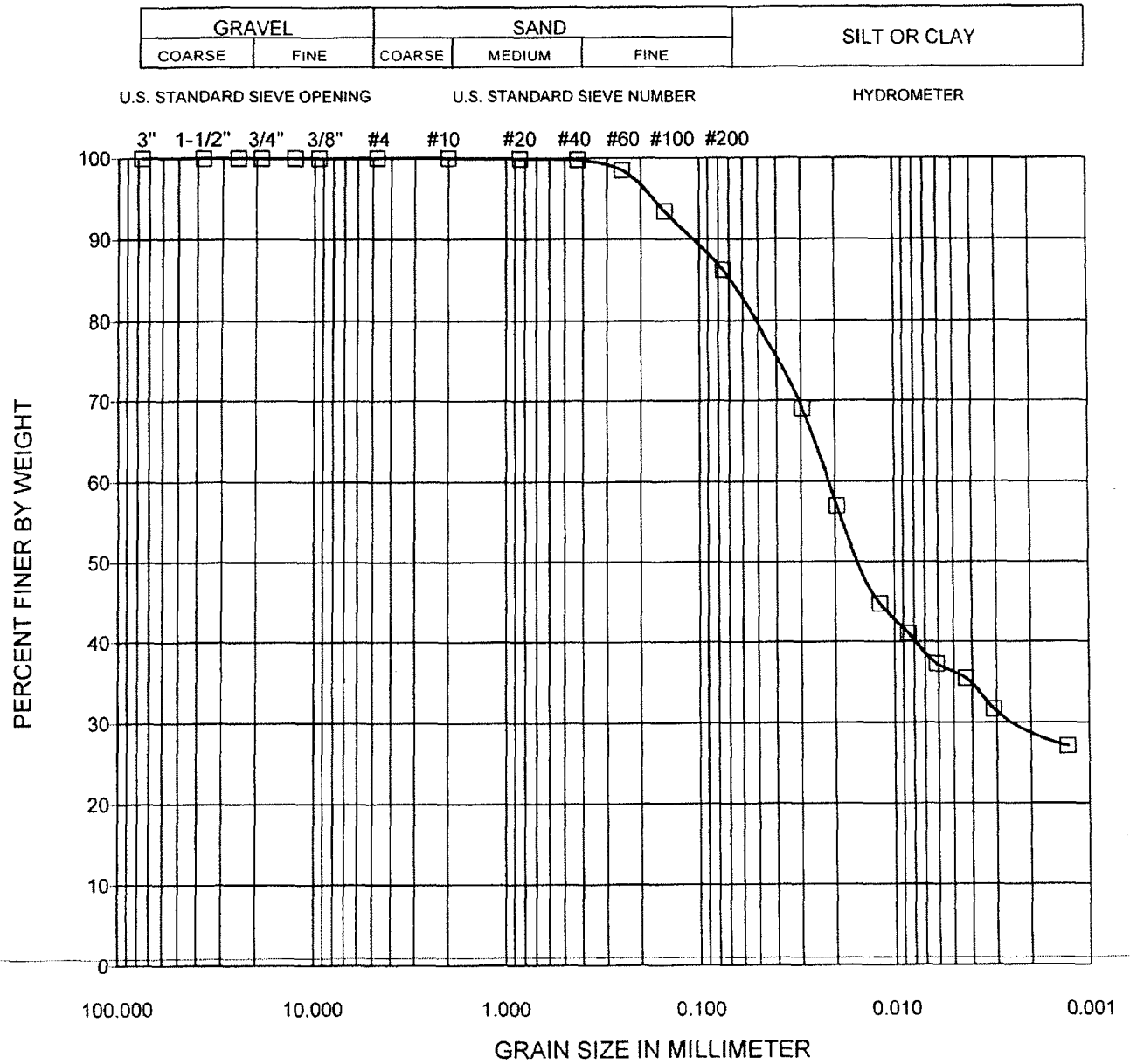
FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	A23SB15	C077S396	6.5-7.5	TUBE	CL	38	22

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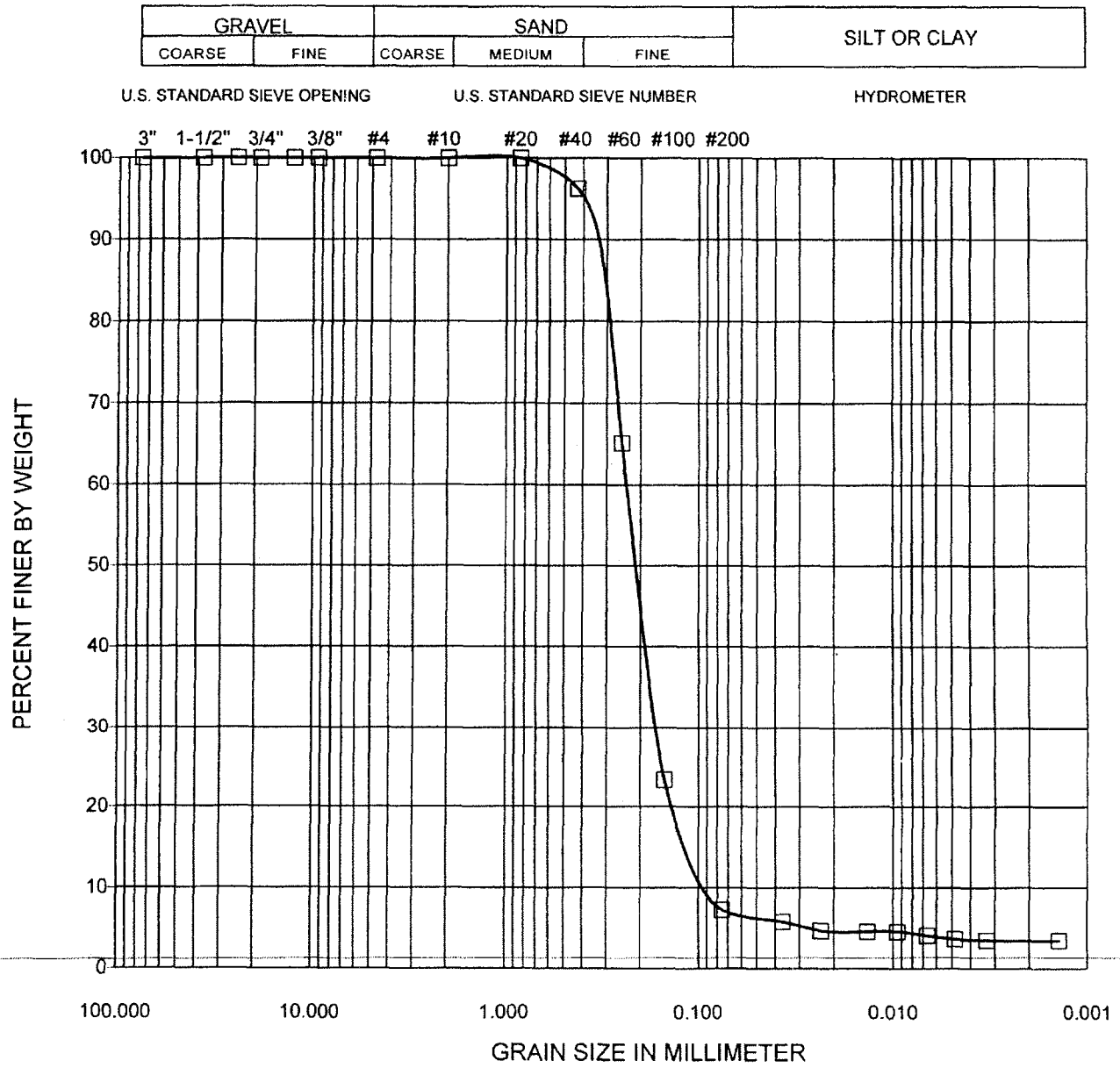
FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	A23SB37	C077S443	2-3.5	TUBE	SP-SM	NP	NP

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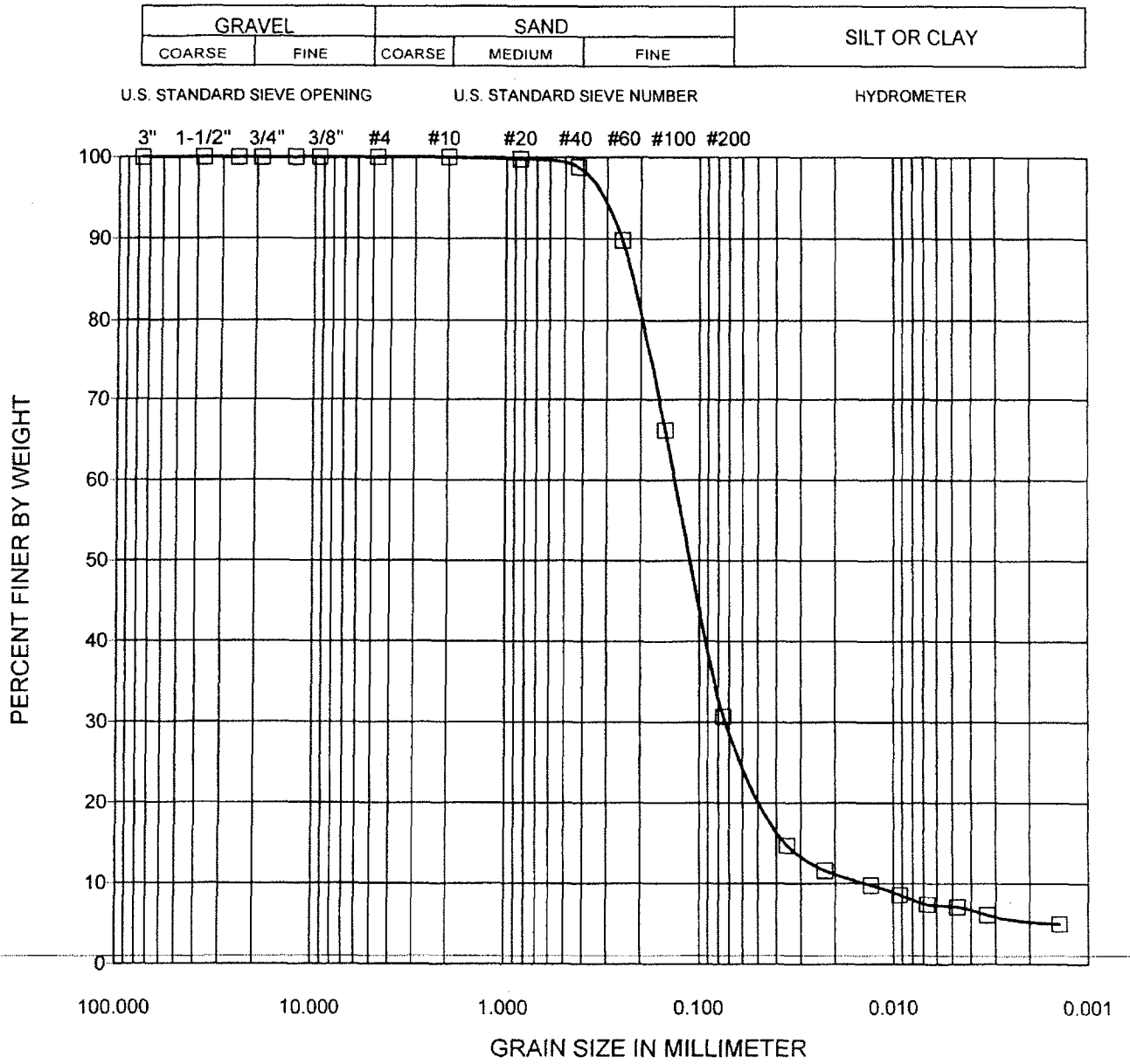
FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	A23SB37	C077S444	5-6.5	TUBE	SM	NP	NP

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

Project Name: IR Site 35
Alameda Point, Alameda, CA
Client: Bechtel
Job No.:CTO-0077
EGL Project No.: 05-089-004

GRAIN SIZE DISTRIBUTION CURVE

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01/06

FIGURE

APPENDIX F

DATA QUALITY AND VALIDATION

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ATTACHMENT

Attachment

F1 DATA VALIDATION CASE NARRATIVES

ACRONYMS/ABBREVIATIONS

CLP	(U.S. EPA) Contract Laboratory Program
DQO	data quality objective
IR	Installation Restoration (Program)
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MS	matrix spike
MSD	matrix spike duplicate
PAH	polynuclear aromatic hydrocarbon
PARCC	precision, accuracy, representativeness, completeness, and comparability
PCB	polychlorinated biphenyl
QC	quality control
RI	remedial investigation
RPD	relative percent difference
SOW	Statement of Work
SVOC	semivolatile organic compound
TPH	total petroleum hydrocarbons
U.S. EPA	United States Environmental Protection Agency
VOC	volatile organic compound

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Appendix F
DATA QUALITY AND VALIDATION

This appendix presents an assessment of the quality of laboratory data generated during the remedial investigation (RI) for Installation Restoration (IR) Program Site 35. The topics discussed include field and laboratory quality control (QC) samples, data verification and validation, and an evaluation of the analytical data based on precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters. These topics were evaluated to assure that data obtained from the sample analyses were adequate to meet the established data quality objectives (DQOs) of the Work Plan (BEI 2006).

F1 FIELD QUALITY CONTROL

Field QC samples were collected and analyzed during RI activities at IR Site 35 to assess the consistency and performance of the sampling program. Field QC samples for this project included field duplicate, source blank, rinsate, and trip blank samples.

F1.1 Field Duplicate Samples

Field duplicate samples consisted of two samples (a primary and a duplicate) collected from the same location at the same depth and time, using the same sampling techniques, and analyzed using the same analytical methods. The purpose of field duplicate samples is to evaluate the precision of the sample collection and analysis process. One duplicate groundwater sample was collected for approximately every three primary groundwater samples collected (i.e., 33 duplicate groundwater samples and 85 primary groundwater samples were collected). The usefulness of duplicate soil samples is often limited, due to the variability and heterogeneity of soil; for this reason, no duplicate soil samples were collected. Similarly, no duplicate sediment samples were collected.

Analysis of field duplicates provides a quantitative measure of the overall sampling and analysis process as the sum of contributions from sample heterogeneity, the precision of the sampling process, and the analytical method. This can be quantified by calculating the relative percent difference (RPD) for each analysis as follows:

$$RPD = \frac{|C_1 - C_2|}{(C_1 + C_2)/2} \times 100$$

where

C_1 = concentration of chemical constituent in primary sample
C_2 = concentration of chemical constituent in duplicate sample

If either the duplicate sample result or the primary sample result is below the detection limit, the RPD is 200 percent. If both the duplicate sample result and the primary sample result are below the detection limit the RPD is not calculated. The average RPD for duplicate groundwater samples collected at IR Site 35 was 6.1 percent.

F1.2 Source Blank Samples

Source blanks are samples of source water (distilled water) used for decontamination of sampling equipment and for rinsate samples. Source blank analysis tests for potential sample contamination resulting from the final rinsewater (source water) used in the decontamination process. Source blank analysis tests for contaminants of concern in the source water at levels above detection limits. See Section F1.3 for use of source water for rinsate samples.

One source blank sample (C077SW01) was collected on December 7, 2005, during the RI field effort at IR Site 35 and was analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals, and general chemistry parameters.

The source blank sample was collected to test the potential for sample contamination resulting from the final rinsewater used in the decontamination process. As listed in Table F-1, eight analytes (bromodichloromethane, chlorodibromomethane, chloroform, di-n-butyl phthalate, calcium, copper, magnesium, and mercury) and one general chemistry parameter (total dissolved solids) were reported above detection limits in this source blank sample. Bromodichloromethane, chlorodibromomethane, and chloroform are trihalomethanes, which are commonly found in chlorinated water supplies. The SVOC di-n-butyl phthalate is a plasticizing agent commonly found in bottled water supplies. Copper was reported at a concentration slightly above the regulatory criterion in one source blank sample. Calcium and magnesium are common nutrients, and the reported mercury concentration is below regulatory criteria. Therefore, the source water was considered to be contaminant-free.

F1.3 Rinsate Samples

Rinsate samples were collected using sampling equipment that was decontaminated between uses. To collect an equipment rinsate sample, contaminant-free source water was passed through or over the piece of field sampling equipment. One rinsate sample was collected per day (every other day during groundwater monitoring well sampling) per medium (soil and groundwater) from the decontaminated equipment for a total of 17 rinsate samples. Analytes reported in the rinsate samples are presented in Table F-2. Seventeen chemical analytes and one general chemistry parameter (total dissolved solids) were reported above detection limits in one or more of the rinsate blanks. Concentrations of bromodichloromethane, chlorodibromomethane, and chloroform were reported in all rinsate samples; however, these trihalomethanes are commonly found in chlorinated water supplies. Calcium and magnesium, common nutrients in soil, were also reported in most of these equipment rinsate blanks. Concentrations of all other analytes were generally within the range of reporting limits (i.e., below target quantitation limits). These low levels confirm that no significant contamination was introduced as a result of decontamination procedures. Affected analytical results in the associated field samples have been qualified accordingly. Additional information on the equipment rinsate blanks is provided in the data validation case narratives (Attachment F1).

Table F-1
Analytes Reported Above Detection Limits in Source Blank Sample
(in micrograms per liter)

Analyte	Concentration in C077SW01
bromodichloromethane	2.2
chlorodibromomethane	1.5
chloroform	3.2
di-n-butyl phthalate	3.9 J
calcium	28.3 J
copper	3.3 J
magnesium	61.8 J
mercury	0.2 U
mercury (by U.S. EPA Method 1631)	0.00015 J
total dissolved solids	10,000

Acronym/Abbreviation:
U.S. EPA – United States Environmental Protection Agency

Review Qualifiers:
J – indicates an estimated value
U – indicates analyte not reported above the detection limit

F1.4 Trip Blank Samples

Trip blank samples for soil and groundwater consisted of laboratory-provided distilled water of known quality containing the same preservative as that used for the actual samples. The trip blank sample was carried to the field and returned to the laboratory along with the actual samples, but without being opened. One trip blank sample was submitted each day that soil and groundwater samples were submitted for VOC analysis. A total of 19 trip blank samples were analyzed. The five chemicals reported above detection limits in the trip blank samples were common laboratory contaminants; all analytes reported in the trip blank samples were present at estimated concentrations below the reporting limit or at low concentrations, as shown in Table F-3. Affected data points in the associated field samples were qualified accordingly. These low levels confirm that no contamination was introduced as a result of procedures.

F2 LABORATORY QUALITY CONTROL

Laboratory QC samples are used to:

- assess data quality in terms of precision and accuracy; and
- verify that procedures such as sample handling, storage, and preparation do not introduce variables into the analysis chain that could render the validity of samples questionable.

QC samples are regularly prepared in the laboratory to assure that all phases of the sampling process are monitored. QC protocols during the RI were the same for all soil, water, and sediment sampling. The types of laboratory QC samples prepared during the analyses of soil and groundwater samples from the field activities are discussed below.

F2.1 Method Blank Samples

One method blank sample was analyzed per batch of samples (no more than 20 samples per batch). The method blank sample was processed following the same preparatory and analytical procedures as the field-collected samples. These QC samples were used to detect the presence and concentration of any contaminant or other anomaly resulting from sample preparation and analytical procedures.

F2.2 Laboratory Control Samples/Duplicates

A minimum of one laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) pair was prepared and analyzed with each batch of samples (which did not exceed 20 samples per batch). The LCS/LCSD samples were prepared by spiking a known amount of certain analytes of interest for each analytical method into American Society for Testing and Materials Type II water for groundwater sample batches, or into clean sand for soil sample batches. The LCS/LCSD samples were then processed using the same procedures as the field-collected samples. The recovery percentiles of the

Table F-2
Analytes Reported Above Detection Limits in Rinsate Samples
(reported in micrograms per liter)

Analyte	SAMPLE NUMBER																
	C077R001	C077R002	C077R003	C077R004	C077R005	C077R006	C077R007	C077R008	C077R009	C077R010	C077R011	C077R012	C077R013	C077R014	C077R015	C077R016	C077R017
Volatile Organic Compounds																	
acetone	2 U	2 U	2 U	2 U	2 U	2 U	1 J	1.5 J	2 U	2 U	2.1 U	1.2 J	4.4 U J	2 U	2 U	4.2 U	4.3 U
bromodichloromethane	1.6	1.9	1.9	2.6	2.1	1.9	1.8	2.1	1.7	1.8	1.9	2.5	1.9	1.9	2.2	1.9	1.6
bromoform	0.34 J	0.34 J	0.5 U	0.5 U	0.7	0.5 U	0.5 U	0.5 U	0.9	0.5 U	1.0	1.0	0.9	0.23 J	0.33 J	0.5 U	0.5 U
carbon disulfide	1.3	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
chlorodibromomethane	1.3	1.4	1.2	1.6	1.4	1.2	1.2	1.5	1.2	1.3	1.4	1.7	1.3	1.3	1.5	1.4	1.3
chloroform	2.1	2.6	2.8	3.3	2.7	2.7	2.5	2.8	2.2	2.2	2.9	3.6	2.5	2.8	2.8	2.5	1.9
1,2-dichlorobenzene	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Semivolatile Organic Compounds																	
bis(2-ethylhexyl)phthalate	10 U	—*	10 U	10 U	10 U	10 U	10 U	3.1 J	10 U	10 U	10 U	10 U	10 U	10 U	—	—	—
di-n-butyl phthalate	10 U	—	10 U	10 U	10 U	10 U	10 U	24 J	6.8 J	10 U	10 U	10 U	10 U	6.8 J	—	—	—
Metals																	
antimony	5 U	—	5 U	5 U	5 U	5 U	5 U	3.5 U	5 U J	5 U	5	3.2 U	5 U	5 U	5 U	5 U	5 U
beryllium	2 U	—	0.29 J	2 U	2 U	0.27 J	2 U	2 U	2 U J	2 U	2 U	2 U	2 U	2 U	0.29 U	2 U	2 U
cadmium	5 U	—	5 U	5 U	5 U	5 U	5 U	5 U	5 U	1.2 J	5 U	5 U	5 U	5 U	5 U	0.92 J	5 U
calcium	35.4 J	—	100 U	33.9 J	57.6 J	38.8 J	100 U	100 U	100 U J	38.2 J	103	39.1 J	39.7 J	35.8 U	33.5 J	27.7 J	100 U
iron	50 U	—	145	50 U	39.1 J	35.7 J	50 U	50 U	50 U J	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
magnesium	61.6	—	87.7	43.2 J	76.0	50.7	78.8	60.7 J	74.9 J	80.6 J	112.0	56.9	86.3	61.7	70.4	68.0	67.4
manganese	5 U	—	2.6 U	3.8 J	1.8 U	2.8 J	1.4 U	5 U	5 U	5 U	5 U	5 U	5 U	2.1 U	5 U	5 U	5 U
mercury	0.2 U	—	0.2 U	0.0002 J	0.2 U	0.14 U	0.2 U	0.2 U	0.061 U	0.063 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.13 U	0.0001 U
sodium	345 J	—	1,000 U	579 U	216 J	1,170 U	978 U	1,010 U	1,000 U	1,120 U	342 J	697 U	253 U	1,400	2,190 U	161 U	116 U
zinc	50 U	—	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	6.4 J	50 U	50 U	50 U	50 U	50 U	50 U
General Chemistry Parameters																	
total dissolved solids	10,000	—	10,000	10,000	10,000	10,000 U	10,000	10,000	10,000	10,000	10,000	5,000	6,000	10,000	—	—	10,000

Note:
* dash indicates not analyzed

Review Qualifiers:
J – indicates an estimated value
U – indicates analyte not detected above the reporting limit
UJ – indicates the compound or analyte was analyzed for, but was not reported above the stated detection limit; the detection limit, in this case, is an estimated value

Table F-3
Analytes Reported Above Detection Limits in Trip Blank Samples
(reported in micrograms per liter)

Sampling Location	VOLATILE ORGANIC COMPOUND				
	Acetone	2-Butanone	Methyl tert-butyl ether	Methylene chloride	1,2,3-Trichloropropane
C077TB01	3	2 U	0.5 U	1.9	2 U
C077TB02	30	12	0.5 U	2	2U
C077TB03	6.2	2 U	0.5 U	5.2	2 U
C077TB04	5	2 U	0.5 U	1 U	2 U
C077TB05	2 UJ	2 UJ	0.5 UJ	0.93 J	2 UJ
C077TB06	2 UJ	2 UJ	0.5 UJ	3.6 J	2 UJ
C077TB07	2 U	2 U	0.21 J	4.3	2 U
C077TB08	4	2 U	0.5 U	4.2	2 U
C077TB09	2 UJ	2 UJ	0.5 UJ	1 UJ	2 UJ
C077TB10	2 U	2 U	0.5 U	1 U	2 U
C077TB11	2 UJ	2 UJ	0.5 UJ	1 UJ	2 UJ
C077TB12	2.9 U	2 U	0.5 U	3.5	2.1
C077TB13	4.5 J	2 UJ	0.5 UJ	3.2 J	2 UJ
C077TB14	2 U	2 U	0.5 U	1 U	2 U
C077TB15	2 U	2 U	0.5 U	1 U	2 U
C077TB17	2 UJ	2 U	0.5 U	1 U	2 U
C077TB17A	2 U	2 U	0.5 U	1 U	2 U
C077TB18	2 U	2 U	0.5 U	1 U	2 U
C077TB19	6.1	2 U	0.5 U	5.3	2 U

Review Qualifiers:
J – indicates an estimated value
U – indicates analyte not detected above the reporting limit
UJ – indicates the compound or analyte was analyzed for, but was not reported above the stated detection limit; the detection limit, in this case, is an estimated value

spiked compounds were used to determine whether the laboratory processes were within acceptable performance limits for the analytical methods. This provided an indication of the accuracy and acceptability of each method. LCS/LCSD samples were analyzed as part of the data validation process. Any anomalous occurrences are discussed in the data validation case narratives presented in Attachment F1.

F2.3 Matrix Spike/Matrix Spike Duplicate Samples

At least one matrix spike (MS)/matrix spike duplicate (MSD) pair was prepared and analyzed for every 20 samples. The MS/MSD samples were prepared by spiking a known amount of certain analytes of interest for each method into a sample of each matrix. The spiked sample pairs were then processed using the same procedures as the unspiked field-collected samples. Recovery percentiles of the spiked compounds were used as an indication of the accuracy and appropriateness of the methods for each matrix. MS/MSD samples were analyzed as part of the data validation process. Any anomalous occurrences are discussed in the data validation case narratives presented in Attachment F1.

F2.4 Surrogate Samples

Surrogate compounds (i.e., compounds with chemical properties and behavior similar to those of the compounds of interest) were added to each sample analyzed using applicable organic analytical methods. Recovery percentiles of these spiked surrogate compounds were used to assess the accuracy of laboratory procedures. Surrogate samples were analyzed as part of the data validation process. Any anomalous occurrences are discussed in the case narratives presented in Attachment F1.

F3 DATA VERIFICATION AND VALIDATION

The purpose of data verification and validation is to assure that the data collected from samples at IR Site 35 meet the DQOs outlined in the Work Plan (BEI 2006).

F3.1 Data Verification

All data collected were subjected to the data verification process, which includes proofreading and editing data reports to assure that the data correctly represent the analytical measurements. Verification identifies nontechnical errors in the data package that can be corrected (e.g., typographical errors), and assures that data reported on hard copy exactly match data reported on electronic deliverables. Data verification also assures that the sample identifiers on hard-copy laboratory reports match those on the chain-of-custody records. All data collected during the RI were verified.

F3.2 Data Validation

Data validation is a systematic process used to interpret, define, and document analytical data quality and determine whether the data quality is sufficient to support the intended uses of the data. Validation of a data package includes a reconstruction of sample preparation and analysis activities from the raw data, and reconciliation of the raw data

with the reduced results, identification of data anomalies, and qualification of data to identify data usability limitations.

Data validation for IR Site 35 was performed by an independent subcontractor (Laboratory Data Consultants, Inc.). All collected data analyzed by a fixed-base analytical laboratory were validated in accordance with Naval Facilities Engineering Service Center (formerly Naval Energy and Environmental Support Activity) guidelines (NEESA 1990), Technical Specification (BNI 1998), and Southwest Division Naval Facilities Engineering Command Environmental Work Instruction No. 1 (SWDIV 2001). Approximately 80 percent of the data were validated using Level III validation criteria. The remaining 20 percent were validated using Level IV criteria, as specified in the Work Plan for the site (BEI 2006).

Data were further evaluated by project personnel to determine suitability and usability for purposes of this RI. The results of this internal review are summarized in Sections F4 and F5.

F3.3 Data Validation Qualifiers

Analytical data were qualified on the basis of data validation reviews. For chemical data, qualifiers ("U," "J," "UJ," or "R") were assigned in accordance with the applicable United States Environmental Protection Agency (U.S. EPA) Guidelines for Data Validation (U.S. EPA 1994, 1999). Individual validation data flags are presented in the data validation case narratives in Attachment F1.

Data assigned an R (rejected) qualifier were deemed unusable and not used for any purpose (including, but not limited to, risk assessment, data interpretation, tables, or figures). Data may be rejected because of noncompliance with method requirements during the course of validation. Data may also be qualified as unusable in dilutions and reanalyses by the validators in order to produce only one complete set of data for a given sample and eliminate redundancy. The intent of the latter classification is to guide data users in choosing the best set of sample analytical results when reanalyses and/or dilutions exist.

Table F-4 lists rejected data collected during RI activities at IR Site 35. Data were rejected due to either calibration issues or low recovery in matrix spike sample data. Individual laboratory data flags are presented in the data validation reports in Attachment F1.

F4 EVALUATION OF ANALYTICAL DATA

Data quality was assessed against the established DQOs of the Work Plan (BEI 2006). Evaluation of the validated data sets compared the data objective with the actual data results using PARCC parameters.

Table F-4
Data Rejected for Method Noncompliance
(as a result of data validation)

Sampling Location	Depth (feet bgs)	Sample Number	Analyte	Soil Results (µg/kg)
A05SB03	6.5	C077S079	pyridine	500
A05SB04	0.5	C077S080	pyridine	300
A05SB04	3	C077S081	pyridine	300
A05SB04	7	C077S082	pyridine	300
A23SB10	1	C077S382	antimony	600
A23SB10	1	C077S382	4-nitrophenol	2,000
A23SB10	2	C077S383	antimony	600
A23SB10	2	C077S383	4-nitrophenol	2,000
A23SB10	4	C077S384	antimony	900
A23SB10	4	C077S384	4-nitrophenol	4,000
A23SB13	1	C077S388	antimony	500
A23SB13	1	C077S388	4-nitrophenol	2,000
A23SB13	2	C077S389	antimony	500
A23SB13	2	C077S389	4-nitrophenol	2,000
A23SB13	4	C077S390	antimony	600
A23SB13	4	C077S390	4-nitrophenol	2,000
A23SB18	1	C077S400	antimony	600
A23SB18	1	C077S400	4-nitrophenol	2,000
A23SB18	3	C077S401	antimony	600
A23SB18	3	C077S401	4-nitrophenol	2,000
A23SB18	6.5	C077S402	4-nitrophenol	4,000
A23SB40	1	C077S451	antimony	600
A23SB40	1	C077S451	4-nitrophenol	3,000
A23SB40	2	C077S452	antimony	500
A23SB40	2	C077S452	4-nitrophenol	2,000
A23SB40	7	C077S453	antimony	600
A23SB40	7	C077S453	4-nitrophenol	2,000
				Groundwater Results (µg/L)
A23SB09	4	C077G112	4-nitrophenol	25
A23SB09	6	C077G116	4-nitrophenol	25
A23SB10	5	C077G113	4-nitrophenol	25
A23SB11	5	C077G114	4-nitrophenol	25
A23SB12	8	C077G115	4-nitrophenol	25

(table continues)

Table F-4 (continued)

Sampling Location	Depth (feet bgs)	Sample Number	Analyte	Groundwater Results (µg/L)
A23SB18	3	C077G122	4-nitrophenol	25
A23SB23	5	C077G128	4-nitrophenol	25
				FQC Result (µg/L)
FQC	not applicable	C077R007	4-nitrophenol	25

Acronyms/Abbreviations:
bgs – below ground surface
FQC – field quality control sample (trip blank or rinsate sample)
µg/kg – micrograms per kilogram
µg/L – micrograms per liter

Precision, accuracy, and completeness goals for the major chemical analyses performed on IR Site 35 samples were those specified in the U.S. EPA Contract Laboratory Program (CLP) Statement of Work (SOW). For procedures not specified in the CLP SOW, the criteria specified in U.S. EPA Method SW-846 applied. The principal analytical methodologies used in this evaluation are listed in Table F-5.

F4.1 Precision and Accuracy

QC data were assessed through the use of blanks, duplicates, spikes, and surrogates. Review of these data provided information concerning the precision and accuracy measurements conducted by the laboratories.

F4.1.1 LABORATORY METHOD BLANKS

Acetone, chloroform, cis-1,2-dichloroethene, hexachlorobutadiene, methylene chloride, naphthalene, and 1,2,3-trichlorobenzene were reported in at least one of the method blanks for VOC analysis during at least one of the sampling events. A total of 12 of the target analyte metals were reported in at least one blank associated with the metals analysis. All affected analytical results have been qualified accordingly during data validation. Additional information about the laboratory method blanks is provided in the data validation case narratives in Attachment F1.

F4.1.2 SOURCE BLANKS

As shown in Table F-1, three trihalomethane analytes were reported in source water blank samples for VOC analysis. The SVOC di-n-butyl phthalate was also reported in one source blank sample. Four metals (calcium, copper, magnesium, and mercury) and one general chemistry parameter (total dissolved solids) were reported in source blank samples. Affected data points in the associated field samples have been qualified accordingly. Additional information about the qualified data based on the source water blanks is provided in the data validation case narratives in Attachment F1.

Table F-5
Analytical Methodologies

Parameter	Method Number*	Method
VOCs	U.S. EPA 5035A and 8260B	GC/MS
TPH-ff	U.S. EPA 8015B-M with silica gel cleanup	GC/MS
TPH-g	U.S. EPA 8015-M	GC/MS
SVOCs (non-PAHs)	U.S. EPA 8270C	GC/MS
PAHs	U.S. EPA 8270C SIM	GC/MS
pesticides/PCBs	U.S. EPA 8081A/8082	GC/MS
TAL metals	U.S. EPA 6010B/7000 series	ICP, CVAA
chromium, hexavalent	U.S. EPA 7196A	Colorimetric
lead	U.S. EPA 6010B	ICP
mercury	U.S. EPA 1631	
air permeability	API Recommended Practice 40	
density and moisture content	ASTM D2937 and D2216	
effective porosity	SWRCB	
grain-size distribution	ASTM C136-96 and D422-63	
liquid limits	ASTM D4318-00	
hydraulic conductivity	ASTM D5084-90	
total organic carbon	Walkley-Black	
total dissolved solids	U.S. EPA 160.1	Gravimetric

Note:
* the latest version of the method was used by the laboratory at the time of analysis

Acronyms/Abbreviations:
API – American Petroleum Institute
ASTM – American Society for Testing and Materials
CVAA – cold vapor atomic absorption spectroscopy
GC – gas chromatography
ICP – inductively coupled argon plasma
MS – mass spectrometry
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
SIM – selected ion monitoring
SVOC – semivolatile organic compound
SWRCB – (California) State Water Resources Control Board
TAL – target analyte list
TPH-ff – total petroleum hydrocarbons, fuel fingerprint
TPH-g – total petroleum hydrocarbons as gasoline
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

F4.1.3 EQUIPMENT RINSATE BLANKS

As shown in Table F-2, a number of analytes were reported above detection limits in at least one of the equipment rinsate blanks. Affected data points in the associated field samples have been qualified accordingly. Additional information about the equipment rinsate blanks is provided in the data validation case narratives presented in Attachment F1.

F4.1.4 TRIP BLANKS

As shown in Table F-3, five VOC analytes were reported in at least one of the trip blanks associated with the field activities. Affected data points in the associated field samples have been qualified accordingly. Additional information about the trip blanks is provided in the data validation case narratives presented in Attachment F1.

F4.1.5 LABORATORY CONTROL SAMPLES/DUPLICATES

Most LCS/LCSDs analyzed by the laboratory were within control limits. On the basis of these samples, the overall precision and accuracy of the laboratory are considered acceptable. LCS/LCSDs that were not within control limits are discussed in the data validation case narratives presented in Attachment F1.

F4.1.6 MATRIX SPIKES/MATRIX SPIKE DUPLICATES

Most MS/MSD samples prepared and results analyzed by the laboratory were within control limits. MS/MSDs that were not within control limits are discussed in the data validation case narratives presented in Attachment F1. The overall precision and accuracy of the laboratory are considered acceptable.

F4.1.7 SURROGATES

Most surrogate compounds prepared and analyzed by the laboratory were within control limits. Surrogates not within control limits are discussed in the data validation case narratives presented in Attachment F1. The overall precision and accuracy of the laboratory are considered acceptable.

F4.2 Representativeness

Representativeness is the reliability with which a measurement or measurement system reflects the true conditions under investigation. Representativeness is influenced by the number and location of the sampling points, sampling timing and frequency of monitoring efforts, and the field and laboratory sampling procedures (U.S. EPA 1989).

The representativeness of data was assured through the use of established field and laboratory procedures and their consistent application. All samples collected are considered representative of the conditions at IR Site 35.

F4.3 Completeness

Data completeness is a measure of the amount of valid data obtained from the field program compared with the amount that was expected to be obtained under planned conditions. Data are considered valid if they have not been rejected (were not R-qualified either from data validation or internal data review). Percent completeness can be expressed by the following equation:

$$C = \frac{(\text{number of valid results}) \times 100}{\text{total number of requested results}}$$

Based on internal review, the completeness of the sample set submitted for analysis for IR Site 35 was 99.93 percent (48,196 valid results out of 48,231 total analyses). This value is within the completeness goals stated in the Quality Assurance Project Plan of the Work Plan (BEI 2006).

F4.4 Comparability

Comparability expresses the confidence with which one data set can be compared to another based on U.S. EPA-defined procedures. The comparability of data was established through well-documented methods and procedures, standard reference materials, QC samples and surrogates, and performance-evaluation study results, as well as by reporting each data type in consistent units. Analytical methods employed were the same or equivalent for all rounds of sampling.

All units of measurement were consistent and appropriate for the matrices sampled. The comparability of the laboratory results was determined to be acceptable.

F5 DATA VALIDATION/INTERNAL EVALUATION SUMMARY

This section summarizes the results of data validation and internal data evaluation for all analytical parameters. Details are provided in Attachment F1, which contains the data validation case narratives. A summary of the significant data validation findings for the analytes in each method category is presented below.

F5.1 Volatile Organic Compounds

No significant problems were noted during validation for the soil and groundwater samples analyzed for VOCs. None of the reported data were qualified as unusable. Additional information about other VOC data that were qualified is provided in the data validation case narratives in Attachment F1.

F5.2 Total Petroleum Hydrocarbons

No significant problems were noted in the analyses of soil and groundwater samples for total petroleum hydrocarbons (TPH), and none of the reported data were qualified as

unusable. Additional information about other TPH data that were qualified is provided in the data validation case narratives in Attachment F1.

F5.3 Semivolatile Organic Compounds

No significant problems were noted during validation for the soil and groundwater samples analyzed for SVOCs, with the following exceptions. Due to various difficulties in calibration, 20 reported nondetect results for 4-nitrophenol in soil or groundwater samples were qualified as unusable (rejected) during the validation process. Due to low recovery in matrix spike samples, four results for pyridine in soil samples were also rejected. None of the other reported data points were qualified as unusable in any of the sampling events. Additional information about other SVOC data that were qualified is provided in the data validation case narratives in Attachment F1.

F5.4 Polynuclear Aromatic Hydrocarbons

No significant problems were noted in the analyses of soil and groundwater samples for polynuclear aromatic hydrocarbons (PAHs), and none of the reported data were qualified as unusable. Additional information about other PAH data that are qualified is provided in the data validation case narratives in Attachment F1.

F5.5 Pesticides

No significant problems were noted in the analyses of soil and groundwater samples for pesticides. None of the reported data were qualified as unusable based on noncompliance issues. Additional information about other pesticide data that were qualified is provided in the data validation case narratives in Attachment F1.

F5.6 Polychlorinated Biphenyls

No significant problems were noted in the analyses of soil and groundwater samples for PCBs, and none of the reported data were qualified as unusable based on noncompliance issues. Additional information about other PCB data that were qualified is provided in the data validation case narratives in Attachment F1.

F5.7 Metals and Hexavalent Chromium

No significant problems were noted during validation for the soil and groundwater samples analyzed for metals and hexavalent chromium, with the following exception. Due to low recovery in matrix spike samples, 11 reported nondetect results for antimony were qualified as unusable (rejected) during the validation process. None of the other reported data were qualified as unusable for noncompliance issues in analyses for metals or hexavalent chromium. Additional information about other metals and hexavalent chromium data that were qualified is provided in the data validation case narratives in Attachment F1.

F5.8 General Chemistry Parameters

No significant problems were noted during validation for the samples analyzed for general chemistry parameters. None of the reported data points were qualified as unusable in any of the sampling events. Additional information about other general chemistry data that were qualified is provided in the data validation case narratives in Attachment F1.

F6 REFERENCES

Bechtel Environmental, Inc. 2006. Remedial Investigation Work Plan, IR Site 35, Areas of Concern in Transfer Parcel EDC-5, Alameda Point, Alameda, California. Final. March.

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BEI. *See* Bechtel Environmental, Inc.

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United States Environmental Protection Agency. 1989. U.S. EPA Region 9 Guidance for Preparing Quality Assurance Project Plans for Superfund Remedial Projects. 9QA-03-89. September.

_____. 1994. Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis. Hazardous Site Evaluation Division. Prepared by U. S. EPA Data Review Work Group. February 1.

_____. 1999. Laboratory Data Validation Functional Guidelines for Evaluating Organics Analysis. Hazardous Site Evaluation Division. Prepared by U.S. EPA Data Review Work Group. February.

U.S. EPA. *See* United States Environmental Protection Agency.

ATTACHMENT F1

DATA VALIDATION CASE NARRATIVES

Attachment F1
Table of Contents

LDC Project Number SDG Parameter	14417A1 49199/49200 Volatiles	14417A2a 49199/49200 Semivolatiles	14417A2b 49199/49200 Polynuclear Aromatic Hydrocarbons	14417A3 49199/49200 Chlorinated Pesticides & PCBs	14417A4 49199/49200 Metals	14417A7 49199/49200 TPH as Gasoline	14417A8 49199/49200 TPH as Extractables
Samples	C077G103 C077G101 C077G102 C077TB02 C077R001 C077R002 C077TB01 C077S361 C077S362 C077S363 C077S367 C077S368 C077S369 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372 C077S361MS C077S361MSD	C077G103 C077G101 C077R001 C077G104 C077S361 C077S362 C077S363 C077S367 C077S368 C077S369 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372 C077S371MS C077S371MSD	C077G103 C077G101 C077R001 C077S361 C077S362 C077S363 C077S367 C077S368 C077S369 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372 C077S371MS C077S371MSD C077S372DL	C077G103 C077G101 C077G102 C077R001 C077S361 C077S362 C077S363 C077S367 C077S368 C077S369 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372	C077G101 C077R001 C077S361 C077S362 C077S363 C077S367 C077S368 C077S369 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372	C077G103 C077G101 C077R001 C077S361 C077S362 C077S363 C077S368 C077S369 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372 C077S361MS C077S361MSD C077S367	C077G103 C077G101 C077R001 C077S361 C077S362 C077S363 C077S368 C077S369 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372 C077S367

Attachment F1
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LDC Project Number SDG Parameter	14417B1 49212/49213 Volatiles	14417B2a 49212/49213 Semivolatiles	14417B2b 49212/49213 Polynuclear Aromatic Hydrocarbons	14417B3 49212/49213 Chlorinated Pesticides & PCBs	14417B4 49212/49213 Metals	14417B7 49212/49213 TPH as Gasoline	14417B8 49212/49213 TPH as Extractables
Samples	C077G105 C077G107 C077G108 C077TB04 C077R003 C077G106 C077TB03 C077G110 C077G109 C077S376* C077S377 C077S378* C077S385 C077S386* C077S387 C077S373* C077S375 C077S387MS C077S387MSD	C077G105 C077R003 C077G106 C077G109 C077S376* C077S377 C077S378* C077S385 C077S386* C077S387	C077G107 C077G108 C077R003 C077G106 C077S376* C077S377 C077S378* C077S385 C077S386* C077S387 C077S373* C077S375	C077R003 C077G106 C077S376* C077S377 C077S378* C077S385 C077S386* C077S387	C077R003 C077G103A C077G106 C077S376* C077S377 C077S378* C077S385 C077S386* C077S387 C077G106MS C077G106DUP C077G103ADL C077G106DL	C077G105 C077R003 C077G106 C077G109 C077S376* C077S377 C077S378* C077S385 C077S386* C077S387 C077G106MS C077G106MSD	C077G105 C077R003 C077G106 C077G109 C077S376* C077S377 C077S378* C077S385 C077S386* C077S387 C077G106MS C077G106MSD C077S376MS C077S376MSD

Note:
* indicates sample underwent Level IV review

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LDC Project Number SDG Parameter	14428A1 49232/49233 Volatiles	14428A2a 49232/49233 Semivolatiles	14428A2b 49232/49233 Polynuclear Aromatic Hydrocarbons	14428A3 49232/49233 Chlorinated Pesticides & PCBs	14428A4 49232/49233 Metals	14428A7 49232/49233 TPH as Gasoline	14428A8 49232/49233 TPH as Extractables
Samples	C077TB07 C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077G182 C077R005 C077S507 C077S508 C077S509 C077S510 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523 C077S521MS C077S521MSD	C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077R005 C077G186 C077S507 C077S508 C077S509 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523 C077S522MS C077S522MSD	C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077R005 C077G188 C077G146 C077S507 C077S508 C077S509 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523 C077S512MS C077S512MSD	C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077R005 C077G144 C077S507 C077S508 C077S509 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523 C077S512MS C077S512MSD	C077G145 C077G191 C077G143 C077G192 C077G185 C077G187 C077G183 C077G181 C077R005 C077S507 C077S508 C077S509 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523 C077S509MS C077S509MSD	C077G145 C077G191 C077G143 C077G192 C077G185 C077G187 C077G183 C077G181 C077G182 C077R005 C077S507 C077S508 C077S509 C077S510 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523 C077S504MS C077S504MSD	C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077R005 C077G184 C077S507 C077S508 C077S509 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523

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LDC Project Number SDG Parameter	14428B1 49235/49236 Volatiles	14428B2a 49235/49236 Semivolatiles	14428B2b 49235/49236 Polynuclear Aromatic Hydrocarbons	14428B3 49235/49236 Chlorinated Pesticides & PCBs	14428B4 49235/49236 Metals	14428B7 49235/49236/ 05BR1817 TPH as Gasoline	14428B8 49235/49236 TPH as Extractables
Samples	C077TB05 C077G151 C077G152 C077G154 C077G148 C077G147* C077TB06 C077R004 C077S436 C077S437 C077S438 C077S445 C077S446 C077S447 C077S448 C077S449 C077S450* C077S439 C077S440 C077S441 C077S433 C077S434* C077S435* C077S430* C077S431 C077S432 C077S438MS C077S438MSD	C077G148 C077G147* C077R004 C077S436 C077S437 C077S438 C077S439 C077S441 C077S433 C077S434* C077S435* C077S430* C077S431 C077S432 C077S433MS C077S433MSD	C077G147* C077R004 C077G109A C077S436 C077S437 C077S438 C077S439 C077S441 C077S433 C077S434* C077S435* C077S430* C077S431 C077S432 C077G105 C077G147MS C077G147MSD C077S441MS C077S441MSD C077G148	C077G148 C077G147* C077R004 C077G109A C077G105A C077S436 C077S437 C077S438 C077S439 C077S441 C077S433 C077S434* C077S435* C077S430* C077S431 C077G105AMS C077G105AMSD C077S436MS C077S436MSD C077S432MS C077S432MSD C077S432	C077G151 C077G152 C077G154 C077G148 C077G147* C077R004 C077G109A C077G109 C077G105A C077S436 C077S437 C077S438 C077S445 C077S446 C077S447 C077S448 C077S449 C077S450* C077S439 C077S441 C077S433 C077S434* C077S435* C077S430* C077S431 C077S432 C077G154MS C077G154MSD C077S445MS C077S445MSD	C077G148 C077G149 C077G147* C077R004 C077S436 C077S437 C077S438 C077S439 C077S440 C077S441 C077S433 C077S434* C077S435* C077S430* C077S431 C077S432	C077G148 C077G149 C077G147* C077R004 C077S436 C077S437 C077S438 C077S439 C077S441 C077S433 C077S434* C077S435* C077S430* C077S431 C077S432 C077S433MS C077S433MSD

Note:
* indicates sample underwent Level IV review

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LDC Project Number SDG Parameter	14434A1 49247/49249 Volatiles	14434A2a 49247/49249 Semivolatiles	14434A2b 49247/49249 Polynuclear Aromatic Hydrocarbons	14434A3 49247/49249 Chlorinated Pesticides & PCBs	14434A4 49247/49249 Metals	14434A7 49247/49249 TPH as Gasoline	14434A8 49247/49249 TPH as Extractables
Samples	C077S524 C077S525* C077S526 C077S530* C077S531 C077S532 C077S527 C077S528 C077S529 C077S379 C077S380 C077S381 C077G193 C077G111* C077G196 C077G195 C077R006 C077T08	C077S524 C077S525* C077S526 C077S530* C077S531 C077S532 C077S527 C077S528 C077S529 C077S379 C077S380 C077S381 C077G193 C077G111* C077G196 C077R006 C077G194 C077S532MS C077S532MSD C077G193MS C077G193MSD	C077S524 C077S525* C077S526 C077S530* C077S531 C077S532 C077S527 C077S528 C077S529 C077S379 C077S380 C077S381 C077G193 C077G111* C077G196 C077R006 C077G194 C077G196MS C077G196MSD	C077S524 C077S525* C077S526 C077S530* C077S531 C077S532 C077S527 C077S528 C077S529 C077S394 C077S395 C077S396 C077S397 C077S398 C077S399 C077S379 C077S380 C077S381 C077G193 C077G111* C077G196 C077R006 C077G194 C077G120 C077S529MS C077S529MSD C077G195	C077S524 C077S525* C077S526 C077S530* C077S531 C077S532 C077S527 C077S528 C077S529 C077S394 C077S395 C077S396 C077S397 C077S398 C077S399 C077S379 C077S380 C077S381 C077G193 C077G111* C077G196 C077R006 C077G194 C077G120 C077S380MS C077S380DUP	C077S524 C077S525* C077S526 C077S530* C077S531 C077S532 C077S527 C077S528 C077S529 C077S379 C077S380 C077S381 C077G193 C077G111* C077G196 C077G195 C077R006 C077S528MS C077S528MSD C077S380MS C077S380MSD	C077S524 C077S525* C077S526 C077S530* C077S531 C077S532 C077S527 C077S528 C077S529 C077S379 C077S380 C077S381 C077G193 C077G111* C077G196 C077R006 C077G194 C077S381DL

Note:
* indicates sample underwent Level IV review

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LDC Project Number SDG Parameter	14443A1 49257/49262 Volatiles	14443A2a 49257/49262 Semivolatiles	14443A2b 49257/49262 Polynuclear Aromatic Hydrocarbons	14443A3 49257/49262 Chlorinated Pesticides & PCBs	14443A4 49257/49262 Metals	14443A7 49257/49262 TPH as Gasoline	14443A8 49257/49262 TPH as Extractables
Samples	C077S451 C077S452 C077S453* C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400 C077G122 C077TB09 C077G112 C077R007 C077G115* C077G116 C077G128 C077G129 C077G113 C077G114 C077G112MS C077G112MSD	C077S451 C077S452 C077S453* C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400 C077G122 C077G112 C077R007 C077G115* C077G116 C077G128 C077G113 C077G114 C077S402MS C077S402MSD	C077S451 C077S452 C077S453* C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400 C077G122 C077G112 C077R007 C077G115* C077G116 C077G128 C077G113 C077G114	C077S451 C077S452 C077S453* C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400 C077G122 C077G112 C077R007 C077G115* C077G116 C077G128 C077G113 C077G114 C077G122MS C077G122MSD	C077S451 C077S452 C077S453* C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400 C077G122 C077G112 C077R007 C077G115* C077G116 C077G128 C077G129 C077G113 C077S384MS C077S384MSD	C077S451 C077S452 C077S453* C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400 C077G122 C077G112 C077R007 C077G115* C077G116 C077G128 C077G129 C077G113 C077G114	C077S451 C077S452 C077S453* C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400 C077G122 C077G112 C077R007 C077G115* C077G116 C077G128 C077G129 C077G113 C077G114 C077G117 C077S390DL C077S384DL

Note:
* indicates sample underwent Level IV review

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LDC Project Number SDG Parameter	14449A1 49265/49267 Volatiles	14449A2a 49265/49267 Semivolatiles	14449A2b 49265/49267 Polynuclear Aromatic Hydrocarbons	14449A3 49265/49267 Chlorinated Pesticides & PCBs	14449A4 49265/49267 Metals	14449A7 49265/49267 TPH as Gasoline	14449A8 49265/49267 TPH as Extractables
Samples	C077S413 C077S412 C077S414 C077S421 C077S422 C077S423 C077S418 C077S419 C077S420 C077S424 C077S425 C077S426 C077G132 C077G130 C077G155 C077TB10 C077SW01 C077G135 C077G136 C077R008 C077S419MS C077S419MSD	C077S413 C077S412 C077S414 C077S421 C077S424 C077S425 C077S426 C077G132 C077G130 C077G155 C077SW01 C077R008	C077S413 C077S412 C077S414 C077S421 C077S424 C077S425 C077S426 C077G132 C077G130 C077G155 C077SW01 C077R008	C077S413 C077S412 C077S414 C077S421 C077S424 C077S425 C077S426 C077S119 C077S120 C077S117 C077S118 C077S115 C077S116 C077S113 C077S114 C077S111 C077S112 C077G132 C077G130 C077G155 C077SW01 C077R008 C077G131 C077S114MS C077S114MSD	C077S413 C077S412 C077S414 C077S421 C077S422 C077S423 C077S418 C077S419 C077S420 C077S424 C077S425 C077S426 C077G132 C077G130 C077G155 C077SW01 C077G135 C077G136 C077R008 C077S413MS C077S413MSD C077S423MS C077S423MSD C077G136MS C077G136MSD	C077S413 C077S412 C077S414 C077S424 C077S425 C077S426 C077G132 C077G130 C077G155 C077SW01 C077R008	C077S413 C077S412 C077S414 C077S421 C077S422 C077S423 C077S418 C077S419 C077S420 C077S424 C077S425 C077S426 C077G132 C077G130 C077G155 C077SW01 C077G135 C077G136 C077R008

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LDC Project Number SDG Parameter	14449B1 49277/49278 Volatiles	14449B2a 49277/49278 Semivolatiles	14449B2b 49277/49278 Polynuclear Aromatic Hydrocarbons	14449B3 49277/49278 Chlorinated Pesticides & PCBs	14449B4 49277/49278 Metals	14449B7 49277/49278 TPH as Gasoline	14449B8 49277/49278 TPH as Extractables
Samples	C077S428 C077S429 C077S415 C077S416 C077S417 C077S442 C077S443 C077S444 C077S409* C077S410 C077S411* C077S427 C077S406* C077S407 C077S408 C077S404 C077S403 C077S405 C077G137 C077G150 C077G127 C077G133 C077G126* C077R009 C077G142* C077G141 C077TB11 C077G121 C077G141MS C077G141MSD	C077S428 C077S429 C077S415 C077S416 C077S417 C077S409* C077S410 C077S411* C077S427 C077S406* C077S407 C077S408 C077S404 C077S403 C077S405 C077G137 C077G127 C077G126* C077R009 C077G142* C077G141 C077G121 C077S407MS C077S407MSD	C077S428 C077S429 C077S415 C077S416 C077S417 C077S409* C077S410 C077S411* C077S427 C077S406* C077S407 C077S408 C077S404 C077S403 C077S405 C077G137 C077G127 C077G126* C077R009 C077G142* C077G141 C077G121 C077S407MS C077S407MSD	C077S428 C077S429 C077S415 C077S416 C077S417 C077S409* C077S410 C077S411* C077S427 C077S406* C077S407 C077S408 C077S404 C077S403 C077S405 C077G137 C077G126* C077R009 C077G142* C077G141 C077G121 C077G126MS C077G126MSD	C077S428 C077S429 C077S415 C077S416 C077S417 C077S442 C077S443 C077S444 C077S409* C077S410 C077S411* C077S427 C077S406* C077S407 C077S408 C077S404 C077S403 C077S405 C077G137 C077G150 C077G127 C077G133 C077G126* C077R009 C077G142* C077G141 C077G121 C077G138 C077G134 C077G145 C077G143 C077SW01	C077S428 C077S429 C077S415 C077S416 C077S417 C077S409* C077S410 C077S411* C077S427 C077S406* C077S407 C077S408 C077S404 C077S403 C077S405 C077G137 C077G127 C077G133 C077G126* C077R009 C077G142* C077G141 C077G121 C077S416MS C077S416MSD	C077S428 C077S429 C077S415 C077S416 C077S417 C077S409* C077S410 C077S411* C077S427 C077S406* C077S407 C077S408 C077S404 C077S403 C077S405 C077G137 C077G127 C077G133 C077G126* C077R009 C077G142* C077G141 C077G121

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LDC Project Number SDG Parameter	14449B1 49277/49278 Volatiles	14449B2a 49277/49278 Semivolatiles	14449B2b 49277/49278 Polynuclear Aromatic Hydrocarbons	14449B3 49277/49278 Chlorinated Pesticides & PCBs	14449B4 49277/49278 Metals	14449B7 49277/49278 TPH as Gasoline	14449B8 49277/49278 TPH as Extractables
					C077S407MS C077S407DUP C077G150MS C077G150MSD C077G145MS C077G145MSD		

Note:
* indicates sample underwent Level IV review

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LDC Project Number SDG Parameter	14457A1 49287/49289 Volatiles	14457A2a 49287/49289 Semivolatiles	14457A2b 49287/49289 Polynuclear Aromatic Hydrocarbons	14457A3 49287/49289 Chlorinated Pesticides & PCBs	14457A4 49287/49289 Metals	14457A7 49287/49289 TPH as Gasoline	14457A8 49287/49289 TPH as Extractables
Samples	C077S391 C077S392 C077S393 C077S220 C077S221 C077G123 C077G139 C077G124 C077G118 C077TB12 C077R010	C077S391 C077S392 C077S393 C077G123 C077G139 C077G124 C077G118 C077G119 C077R010 C077G140 C077G123MS C077G123MSD	C077S391 C077S392 C077S393 C077G123 C077G139 C077G124 C077G118 C077R010 C077G125	C077S391 C077S392 C077S393 C077G123 C077G139 C077G124 C077G118 C077R010 C077S393MS C077S393MSD	C077S391 C077S392 C077S393 C077S193 C077S194 C077S195 C077S196 C077S197 C077S198 C077S222 C077S220 C077S221 C077S199 C077S200 C077S223 C077S201 C077S202 C077S224 C077G123 C077G139 C077G124 C077G118 C077R010 C077G125 C077R010MS C077R010DUP	C077S391 C077S392 C077S393 C077G123 C077G139 C077G124 C077G118 C077G119 C077R010 C077S391MS C077S391MSD	C077S391 C077S392 C077S393 C077G123 C077G139 C077G124 C077G118 C077R010

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LDC Project Number SDG Parameter	14457B1 49301/49303 Volatiles	14457B2a 49301/49303 Semivolatiles	14457B2b 49301/49303 Polynuclear Aromatic Hydrocarbons	14457B3 49301/49303 Chlorinated Pesticides & PCBs	14457B4 49301/49303 Metals	14457B7 49301/49303 TPH as Gasoline	14457B8 49301/49303 TPH as Extractables
Samples	C077S301 C077S302* C077S303 C077S304* C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312 C077G071* C077G073 C077TB13 C077R011	C077S301 C077S302* C077S303 C077S304* C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312 C077G071* C077G073 C077R011 C077S302MS C077S302MSD	C077S301 C077S302* C077S303 C077S304* C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312 C077G071* C077G073 C077R011	C077S301 C077S302* C077S303 C077S304* C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312 C077G071* C077G073 C077R011 C077S312MS C077S312MSD C077G073MS C077G073MSD	C077S301 C077S302* C077S303 C077S304* C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312 C077S211 C077S212* C077S229* C077S207* C077S208* C077S227 C077S205 C077S206 C077S226 C077S191 C077S192 C077S219 C077S217 C077S218 C077S232 C077S203 C077S204 C077S225 C077S213 C077S214 C077S230 C077S215	C077S301 C077S302* C077S303 C077S304* C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312 C077G071* C077G072 C077G073 C077R011 C077S305MS C077S305MSD	C077S301 C077S302* C077S303 C077S304* C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312 C077G071* C077G073 C077R011

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LDC Project Number SDG Parameter	14457B1 49301/49303 Volatiles	14457B2a 49301/49303 Semivolatiles	14457B2b 49301/49303 Polynuclear Aromatic Hydrocarbons	14457B3 49301/49303 Chlorinated Pesticides & PCBs	14457B4 49301/49303 Metals	14457B7 49301/49303 TPH as Gasoline	14457B8 49301/49303 TPH as Extractables
Samples					C077S216 C077S231 C077S209 C077S210 C077S228 C077G071* C077G073 C077R011 C077S312MS C077S312MSD		

Note:
* indicates sample underwent Level IV review

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LDC Project Number SDG Parameter	14461A1 49310/49311 Volatiles	14461A2a 49310/49311 Semivolatiles	14461A2b 49310/49311 Polynuclear Aromatic Hydrocarbons	14461A3 49310/49311 Chlorinated Pesticides & PCBs	14461A4 49310/49311 Metals	14461A6 49310/49311 Hexavalent Chromium	14461A7 49310/49311 TPH as Gasoline	14461A8 49310/49311 TPH as Extractables
Samples	C077S177 C077S178 C077S179 C077S180* C077S181 C077S182 C077S174 C077S175 C077S171 C077S172 C077S173 C077S621 C077S622 C077S287 C077S288 C077S289* C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321* C077S322 C077S323 C077S324 C077S325 C077S326 C077S344 C077S345 C077S346 C077S341 C077S342 C077S343	C077S177 C077S178 C077S179 C077S180* C077S181 C077S182 C077S174 C077S175 C077S176 C077S171 C077S172 C077S173 C077G053 C077R012 C077G054	C077S177 C077S178 C077S179 C077S180* C077S181 C077S182 C077S174 C077S175 C077S176 C077S261* C077S262 C077S263 C077S171 C077S172 C077S173 C077S264 C077S265 C077S266 C077S267 C077S268 C077S269 C077G053 C077R012 C077S176MS C077S176MSD C077S267MS C077S267MSD	C077S177 C077S178 C077S179 C077S180* C077S181 C077S182 C077S174 C077S175 C077S176 C077S171 C077S172 C077S173 C077G053 C077R012	C077S177 C077S178 C077S179 C077S180* C077S181 C077S182 C077S174 C077S175 C077S176 C077S171 C077S172 C077S173 C077S287 C077S288 C077S289* C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321* C077S322 C077S323 C077S324 C077S325 C077S326 C077S541 C077S542* C077S543 C077S544 C077S545 C077S546 C077G053	C077S287 C077S288 C077S289* C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077G063 C077G062* C077G061 C077R012 C077G064 C077G064MS C077G064MSD	C077S541 C077S542* C077S543 C077S544 C077S545 C077S546	C077S621 C077S622 C077S287 C077S288 C077S289* C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321* C077S322 C077S323 C077S324 C077S325 C077S326 C077S541 C077S542* C077S543 C077S544 C077S545 C077S546 C077G063 C077G062* C077G061 C077G241 C077R012 C077S285MS C077S285MSD C077S325MS C077S325MSD C077S542MS C077S542MSD

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LDC Project Number SDG Parameter	14461A1 49310/49311 Volatiles	14461A2a 49310/49311 Semivolatiles	14461A2b 49310/49311 Polynuclear Aromatic Hydrocarbons	14461A3 49310/49311 Chlorinated Pesticides & PCBs	14461A4 49310/49311 Metals	14461A6 49310/49311 Hexavalent Chromium	14461A7 49310/49311 TPH as Gasoline	14461A8 49310/49311 TPH as Extractables
	C077S541 C077S542* C077S543 C077S544 C077S545 C077S546 C077G053 C077G063 C077G062* C077G061 C077G091 C077G092 C077G093 C077TB14 C077G241 C077TB15 C077R012 C077S174MS C077S174MSD C077S283MS C077S283MSD C077G091MS C077G091MSD				C077G063 C077G062* C077G061 C077R012 C077G064 C077S172MS C077S172MSD C077S325MS C077S325MSD C077S542MS C077S542MSD			

Note:
* indicates sample underwent Level IV review

Attachment F1
Table of Contents (continued)

LDC Project Number SDG Parameter	14473A1 49342/49343 Volatiles	14473A2a 49342/49343 Semivolatiles	14473A2b 49342/49343 Polynuclear Aromatic Hydrocarbons	14473A3 49342/49343 Chlorinated Pesticides & PCBs	14473A4 49342/49343 Metals
Samples	C077G011 C077G013 C077TB17 C077R014 C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078 C077S079 C077S080* C077S081* C077S082*	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078 C077S079 C077S080* C077S081* C077S082* C077G011 C077G013 C077R014 C077S080MS C077S080MSD	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078 C077S079 C077S080* C077S081* C077S082* C077G011 C077G013 C077R014 C077G014 C077S023MS C077S023MSD C077S080MS C077S080MSD	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078 C077S079 C077S080* C077S081* C077S082* C077S091* C077S092 C077S093 C077S094 C077S095 C077S096 C077S097 C077S098	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078 C077S079 C077S080* C077S081* C077S082* C077S151* C077S152* C077S153 C077S157 C077S158 C077S159 C077S163 C077S164

Attachment F1
Table of Contents (continued)

LDC Project Number SDG Parameter	14473A1 49342/49343 Volatiles	14473A2a 49342/49343 Semivolatiles	14473A2b 49342/49343 Polynuclear Aromatic Hydrocarbons	14473A3 49342/49343 Chlorinated Pesticides & PCBs	14473A4 49342/49343 Metals
				C077S100 C077S99 C077S101 C077S102 C077G011 C077G013 C077R014 C077S079MS C077S079MSD	C077S165 C077S154 C077S155 C077S156 C077G011 C077G013 C077R014 C077S031MS C077S031MSD C077S158MS C077S158MSD

Note:
* indicates sample underwent Level IV review

Attachment F1
Table of Contents (continued)

LDC Project Number SDG Parameter	14479A1 49319/49320 Volatiles	14479A2a 49319/49320 Semivolatiles	14479A2b 49319/49320 Polynuclear Aromatic Hydrocarbons	14479A3 49319/49320 Chlorinated Pesticides & PCBs	14479A4 49319/49320/ 05BR1891 Metals	14479A7 49319/49320 TPH as Gasoline	14479A8 49319/49320 TPH as Extractables
Samples	C077S001 C077S002* C077S009 C077S004 C077S005 C077S006 C077S007 C077S008 C077S010 C077S010DL C077S461* C077S462* C077S463 C077TB17 C077G161 C077G201* C077G003* C077G001 C077G081 C077G082 C077G051* C077G083 C077G002 C077G202 C077R013 C077S010MS C077S010MSD C077G201MS C077G201MSD C077G051DL C077G003DL	C077G051* C077R013	C077S253 C077S254 C077G051* C077R013	C077S041* C077S042* C077S053* C077S054* C077S055* C077S047 C077S048 C077S049 C077S050 C077S051* C077S052 C077S043 C077S044 C077S045 C077S046 C077S241 C077S242 C077S243 C077S244 C077S245 C077S246 C077S253 C077S254 C077S251 C077S252 C077S249 C077S250 C077S247 C077S248 C077G051 C077R013	C077S461* C077S462* C077S463 C077G161 C077G201* C077G081 C077G051* C077G202 C077R013 C077G083 C077G011 C077G012 C077G013 C077G161MS C077G161MSD C077G201MS C077G201MSD C077G081MS C077G081MSD C077G202MS C077G202MSD	C077G201* C077G202 C077R013	C077S001 C077S002* C077S009 C077S004 C077S005 C077S006 C077S007 C077S008 C077S010 C077S461* C077S462* C077S463 C077G161 C077G201* C077G003* C077G001 C077G081 C077G202 C077R013 C077G084 C077G083 C077G002 C077G201MS C077G201MSD

Attachment F1
Table of Contents (continued)

LDC Project Number SDG Parameter	14479A1 49319/49320 Volatiles	14479A2a 49319/49320 Semivolatiles	14479A2b 49319/49320 Polynuclear Aromatic Hydrocarbons	14479A3 49319/49320 Chlorinated Pesticides & PCBs	14479A4 49319/49320 05BR1891 Metals	14479A7 49319/49320 TPH as Gasoline	14479A8 49319/49320 TPH as Extractables
Samples				C077G052 C077S048MS C077S048MSD			

Note:
* indicates sample underwent Level IV review

Attachment F1
Table of Contents (continued)

LDC Project Number SDG Parameter	14479B1 49363/49364 Volatiles	14479B2a 49363/49364 Semivolatiles	14479B2b 49363/49364 Polynuclear Aromatic Hydrocarbons	14479B3 49363/49364 Chlorinated Pesticides & PCBs	14479B4 49363/49364 Metals	14479B7 49363/49364/ TPH as Gasoline	14479B8 49363/49364 TPH as Extractables
Samples	C077S561 C077S562 C077S581 C077S582 C077S601 C077S602 C077S661 C077S662 C077G031 C077G033 C077R015 C077G211 C077G221 C077G222 C077G261 C077G231 C077TB18 C077S581MS C077S581MSD	C077G031	C077G031	C077S140 C077S141 C077S142 C077S137 C077S138 C077S139 C077S131 C077S132 C077S133 C077S134 C077S135 C077S136 C077G031 C077R015 C077S136MS C077S136MSD	C077S160 C077S161 C077S162 C077S581 C077S582 C077G031 C077G032 C077G033 C077R015		C077S141 C077S142 C077S561 C077S562 C077S581 C077S582 C077S601 C077S602 C077S661 C077S662 C077G041 C077R015 C077G211 C077G212 C077G221 C077G261 C077G231 C077S562MS C077S562MSD C077S602MS C077S602MSD C077G041MS C077G041MSD

Attachment F1
Table of Contents (continued)

LDC Project Number SDG Parameter	14479C1 49373/49374 Volatiles	14479C2a 49373/49374 Semivolatiles	14479C2b 49373/49374 Polynuclear Aromatic Hydrocarbons	14479C3 49373/49374 Chlorinated Pesticides & PCBs	14479C4 49373/49374/ 05BR1906 Metals	14479C7 49373/49374 TPH as Gasoline	14479C8 49373/49374 TPH as Extractables
Samples	C077S641 C077S642 C077G251 C077TB19 C077R016 C077G153 C077R017 C077S641MS C077S641MSD				C077S481 C077S482 C077S483 C077S484 C077S485 C077S486 C077S487 C077S488 C077S489 C077CB02 C077R016 C077G153 C077R017 C077G171 C077G172 C077G173 C077G174	C077G174 C077G174MS C077G174MSD	C077S641 C077S642 C077G251 C077R016 C077G174 C077G174MS C077G174MSD

Attachment F1
Table of Contents (continued)

LDC Project Number SDG Parameter	14479D1 49394 Volatiles	14479D2a 49394 Semivolatiles	14479D2b 49394 Polynuclear Aromatic Hydrocarbons	14479D3 49394 Chlorinated Pesticides & PCBs	14479D4 49394 Metals (Lead)	14479D7 49394 TPH as Gasoline	14479D8 49394 TPH as Extractables
Samples					C077CB03		

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Bechtel Environmental
1230 Columbia Street, Suite 400
San Diego, CA 92101
Attn: Ms. Toni Kuzmack

December 22, 2005

Project Name : NAS Alameda Point
Project # : CTO 077

On December 16, 2005 the following data packages were received by Laboratory Data Consultants, Inc. from Bechtel Environmental. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 14417:

SDG #	Fraction
49199/49200, 49212/49213	Volatiles, Semivolatiles, Polynuclear Aromatic Hydrocarbons, Chlorinated Pesticides & PCBs, Metals, TPH as Gasoline, TPH as Extractables

The above SDGs were reviewed using Level III and Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- NFESC Special Publication SP-2056-ENV, Navy Installation Restoration Chemical Data Quality Manual, Naval Facilities Engineering Command, September 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998

The data validators did utilize their professional judgement when evaluating the data to achieve the most complete and accurate assessment of the data. The data packages were reviewed according to the above stated validation procedures.

For GC/MS volatile analyses, the primary findings consisted of:

a) Continuing calibration factors exceeded acceptance criteria in SDGs 49199/49200 and 49212/49213. Since the laboratory met the protocol requirement, this finding should be considered advisory.

b) Matrix spike analyses were not performed for all batches in SDGs 49199/49200 and 49212/49213.

c) Matrix spike/matrix spike duplicate percent recoveries exceeded acceptance criteria for several compounds in SDGs 49199/49200 and 49212/49213. Since the laboratory met the protocol requirement, this finding should be considered advisory.

d) Surrogate percent recoveries exceeded acceptance criteria for several samples in SDG 49199/49200 and for samples C077S375 and C077S378 in SDG 49212/49213.

e) Internal standard areas exceeded acceptance criteria for several samples in SDGs 49199/49200 and 49212/49213. Since the laboratory met the protocol requirement, this finding should be considered advisory.

f) Several volatile compounds were detected in the method and field blanks in SDG 49199/49200 and methylene chloride was detected in the method blanks and acetone in the field blanks in SDG 49212/49213. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For GC/MS semivolatile analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDGs 49199/49200 and 49212/49213.

b) Matrix spike/matrix spike duplicate percent recoveries and relative percent differences exceeded acceptance criteria for 4-nitroaniline, pyridine and aniline in SDG 49199/49200. Since the laboratory met the protocol requirement, this finding should be considered advisory.

c) Laboratory control sample percent recoveries exceeded acceptance criteria for 4-chloroaniline in SDGs 49199/49200 and 49212/49213.

For GC/MS PAH analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDGs 49199/49200 and 49212/49213.

b) Laboratory control sample percent recoveries exceeded acceptance criteria for several compounds in SDGs 49199/49200 and 49212/49213.

c) Surrogate percent recoveries exceeded acceptance criteria for sample C077S387 in SDG 49212/49213.

d) Benzo(b)fluoranthene and benzo(k)fluoranthene coeluted for several samples in SDG 49212/49213. Since the laboratory met the protocol requirement, this finding should be considered advisory.

e) Benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, fluoranthene and pyrene for sample C077S372 in SDG 49199/49200 exceeded calibration range. Since the laboratory met the protocol requirement, this finding should be considered advisory.

f) Data was qualified as unusable in dilutions by the validators in order to yield only one complete set of data for a given sample and eliminate redundant data.

For chlorinated pesticide analyses, the primary findings consisted of:

a) Continuing calibration factors exceeded acceptance criteria in SDGs 49199/49200 and 49212/49213. Since the laboratory met the protocol requirement, this finding should be considered advisory.

b) Matrix spike analyses were not performed for all batches in SDGs 49199/49200 and 49212/49213.

For metal analyses, the primary findings consisted of:

a) Matrix spike analyses were not performed for all batches in SDGs 49199/49200 and 49212/49213.

b) Duplicate analyses were not performed for all batches in SDGs 49199/49200 and 49212/49213.

c) Sodium was reported above the calibration range for samples C077G103A and C077G106 in SDG 49212/49213. Since the laboratory met the protocol requirement, this finding should be considered advisory.

d) Data was qualified as unusable in dilutions by the validators in order to yield only one complete set of data for a given sample and eliminate redundant data.

e) Several metals were detected in the method and field blanks in SDGs 49199/49200 and 49212/49213. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For TPH as gasoline analyses, the primary finding consisted of:

a) Matrix spike analyses were not performed for all batches in SDG and 49212/49213.

For TPH as extractable analyses, the primary findings consisted of:

a) Matrix spike analyses were not performed for all batches in SDG and 49199/49200.

b) Surrogate percent recoveries exceeded acceptance criteria for sample C077S387 in SDG 49212/49213.

In general, the data for all analyses appear usable with the limitations noted in the Data Validation Reports. Data validation flags were noted on the Laboratory Form 1s and included with each validation report.

Sincerely,

Richard M. Amano
President/Principal Chemist

Attachment 1

1 Week TAT

LDC #14417 (Bechtel Environmental-San Diego / Alameda Point, CTO 077)

LDC	SDG#	DATE REC'D	(2) DATE DUE	VOA (8260B)		SVOA (8270C)		PAHs (8270C -SIM)		Pest. /PCBs (SW846)		Metals (SW846)		Diss. Metals (SW846)		TPH-G (8015)		TPH-E (8015)																			
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	49199/49200	12/16/05	12/23/05	7	14	4	14	3	15	4	12	0	12	2	0	3	13	3	12																
B	49212/49213	12/16/05	12/23/05	9	6	4	3	4	4	2	3	0	3	7	0	6	3	6	5																
B	49212/49213	12/16/05	12/23/05	0	4	0	3	0	4	0	3	0	3	0	0	0	3	0	3																
Total	B/LR			16	24	8	20	7	23	6	18	0	18	9	0	9	19	9	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	206

Shaded cells indicate Level IV validation (all other cells are Level III validation)

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14417

Volatiles

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: November 29, 2005

LDC Report Date: December 27, 2005

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49199/49200

Sample Identification

C077G103
C077G101
C077G102
C077TB02
C077R001
C077R002
C077TB01
C077S361
C077S362
C077S363
C077S367
C077S368
C077S369
C077S364
C077S365
C077S366
C077S370
C077S371
C077S372
C077S361MS
C077S361MSD

Introduction

This data review covers 14 soil samples and 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all volatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/2/05	Hexachlorobutadiene	27	All water samples in SDG 49199/49200	J (all detects) UJ (all non-detects)	A

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051202A-BLK	12/2/05	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene	0.66 ug/L 0.24 ug/L 0.30 ug/L	All water samples in SDG 49199/49200
051207A-BLK	12/8/05	cis-1,2-Dichloroethene	0.00061 mg/Kg	C077S364 C077S365 C077S366
051212A-BLK	12/12/05	Methylene chloride	0.0059 mg/Kg	C077S362
051209A-BLK	12/9/05	Acetone cis-1,2-Dichloroethene Methylene chloride	0.0042 mg/Kg 0.00057 mg/Kg 0.081 mg/Kg	C077S361 C077S363 C077S367 C077S368 C077S369
051209A1-BLK	12/9/05	Acetone	0.0052 mg/Kg	C077S370 C077S371 C077S372

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077S365	cis-1,2-Dichloroethene	0.0023 mg/Kg	0.006U mg/Kg
C077S366	cis-1,2-Dichloroethene	0.0016 mg/Kg	0.009U mg/Kg

*Indicates change as the result of report review.

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077S361	Acetone cis-1,2-Dichloroethene Methylene chloride	0.039 mg/Kg 0.0023 mg/Kg 0.026 mg/Kg	0.1U mg/Kg 0.006U mg/Kg 0.06U mg/Kg
C077S363	cis-1,2-Dichloroethene Methylene chloride	0.0019 mg/Kg 0.023 mg/Kg	0.006U mg/Kg 0.06U mg/Kg
C077S367	cis-1,2-Dichloroethene Methylene chloride	0.0024 mg/Kg 0.025 mg/Kg	0.006U mg/Kg 0.06U mg/Kg
C077S368	cis-1,2-Dichloroethene Methylene chloride	0.0016 mg/Kg 0.018 mg/Kg	0.006U mg/Kg 0.06U mg/Kg
C077S369	cis-1,2-Dichloroethene Methylene chloride	0.0055 mg/Kg 0.035 mg/Kg	0.008U mg/Kg 0.08U mg/Kg
C077S370	Acetone	0.037 mg/Kg	0.1U mg/Kg
C077S371	Acetone	0.037 mg/Kg	0.1U mg/Kg
C077S362	Methylene chloride	0.018 mg/Kg	0.06U mg/Kg

Samples C077TB02 and C077TB01 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
C077TB02	11/29/05	2-Butanone Acetone Methylene chloride	12 ug/L 30 ug/L 2.0 ug/L	C077R001 C077R002 C077S361 C077S362 C077S363 C077S367 C077S368 C077S369
C077TB01	11/29/05	Acetone Methylene chloride	3.0 ug/L 1.9 ug/L	C077G103 C077G101 C077G102 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372

*Indicates change as the result of report review.

Samples C077R001 and C077R002 were identified as rinsates. No volatile contaminants were found in these blanks with the following exceptions:

Rinsate ID	Sampling Date	Compound	Concentration	Associated Samples
C077R001	11/29/05	Acetone Bromodichloromethane Bromoform Carbon disulfide Chloroform Dibromochloromethane	1.7 ug/L 1.6 ug/L 0.34 ug/L 1.3 ug/L 2.1 ug/L 1.3 ug/L	C077G103 C077G101 C077G102
C077R002	11/29/05	Acetone Bromodichloromethane Bromoform Chloroform Dibromochloromethane	1.5 ug/L 1.9 ug/L 0.34 ug/L 2.6 ug/L 1.4 ug/L	All soil samples in SDG 49199/49200

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
C077G103	Carbon disulfide	1.8 ug/L	1.8U ug/L
C077G101	Carbon disulfide	1.7 ug/L	1.7U ug/L
C077G102	Carbon disulfide	2.1 ug/L	2.1U ug/L
C077S361	Chloroform Acetone	0.0032 mg/Kg 0.039 mg/Kg	0.006U mg/Kg 0.1U mg/Kg
C077S362	Chloroform 2-Butanone Acetone Methylene chloride	0.0045 mg/Kg 0.0011 mg/Kg 0.11 mg/Kg 0.018 mg/Kg	0.006U mg/Kg 0.1U mg/Kg 0.11U mg/Kg 0.06U mg/Kg
C077S363	Chloroform Acetone	0.0023 mg/Kg 0.089 mg/Kg	0.006U mg/Kg 0.1U mg/Kg
C077R001	Acetone	1.7 ug/L	2U ug/L
C077R002	Acetone	1.5 ug/L	2U ug/L

*Indicates change as the result of report review.

Sample	Compound	Reported Concentration	Modified Final Concentration
C077S367	Chloroform Dibromochloromethane Acetone	0.0029 mg/Kg 0.0026 mg/Kg 0.053 mg/Kg	0.006U mg/Kg 0.006U mg/Kg 0.1U mg/Kg
C077S368	Acetone Methylene chloride	0.10 mg/Kg 0.018 mg/Kg	0.1U mg/Kg 0.06U mg/Kg
C077S369	Chloroform Acetone	0.004 mg/Kg 0.085 mg/Kg	0.008U mg/Kg 0.2U mg/Kg
C077S365	Chloroform	0.0023 mg/Kg	0.006U mg/Kg
C077S366	Acetone	0.021 mg/Kg	0.2U mg/Kg
C077S370	Chloroform Methylene chloride	0.0029 mg/Kg 0.012 mg/Kg	0.005U mg/Kg 0.06U mg/Kg
C077S371	Chloroform Methylene chloride	0.0027 mg/Kg 0.014 mg/Kg	0.006U mg/Kg 0.06U mg/Kg
C077S372	Chloroform Methylene chloride	0.003 mg/Kg 0.013 mg/Kg	0.009U mg/Kg 0.09U mg/Kg

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S364	1,2-Dichloroethane-d4 *Bromofluorobenzene* Dibromofluoromethane	192 (52-149) 121 (85-120) 142 (65-135)	All TCL compounds	J (all detects)	P
C077S365	1,2-Dichloroethane-d4 Dibromofluoromethane Toluene-d8	162 (52-149) 136 (65-135) 118 (85-115)	All TCL compounds	J (all detects)	P
C077S366	1,2-Dichloroethane-d4	151 (52-149)	All TCL compounds	J (all detects)	P
C077S363	1,2-Dichloroethane-d4	157 (52-149)	All TCL compounds	J (all detects)	P
C077S368	1,2-Dichloroethane-d4	173 (52-149)	All TCL compounds	J (all detects)	P

*Indicates change as the result of report review.

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S369	1,2-Dichloroethane-d4	157 (52-149)	All TCL compounds	J (all detects)	P
C077S362	Toluene-d8	120 (85-115)	All TCL compounds	J (all detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077G103 C077G101 C077G102 C077TB02 C077R001 C077R002 C077TB01 C077S362 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S372/MSD	1,1,1-Trichloroethane	50.6 (70-135)	48.2 (70-135)	-	J (all detects)	A
(C077S361	1,1-Dichloroethene	44.4 (65-135)	42.8 (65-135)	-	UJ (all non-detects)	
C077S363	1,2-Dichloroethane	67.4 (70-135)	-	-		
C077S367	Benzene	35.2 (75-125)	33.2 (75-125)	-		
C077S368	Chlorobenzene	27.2 (75-125)	27.0 (75-125)	-		
C077S369)	Ethylbenzene	23.0 (75-125)	26.6 (75-125)	-		
	m,p-Xylenes	21.6 (80-125)	22.9 (80-125)	-		
	o-Xylene	20.4 (75-125)	24.0 (75-125)	-		
	Trichloroethene	33.4 (75-125)	32.6 (75-125)	-		
	Tetrachloroethene	23.4 (65-140)	26.8 (65-140)	-		
	Toluene	27.9 (70-125)	27.3 (70-125)	-		
	trans-1,2-Dichloroethene	37.4 (65-135)	35.2 (65-135)	-		

*Indicates change as the result of report review.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

*X. Internal Standards

All internal standard areas and retention times were within QC limits with the following exceptions:

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S364	Fluorobenzene Chlorobenzene-d5 1,4-Dichlorobenzene-d4	13854 (151528-606110) 10647 (99104-396416) 4556 (37532-150126)	All TCL compounds	J (all detects) UJ (all non-detects)	A
C077S365	Fluorobenzene Chlorobenzene-d5 1,4-Dichlorobenzene-d4	150464 (151528-606110) 84280 (99104-396416) 28944 (37532-150128)	All TCL compounds	J (all detects) UJ (all non-detects)	A
C077S366	Fluorobenzene Chlorobenzene-d5 1,4-Dichlorobenzene-d4	78448 (151528-606110) 54752 (99104-396416) 23440 (37532-150128)	All TCL compounds	J (all detects) UJ (all non-detects)	A
C077S361	1,4-Dichlorobenzene-d4	34216 (49656-198624)	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	A

*Indicates change as the result of report review.

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S363	Fluorobenzene Chlorobenzene-d5 1,4-Dichlorobenzene-d4	112360 (154813-619250) 67464 (114304-457216) 21304 (49656-198624)	All TCL compounds	J (all detects) UJ (all non-detects)	A
C077S367	1,4-Dichlorobenzene-d4	27560 (49656-198624)	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	A
C077S368	Fluorobenzene Chlorobenzene-d5 1,4-Dichlorobenzene-d4	36392 (154813-619250) 20872 (114304-457216) 6322 (49656-198624)	All TCL compounds	J (all detects) UJ (all non-detects)	A

*Indicates change as the result of report review.

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S369	Chlorobenzene-d5 1,4-Dichlorobenzene-d4	87968 (141304-457216) 25536 (49656-198624)	Dibromochloromethane Bromoform 2-Hexanone Tetrachloroethene Chlorobenzene Ethylbenzene Styrene 1,3-Dichloropropane 1,2-Dibromoethane 1,1,1,2-Tetrachloroethane m,p-Xylenes o-Xylene 4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	A

*Corrected associated compounds for samples C077S361, C077S367, and C077S369.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

*Indicates change as the result of report review.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

Samples C077G101 and C077G102 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD
	C077G101	C077G102	
Benzene	0.18	0.22	20
Carbon disulfide	1.7	2.1	21
cis-1,2-Dichloroethene	0.21	0.16	27
m,p-Xylenes	0.39	0.36	25
Toluene	0.76	0.79	4

*Indicates change as the result of report review.

*NAS Alameda Point, CTO 077
Volatiles - Data Qualification Summary - SDG 49199/49200

SDG	Sample	Compound	Flag	A or P	Reason
49199/ 49200	C077G103 C077G101 C077G102 C077TB02 C077R001 C077R002 C077TB01	Hexachlorobutadiene	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49199/ 49200	C077S364 C077S365 C077S366 C077S363 C077S368 C077S369 C077S362	All TCL compounds	J (all detects)	P	Surrogate recovery (%R)
49199/ 49200	C077G103 C077G101 C077G102 C077TB02 C077R001 C077R002 C077TB01 C077S362 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49199/ 49200	C077S361 C077S363 C077S367 C077S368 C077S369	1,1,1-Trichloroethane 1,1-Dichloroethene 1,2-Dichloroethane Benzene Chlorobenzene Ethylbenzene m,p-Xylenes o-Xylene Trichloroethene Tetrachloroethene Toluene trans-1,2-Dichloroethene	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49199/ 49200	C077S364 C077S365 C077S366 C077S363 C077S368	All TCL compounds	J (all detects) UJ (all non-detects)	A	Internal standards (area)

*Indicates change as the result of report review.

SDG	Sample	Compound	Flag	A or P	Reason
*49199/ 49200	C077S361 C077S367	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	A	Internal standards (area)
*49199/ 49200	C077S369	Dibromochloromethane Bromoform 2-Hexanone Tetrachloroethene Chlorobenzene Ethylbenzene Styrene 1,3-Dichloropropane 1,2-Dibromoethane 1,1,1,2-Tetrachloroethane m,p-Xylenes o-Xylene n-Propylbenzene 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	A	Internal standards (area)

*Indicates change as the result of report review.

NAS Alameda Point, CTO 077
Volatiles - Laboratory Blank Data Qualification Summary - SDG 49199/49200

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49199/49200	C077S365	cis-1,2-Dichloroethene	0.006U mg/Kg	A
49199/49200	C077S366	cis-1,2-Dichloroethene	0.009U mg/Kg	A
49199/49200	C077S361	Acetone cis-1,2-Dichloroethene Methylene chloride	0.1U mg/Kg 0.006U mg/Kg 0.06U mg/Kg	A
49199/49200	C077S363	cis-1,2-Dichloroethene Methylene chloride	0.006U mg/Kg 0.06U mg/Kg	A
49199/49200	C077S367	cis-1,2-Dichloroethene Methylene chloride	0.006U mg/Kg 0.06U mg/Kg	A
49199/49200	C077S368	cis-1,2-Dichloroethene Methylene chloride	0.006U mg/Kg 0.06U mg/Kg	A
49199/49200	C077S369	cis-1,2-Dichloroethene Methylene chloride	0.008U mg/Kg 0.08U mg/Kg	A
49199/49200	C077S370	Acetone	0.1U mg/Kg	A
49199/49200	C077S371	Acetone	0.1U mg/Kg	A
49199/49200	C077S362	Methylene chloride	0.06U mg/Kg	A

NAS Alameda Point, CTO 077
Volatiles - Field Blank Data Qualification Summary - SDG 49199/49200

SDG	Sample	Compound	Modified Final Concentration	A or P
49199/49200	C077G103	Carbon disulfide	1.8U ug/L	A
49199/49200	C077G101	Carbon disulfide	1.7U ug/L	A
49199/49200	C077G102	Carbon disulfide	2.1U ug/L	A
49199/49200	C077S361	Chloroform Acetone	0.006U mg/Kg 0.1U mg/Kg	A

*Indicates change as the result of report review.

SDG	Sample	Compound	Modified Final Concentration	A or P
49199/49200	C077S362	Chloroform 2-Butanone Acetone Methylene chloride	0.006U mg/Kg 0.1U mg/Kg 0.11U mg/Kg 0.06U mg/Kg	A
49199/49200	C077S363	Chloroform Acetone	0.006U mg/Kg 0.1U mg/Kg	A
49199/49200	C077R001	Acetone	2U ug/L	A
49199/49200	C077R002	Acetone	2U ug/L	A
49199/49200	C077S367	Chloroform Dibromochloromethane Acetone	0.006U mg/Kg 0.006U mg/Kg 0.1U mg/Kg	A
49199/49200	C077S368	Acetone Methylene chloride	0.1U mg/Kg 0.06U mg/Kg	A
49199/49200	C077S369	Chloroform Acetone	0.008U mg/Kg 0.2U mg/Kg	A
49199/49200	C077S365	Chloroform	0.006U mg/Kg	A
49199/49200	C077S366	Acetone	0.2U mg/Kg	A
49199/49200	C077S370	Chloroform Methylene chloride	0.005U mg/Kg 0.06U mg/Kg	A
49199/49200	C077S371	Chloroform Methylene chloride	0.006U mg/Kg 0.06U mg/Kg	A
49199/49200	C077S372	Chloroform Methylene chloride	0.009U mg/Kg 0.09U mg/Kg	A

*Indicates change as the result of report review.

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: November 30, 2005

LDC Report Date: December 27, 2005

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49212/49213

Sample Identification

C077G105
C077G107
C077G108
C077TB04
C077R003
C077G106
C077TB03
C077G110
C077G109
C077S376**
C077S377
C077S378**
C077S385
C077S386**
C077S387
C077S373**
C077S375
C077S387MS
C077S387MSD

**Indicates sample underwent Level IV review

Introduction

This data review covers 10 soil samples and 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all volatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/3/05	Bromomethane 2,2-Dichloropropane	30 27	All water samples in SDG 49212/49213	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051212A1-BLK	12/12/05	Methylene chloride	0.0059 mg/Kg	C077S385 C077S373** C077S375

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077S385	Methylene chloride	0.0098 mg/Kg	0.06U mg/Kg

Samples C077TB04 and C077TB03 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
C077TB04	11/30/05	Acetone	5.0 ug/L	C077G105 C077G107 C077G108 C077R003 C077S373** C077S375
C077TB03	11/30/05	Acetone Methylene chloride	6.2 ug/L 5.2 ug/L	C077G106 C077G110 C077G109

*Indicates change as the result of report review.

Sample C077R003 was identified as a rinsate. No volatile contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Compound	Concentration	Associated Samples
C077R003	11/30/05	Acetone Bromodichloromethane Chloroform Dibromochloromethane	1.5 ug/L 1.9 ug/L 2.8 ug/L 1.2 ug/L	C077G105 C077G107 C077G108 C077G106 C077G110 C077G109 C077S376** C077S377 C077S378** C077S385 C077S386** C077S387 C077S373** C077S375

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
C077G105	Acetone	1.7 ug/L	2.0U ug/L
C077S373**	Acetone	0.0092 mg/Kg	0.1U mg/Kg
C077G106	Acetone	1.3 ug/L	2.0U ug/L
C077S376**	Acetone	0.0056 mg/Kg	0.1U mg/Kg
C077S386**	Acetone	0.011 mg/Kg	0.1U mg/Kg
C077R003	Acetone	1.5 ug/L	2.0U ug/L

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

*Indicates change as the result of report review.

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S375	Toluene-d8	117 (85-115)	All TCL compounds	J (all detects)	P
C077S378**	Bromofluorobenzene Dibromofluoromethane	157 (85-120) 45.9 (65-135)	All TCL compounds	J (all detects) UJ (all non-detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077G105 C077G107 C077G108 C077TB04 C077R003 C077G106 C077TB03 C077G110 C077G109 C077S376** C077S377 C077S385 C077S373** C077S375	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S387MS/MSD (C077S378** C077S386** C077S387)	1,1,1-Trichloroethane	29.2 (70-135)	28.2 (70-135)	-	J (all detects) UJ (all non-detects)	A
	1,1-Dichloroethene	40.8 (65-135)	42.8 (65-135)	-		
	1,2-Dichloroethane	38.6 (70-135)	39.2 (70-135)	-		
	Benzene	27.0 (75-125)	28.8 (75-125)	-		
	Chlorobenzene	17.8 (75-125)	20.4 (75-125)	-		
	Ethylbenzene	16.8 (75-125)	19.6 (75-125)	-		
	m,p-Xylenes	31.6 (80-125)	35.4 (80-125)	-		
	o-Xylene	16.6 (75-125)	18.8 (75-125)	-		
	Trichloroethene	23.0 (75-125)	23.2 (75-125)	-		
	Tetrachloroethene	22.2 (65-140)	24.0 (65-140)	-		
	Toluene	22.4 (70-125)	22.2 (70-125)	-		
	trans-1,2-Dichloroethene	32.6 (65-135)	35.4 (65-135)	-		

*Indicates change as the result of report review.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051202B-LCS	Styrene	63.1 (65-135)	All water samples in SDG 49212/49213	J (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

*All internal standard areas and retention times were within QC limits with the following exceptions:

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S375	1,4-Difluorobenzene	112696 (142509-570036)	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	A
C077S378**	Fluorobenzene Chlorobenzene-d5 1,4-Difluorobenzene	20928 (356490-1425960) 145280 (277600-1110400) 103328 (152960-611840)	All TCL compounds	J (all detects) UJ (all non-detects)	A

*Corrected associated compounds for samples C077S375.

*Indicates change as the result of report review.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

Samples C077G107 and C077G108 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD
	C077G107	C077G108	
Carbon disulfide	0.38	0.30	24
Naphthalene	0.50	0.5U	200
Toluene	0.29	0.41	34
m,p-Xylenes	0.5U	0.19	200

*Indicates change as the result of report review.

*NAS Alameda Point, CTO 077
Volatiles - Data Qualification Summary - SDG 49212/49213

SDG	Sample	Compound	Flag	A or P	Reason
49212/ 49213	C077G105 C077G107 C077G108 C077TB04 C077R003 C077G106 C077TB03 C077G110 C077G109	Bromomethane 2,2-Dichloropropane	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49212/ 49213	C077S375	All TCL compounds	J (all detects)	P	Surrogate recovery (%R)
49212/ 49213	C077S378**	All TCL compounds	J (all detects) UJ (all non-detects)	P	Surrogate recovery (%R)
49212/ 49213	C077G105 C077G107 C077G108 C077TB04 C077R003 C077G106 C077TB03 C077G110 C077G109 C077S376** C077S377 C077S385 C077S373** C077S375	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49212/ 49213	C077S378** C077S386** C077S387	1,1,1-Trichloroethane 1,1-Dichloroethene 1,2-Dichloroethane Benzene Chlorobenzene Ethylbenzene m,p-Xylenes o-Xylene Trichloroethene Tetrachloroethene Toluene trans-1,2-Dichloroethene	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49212/ 49213	C077G105 C077G107 C077G108 C077TB04 C077R003 C077G106 C077TB03 C077G110 C077G109	Styrene	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)

*Indicates change as the result of report review.

SDG	Sample	Compound	Flag	A or P	Reason
*49212/ 49213	C077S375	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene *tert-Butylbenzene* 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	A	Internal standards (area)
49212/ 49213	C077S378**	All TCL compounds	J (all detects) UJ (all non-detects)	A	Internal standards (area)

NAS Alameda Point, CTO 077
Volatiles - Laboratory Blank Data Qualification Summary - SDG 49212/49213

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49212/49213	C077S385	Methylene chloride	0.06U mg/Kg	A

NAS Alameda Point, CTO 077
Volatiles - Field Blank Data Qualification Summary - SDG 49212/49213

SDG	Sample	Compound	Modified Final Concentration	A or P
49212/49213	C077G105	Acetone	2.0U ug/L	A
49212/49213	C077S373**	Acetone	0.1U mg/Kg	A
49212/49213	C077G106	Acetone	2.0U ug/L	A
49212/49213	C077S376**	Acetone	0.1U mg/Kg	A

*Indicates change as the result of report review.

SDG	Sample	Compound	Modified Final Concentration	A or P
49212/49213	C077S386**	Acetone	0.1U mg/Kg	A
49212/49213	C077R003	Acetone	2.0U ug/L	A

*Indicates change as the result of report review.

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14417

Semivolatiles

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: November 29, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49199/49200

Sample Identification

C077G103
C077G101
C077R001
C077G104
C077S361
C077S362
C077S363
C077S367
C077S368
C077S369
C077S364
C077S365
C077S366
C077S370
C077S371
C077S372
C077S371MS
C077S371MSD

Introduction

This data review covers 14 soil samples and 4 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No semivolatile contaminants were found in the method blanks.

Sample C077R001 was identified as a rinsate. No semivolatile contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49199/49200	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S371MS/MSD (All soil samples in SDG 49199/49200)	4-Nitroaniline Aniline Pyridine	25.3 (35-115) 11.9 (25-135) 6.9 (15-115)	25.3 (35-115) 16.9 (25-135) 9.4 (15-115)	- 34.9 (≤30 -	J (all detects) UJ (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051201ALCS	4-Chloroaniline	113 (15-110)	All water samples in SDG 49199/49200	J (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. *Compound Quantitation and CRQLs*

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Semivolatiles - Data Qualification Summary - SDG 49199/49200

SDG	Sample	Compound	Flag	A or P	Reason
49199/ 49200	C077G103 C077G101 C077R001 C077G104	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49199/ 49200	C077S361 C077S362 C077S363 C077S367 C077S368 C077S369 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372	Aniline	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)(RPD)
49199/ 49200	C077S361 C077S362 C077S363 C077S367 C077S368 C077S369 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372	4-Nitroaniline Pyridine	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49199/ 49200	C077G103 C077G101 C077R001 C077G104	4-Chloroaniline	J (all detects)	P	Laboratory control samples (%R)

NAS Alameda Point, CTO 077
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 49199/49200

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Semivolatiles - Field Blank Data Qualification Summary - SDG 49199/49200

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: November 30, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49212/49213

Sample Identification

C077G105
C077R003
C077G106
C077G109
C077S376**
C077S377
C077S378**
C077S385
C077S386**
C077S387

**Indicates sample underwent Level IV review

Introduction

This data review covers 6 soil samples and 4 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U *Indicates the compound or analyte was analyzed for but not detected at or above* the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No semivolatile contaminants were found in the method blanks.

Sample C077R003 was identified as a rinsate. No semivolatile contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49212/49213	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051201ALCS	4-Chloroaniline	113 (15-110)	All water samples in SDG 49212/49213	J (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

All tentatively identified compounds were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Semivolatiles - Data Qualification Summary - SDG 49212/49213

SDG	Sample	Compound	Flag	A or P	Reason
49212/ 49213	C077G105 C077R003 C077G106 C077G109 C077S376** C077S377 C077S378** C077S385 C077S386** C077S387	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49212/ 49213	C077G105 C077R003 C077G106 C077G109	4-Chloroaniline	J (all detects)	P	Laboratory control samples (%R)

NAS Alameda Point, CTO 077
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 49212/49213

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Semivolatiles - Field Blank Data Qualification Summary - SDG 49212/49213

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14417

Polynuclear Aromatic Hydrocarbons

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: November 29, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49199/49200

Sample Identification

C077G103
C077G101
C077R001
C077S361
C077S362
C077S363
C077S367
C077S368
C077S369
C077S364
C077S365
C077S366
C077S370
C077S371
C077S372
C077S371MS
C077S371MSD
C077S372DL

Introduction

This data review covers 15 soil samples and 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C using Selected Ion Monitoring (SIM) for Polynuclear Aromatic Hydrocarbons.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds.

Average relative response factors (RRF) for all target compounds and system monitoring compounds

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0% .

All of the continuing calibration RRF values were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polynuclear aromatic hydrocarbon contaminants were found in the method blanks.

Sample C077R001 was identified as a rinsate. No polynuclear aromatic hydrocarbon contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49199/49200	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051202AX-LCS	2-Methylnaphthalene	114 (53-101)	All soil samples in SDG 49199/49200	J (all detects)	P
	Benzo(k)fluoranthene	140 (52-112)		J (all detects)	
	Fluorene	105 (54-104)		J (all detects)	
	Naphthalene	102 (49-100)		J (all detects)	
	Pyrene	105 (55-104)		J (all detects)	

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077S372	Benzo(a)anthracene Benzo(b)fluoranthene Benzo(k)fluoranthene Fluoranthene Pyrene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A

Sample	Compound	Finding	Flag	A or P
C077S363 C077S367 C077S368 C077S369 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372 C077S372DL	Benzo(b)fluoranthene Benzo(k)fluoranthene	Due to lack of resolution between these compounds in the samples, the laboratory performed the quantitation using the total peak area.	J (all detects) J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
C077S372	Benzo(a)anthracene Benzo(b)fluoranthene Benzo(k)fluoranthene Fluoranthene Pyrene	R R R R R	A

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 49199/49200

SDG	Sample	Compound	Flag	A or P	Reason
49199/ 49200	C077G103 C077G101 C077R001	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49199/ 49200	C077S361 C077S362 C077S363 C077S367 C077S368 C077S369 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372 C077S372DL	2-Methylnaphthalene Benzo(k)fluoranthene Fluorene Naphthalene Pyrene	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P	Laboratory control samples (%R)
49199/ 49200	C077S372	Benzo(a)anthracene Benzo(b)fluoranthene Benzo(k)fluoranthene Fluoranthene Pyrene	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Compound quantitation and CRQLs
49199/ 49200	C077S363 C077S367 C077S368 C077S369 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372 C077S372DL	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) J (all detects)	A	Compound quantitation and CRQLs
49199/ 49200	C077S372	Benzo(a)anthracene Benzo(b)fluoranthene Benzo(k)fluoranthene Fluoranthene Pyrene	R R R R R	A	Overall assessment of data

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 49199/49200

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary - SDG 49199/49200

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: November 30, 2005

LDC Report Date: December 20, 2005

Matrix: Soil/Water

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49212/49213

Sample Identification

C077G107
C077G108
C077R003
C077G106
C077S376**
C077S377
C077S378**
C077S385
C077S386**
C077S387
C077S373**
C077S375

**Indicates sample underwent Level IV review

Introduction

This data review covers 8 soil samples and 4 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C using Selected Ion Monitoring (SIM) for Polynuclear Aromatic Hydrocarbons.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds.

Average relative response factors (RRF) for all target compounds and system monitoring compounds

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0% .

All of the continuing calibration RRF values were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polynuclear aromatic hydrocarbon contaminants were found in the method blanks.

Sample C077R003 was identified as a rinsate. No polynuclear aromatic hydrocarbon contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S387	2-Fluorobiphenyl Nitrobenzene-d5 Terphenyl-d14	36.8 (54-125) 40.6 (49-121) 38.5 (57-126)	All TCL compounds	J (all detects) UJ (all non-detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49212/49213	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051202A-LCS	2-Methylnaphthalene Benzo(b)fluoranthene Phenanthrene	105 (53-101) 114 (49-113) 106 (54-105)	C077S376** C077S377 C077S378** C077S385 C077S386** C077S387 051202A-BLK	J (all detects) J (all detects) J (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Flag	A or P
C077S378** C077S385 C077S386** C077S387 C077S375	Benzo(b)fluoranthene Benzo(k)fluoranthene	Due to lack of resolution between these compounds in the samples, the laboratory performed the quantitation using the total peak area.	J (all detects) J (all detects)	A

Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

Samples C077G107 and C077G108 were identified as field duplicates. No polynuclear aromatic hydrocarbons were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD
	C077G107	C077G108	
Acenaphthene	0.22	0.24	3
Fluoranthene	0.093	0.2U	200
Phenanthrene	0.11	0.10	10
Pyrene	0.39	0.36	8

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 49212/49213

SDG	Sample	Compound	Flag	A or P	Reason
49212/ 49213	C077S387	All TCL compounds	J (all detects) UJ (all non-detects)	P	Surrogate recovery (%R)
49212/ 49213	C077G107 C077G108 C077R003 C077G106 C077S376** C077S377 C077S378** C077S385 C077S386** C077S387 C077S373** C077S375	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49212/ 49213	C077S376** C077S377 C077S378** C077S385 C077S386** C077S387	2-Methylnaphthalene Benzo(b)fluoranthene Phenanthrene	J (all detects) J (all detects) J (all detects)	P	Laboratory control samples (%R)
49212/ 49213	C077S378** C077S385 C077S386** C077S387 C077S375	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) J (all detects)	A	Compound quantitation and CRQLs

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 49212/49213

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary - SDG 49212/49213

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14417

Chlorinated Pesticides & PCBs

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: November 29, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Chlorinated Pesticides & PCBs

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49199/49200

Sample Identification

C077G103
C077G101
C077G102
C077R001
C077S361
C077S362
C077S363
C077S367
C077S368
C077S369
C077S364
C077S365
C077S366
C077S370
C077S371
C077S372

Introduction

This data review covers 12 soil samples and 4 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 8081A and 8082 for Chlorinated Pesticides and PCBs.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical or advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
12/6/05	1129088	DB-35MS	Toxaphene	19.4	All water samples in SDG 49199/49200	J (all detects) UJ (all non-detects)	A
12/12/05	1212020	DB-XLB	Endrin	23	All soil samples in SDG 49199/49200	J (all detects) UJ (all non-detects)	A

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide or PCB contaminants were found in the method blanks.

Sample C077R001 was identified as a rinsate. No chlorinated pesticide or PCB contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for several samples. Since these samples were diluted out, no data were qualified.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49199/49200	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and Reported CRQLs

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples C077G101 and C077G102 were identified as field duplicates. No chlorinated pesticides or PCBs were detected in any of the samples.

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Data Qualification Summary - SDG 49199/49200

SDG	Sample	Compound	Flag	A or P	Reason
49199/ 49200	C077G103 C077G101 C077G102 C077R001	Toxaphene	J (all detects) UJ (all non-detects)	P	Continuing calibration (%D)
49199/ 49200	C077S361 C077S362 C077S363 C077S367 C077S368 C077S369 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372	Endrin	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49199/ 49200	C077G103 C077G101 C077G102 C077R001 C077S361 C077S362 C077S363 C077S367 C077S368 C077S369 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Laboratory Blank Data Qualification Summary - SDG 49199/49200

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Field Blank Data Qualification Summary - SDG 49199/49200

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: November 30, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Chlorinated Pesticides & PCBs

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49212/49213

Sample Identification

C077R003
C077G106
C077S376**
C077S377
C077S378**
C077S385
C077S386**
C077S387

**Indicates sample underwent Level IV review.

Introduction

This data review covers 6 soil samples and 2 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 8081A and 8082 for Chlorinated Pesticides and PCBs.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical or advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J *Indicates an estimated value.*

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

Retention time windows were evaluated and considered technically acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
12/6/05	1129088	DB-35MS	Toxaphene	19.4	All water samples in SDG 49212/49213	J (all detects) UJ (all non-detects)	A
12/12/05	1212020	DB-XLB	Endrin	23	051202A	J (all detects) UJ (all non-detects)	A

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
12/12/05	1212038	DB-35MS	alpha-BHC gamma-BHC 4,4'-DDE Endrin Endosulfan II 4,4'-DDD Endosulfan sulfate	20 18 16 20 19 20 22	C077S376** C077S377 C077S378** C077S385 C077S386** C077S387	J (all detects) UJ (all non-detects)	A
12/12/05	1212038	DB-XLB	alpha-BHC Endrin Endosulfan II 4,4'-DDD 4,4'-DDT Endosulfan sulfate	16 36 18 17 17 21	C077S376** C077S377 C077S378** C077S385 C077S386** C077S387	J (all detects) UJ (all non-detects)	A

Retention times (RT) of all compounds in the calibration standards were within QC limits for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide or PCB contaminants were found in the method blanks.

Sample C077R003 was identified as a rinsate. No chlorinated pesticide or PCB contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49212/49213	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and Reported CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which an Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Data Qualification Summary - SDG 49212/49213

SDG	Sample	Compound	Flag	A or P	Reason
49212/ 49213	C077R003 C077G106	Toxaphene	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49212/ 49213	C077S376** C077S377 C077S378** C077S385 C077S386** C077S387	alpha-BHC gamma-BHC 4,4'-DDE Endrin Endosulfan II 4,4'-DDD Endosulfan sulfate 4,4'-DDT	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49212/ 49213	C077R003 C077G106 C077S376** C077S377 C077S378** C077S385 C077S386** C077S387	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Laboratory Blank Data Qualification Summary - SDG 49212/49213

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Field Blank Data Qualification Summary - SDG 49212/49213

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14417

Metals

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: November 29, 2005

LDC Report Date: December 19, 2005

Matrix: Soil/Water

Parameters: Metals

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49199/49200

Sample Identification

C077G101
C077R001
C077S361
C077S362
C077S363
C077S367
C077S368
C077S369
C077S364
C077S365
C077S366
C077S370
C077S371
C077S372

Introduction

This data review covers 12 soil samples and 2 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 6010B and 7000 for Metals. The metals analyzed were Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	*Antimony*	*4.251 ug/L*	*All water samples in SDG 49199/49200*
ICB/CCB	Antimony Arsenic Lead Mercury	4.736 ug/L 3.87 ug/L 1.898 ug/L 0.107 ug/L	All water samples in SDG 49199/49200
PB (prep blank)	Calcium Lead Vanadium	1.041 mg/Kg 0.157 mg/Kg 0.060 mg/Kg	All soil samples in SDG 49199/49200
ICB/CCB1	Antimony Arsenic Chromium Lead Selenium	2.925 ug/L 3.034 ug/L 0.298 ug/L 1.802 ug/L 4.087 ug/L	C077S361 C077S362 C077S363 C077S367 C077S368 C077S369 C077S364 C077S365 C077S366 C077S370
ICB/CCB1	Mercury	0.229 ug/L	All soil samples in SDG 49199/49200

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB2	Antimony Arsenic Chromium Lead Silver	4.736 ug/L 3.87 ug/L 0.367 ug/L 1.898 ug/L 0.584 ug/L	C077S371 C077S372

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G101	Mercury	0.086 ug/L	0.086U ug/L
C077S361	Mercury	0.07 mg/Kg	0.07U mg/Kg
C077S362	Mercury	0.056 mg/Kg	0.056U mg/Kg
C077S363	Antimony Mercury	0.65 mg/Kg 0.048 mg/Kg	0.65U mg/Kg 0.048U mg/Kg
C077S367	Mercury	0.068 mg/Kg	0.068U mg/Kg
C077S368	Mercury	0.049 mg/Kg	0.049U mg/Kg
C077S369	Antimony	0.59 mg/Kg	0.59U mg/Kg
C077S364	Antimony	0.65 mg/Kg	0.65U mg/Kg
C077S365	Mercury	0.058 mg/Kg	0.058U mg/Kg
C077S366	Antimony	0.91 mg/Kg	0.91U mg/Kg
C077S370	Mercury	0.097 mg/Kg	0.097U mg/Kg
C077S371	Arsenic Mercury Silver	1.7 mg/Kg 0.034 mg/Kg 0.11 mg/Kg	1.7U mg/Kg 0.034U mg/Kg 0.11U mg/Kg
C077S372	Antimony Mercury	1.5 mg/Kg 0.1 mg/Kg	1.5U mg/Kg 0.1U mg/Kg

Sample C077R001 was identified as a rinsate. No metal contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
C077R001	11/29/05	Calcium Magnesium Sodium	35.4 ug/L 61.6 ug/L 345 ug/L	All soil samples in SDG 49199/49200

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S362	Sodium	112 mg/Kg	112U mg/Kg
C077S367	Sodium	74.6 mg/Kg	74.6U mg/Kg
C077S368	Sodium	125 mg/Kg	125U mg/Kg
C077S364	Sodium	75.4 mg/Kg	75.4U mg/Kg
C077S365	Sodium	66.9 mg/Kg	66.9U mg/Kg
C077S370	Sodium	85.2 mg/Kg	85.2U mg/Kg
C077S371	Sodium	120 mg/Kg	120U mg/Kg

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All samples in SDG 49199/49200	All TAL metals	No MS associated with these samples.	MS required.	None	P

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All samples in SDG 49199/49200	All TAL metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Internal Standards

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution was not performed for this SDG.

XI. Sample Result Verification

Raw data were not reviewed for this SDG.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been qualified.

XIII. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Metals - Data Qualification Summary - SDG 49199/49200

SDG	Sample	Analyte	Flag	A or P	Reason
49199/ 49200	C077G101 C077R001 C077S361 C077S362 C077S363 C077S367 C077S368 C077S369 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372	All TAL metals	None	P	Matrix spike analysis
49199/ 49200	C077G101 C077R001 C077S361 C077S362 C077S363 C077S367 C077S368 C077S369 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372	All TAL metals	None	P	Duplicate analysis

NAS Alameda Point, CTO 077
Metals - Laboratory Blank Data Qualification Summary - SDG 49199/49200

SDG	Sample	Analyte	Modified Final Concentration	A or P
49499/49200	C077G101	Mercury	0.086U ug/L	A
49499/49200	C077S361	Mercury	0.07U mg/Kg	A
49499/49200	C077S362	Mercury	0.056U mg/Kg	A
49499/49200	C077S363	Antimony Mercury	0.65U mg/Kg 0.048U mg/Kg	A
49499/49200	C077S367	Mercury	0.068U mg/Kg	A
49499/49200	C077S368	Mercury	0.049U mg/Kg	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49499/49200	C077S369	Antimony	0.59U mg/Kg	A
49499/49200	C077S364	Antimony	0.65U mg/Kg	A
49499/49200	C077S365	Mercury	0.058U mg/Kg	A
49499/49200	C077S366	Antimony	0.91U mg/Kg	A
49499/49200	C077S370	Mercury	0.097U mg/Kg	A
49499/49200	C077S371	Arsenic Mercury Silver	1.7U mg/Kg 0.034U mg/Kg 0.11U mg/Kg	A
49499/49200	C077S372	Antimony Mercury	1.5U mg/Kg 0.1U mg/Kg	A

NAS Alameda Point, CTO 077
Metals - Field Blank Data Qualification Summary - SDG 49199/49200

SDG	Sample	Analyte	Modified Final Concentration	A or P
49499/49200	C077S362	Sodium	112U mg/Kg	A
49499/49200	C077S367	Sodium	74.6U mg/Kg	A
49499/49200	C077S368	Sodium	125U mg/Kg	A
49499/49200	C077S364	Sodium	75.4U mg/Kg	A
49499/49200	C077S365	Sodium	66.9U mg/Kg	A
49499/49200	C077S370	Sodium	85.2U mg/Kg	A
49499/49200	C077S371	Sodium	120U mg/Kg	A

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: November 30, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Metals

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49212/49213

Sample Identification

C077R003
C077G103A
C077G106
C077S376**
C077S377
C077S378**
C077S385
C077S386**
C077S387
C077G106MS
C077G106DUP
C077G103ADL
C077G106DL

**Indicates sample underwent Level IV review

Introduction

This data review covers 6 soil samples and 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 6010B and 7000 for Metals. The metals analyzed were Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Antimony Manganese Mercury	2.512 ug/L 1.504 ug/L 0.107 ug/L	C077R003 C077G103A C077G106
PB (prep blank)	Chromium Manganese	0.036 mg/Kg 0.161 mg/Kg	All soil samples in SDG 49212/49213
ICB/CCB	Antimony Chromium Manganese Mercury Silver	2.593 ug/L 0.531 ug/L 1.536 ug/L 0.091 ug/L 0.46 ug/L	All soil samples in SDG 49212/49213

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077R003	Manganese	2.6 ug/L	2.6U ug/L
C077G106	Antimony (10x) Mercury	23.5 ug/L 0.076 ug/L	23.5U ug/L 0.076U ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G103A	Mercury	0.046 ug/L	0.046U ug/L
C077S376**	Mercury Silver	0.032 mg/Kg 0.12 mg/Kg	0.032U mg/Kg 0.12U mg/Kg
C077S377	Mercury Silver	0.036 mg/Kg 0.15 mg/Kg	0.036U mg/Kg 0.15U mg/Kg
C077S378**	Silver	0.047 mg/Kg	0.047U mg/Kg
C077S385	Mercury Silver	0.032 mg/Kg 0.17 mg/Kg	0.032U mg/Kg 0.17U mg/Kg
C077S386**	Mercury Silver	0.025 mg/Kg 0.22 mg/Kg	0.025U mg/Kg 0.22U mg/Kg
C077S387	Antimony	1.3 mg/Kg	1.3U mg/Kg

Sample C077R003 was identified as a rinsate. No metal contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
C077R003	11/30/05	Beryllium Iron Magnesium Manganese	0.29 ug/L 145 ug/L 87.7 ug/L 2.6 ug/L	C077G103A C077G106 C077S376** C077S377 C077S378** C077S385 C077S386** C077S387

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G103A	Iron	158 ug/L	158U ug/L
C077S376**	Beryllium	0.062 mg/Kg	0.062U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S377	Beryllium	0.077 mg/Kg	0.077U mg/Kg
C077S378**	Beryllium	0.11 mg/Kg	0.11U mg/Kg
C077S385	Beryllium	0.069 mg/Kg	0.069U mg/Kg
C077S386**	Beryllium	0.053 mg/Kg	0.053U mg/Kg

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All soil samples in SDG 49212/49213	All TAL metals	No MS associated with these samples.	MS required.	None	P
All water samples in SDG 49212/49213	All ICP metals	No MS associated with these samples.	MS required.	None	P

Percent recoveries (%R) were within QC limits.

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All soil samples in SDG 49212/49213	All TAL metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P

Sample	Analyte	Finding	Criteria	Flag	A or P
All water samples in SDG 49212/49213	All ICP metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P

Results were within QC limits.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Internal Standards

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution was not performed for this SDG.

XI. Sample Result Verification

All sample result verification met validation criteria with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
C077G103A C077G106	Sodium	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	A

Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
C077G103A C077G106	Sodium	R	A

Data flags have been summarized at the end of this report if data has been qualified.

XIII. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Metals - Data Qualification Summary - SDG 49212/49213

SDG	Sample	Analyte	Flag	A or P	Reason
49212/ 49213	C077S376** C077S377 C077S378** C077S385 C077S386** C077S387	All TAL metals	None	P	Matrix spike analysis
49212/ 49213	C077R003 C077G103A C077G106 C077G103ADL C077G106DL	Aluminum Antimony Arsenic Barium Beryllium Cadmium Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Potassium Selenium Silver Sodium Thallium Vanadium Zinc	None None None None None None None None None None None None None None None None None None None None None None	P	Matrix spike analysis
49212/ 49213	C077S376** C077S377 C077S378** C077S385 C077S386** C077S387	All TAL metals	None	P	Duplicate analysis

SDG	Sample	Analyte	Flag	A or P	Reason
49212/ 49213	C077R003 C077G103A C077G106 C077G103ADL C077G106DL	Aluminum Antimony Arsenic Barium Beryllium Cadmium Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Potassium Selenium Silver Sodium Thallium Vanadium Zinc	None None None None None None None None None None None None None None None None None None None None None None	P	Duplicate analysis
49212/ 49213	*C077G103A C077G106*	*Sodium*	*J (all detects)*	A	*Sample result verification*
49212/ 49213	C077G103A C077G106	Sodium	R	A	Overall assessment of data

NAS Alameda Point, CTO 077
Metals - Laboratory Blank Data Qualification Summary - SDG 49212/49213

SDG	Sample	Analyte	Modified Final Concentration	A or P
49212/49213	C077R003	Manganese	2.6U ug/L	A
49212/49213	C077G106	Antimony (10x) Mercury	23.5U ug/L 0.076U ug/L	A
49212/49213	C077G103A	Mercury	0.046U ug/L	A
49212/49213	C077S376**	Mercury Silver	0.032U mg/Kg 0.12U mg/Kg	A
49212/49213	C077S377	Mercury Silver	0.036U mg/Kg 0.15U mg/Kg	A
49212/49213	C077S378**	Silver	0.047U mg/Kg	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49212/49213	C077S385	Mercury Silver	0.032U mg/Kg 0.17U mg/Kg	A
49212/49213	C077S386**	Mercury Silver	0.025U mg/Kg 0.22U mg/Kg	A
49212/49213	C077S387	Antimony	1.3U mg/Kg	A

NAS Alameda Point, CTO 077
Metals - Field Blank Data Qualification Summary - SDG 49212/49213

SDG	Sample	Analyte	Modified Final Concentration	A or P
49212/49213	C077G103A	Iron	158U ug/L	A
49212/49213	C077S376**	Beryllium	0.062U mg/Kg	A
49212/49213	C077S377	Beryllium	0.077U mg/Kg	A
49212/49213	C077S378**	Beryllium	0.11U mg/Kg	A
49212/49213	C077S385	Beryllium	0.069U mg/Kg	A
49212/49213	C077S386**	Beryllium	0.053U mg/Kg	A

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14417

TPH as Gasoline

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: November 29, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Gasoline

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49199/49200

Sample Identification

C077G103
C077G101
C077R001
C077S361
C077S362
C077S363
C077S368
C077S369
C077S364
C077S365
C077S366
C077S370
C077S371
C077S372
C077S361MS
C077S361MSD
C077S367

Introduction

This data review covers 14 soil samples and 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Gasoline.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as gasoline contaminants were found in the method blanks.

Sample C077R001 was identified as a rinsate. No total petroleum hydrocarbons as gasoline contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

Raw data were not reviewed for this SDG.

VI. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

VII. System Performance

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Data Qualification Summary - SDG 49199/49200

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Laboratory Blank Data Qualification Summary - SDG 49199/49200

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Field Blank Data Qualification Summary - SDG 49199/49200

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: November 30, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Gasoline

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49212/49213

Sample Identification

C077G105
C077R003
C077G106
C077G109
C077S376**
C077S377
C077S378**
C077S385
C077S386**
C077S387
C077G106MS
C077G106MSD

**Indicates sample underwent Level IV review

Introduction

This data review covers 6 soil samples and 6 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Gasoline.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent Level IV review. Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

The percent relative standard deviations (%RSD) of calibration factors for all compounds were less than or equal to 20.0% .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as gasoline contaminants were found in the method blanks.

Sample C077R003 was identified as a rinsate. No total petroleum hydrocarbons as gasoline contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All soil samples in SDG 49212/49213	TPH as gasoline	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Data Qualification Summary - SDG 49212/49213

SDG	Sample	Compound	Flag	A or P	Reason
49212/49213	C077S376** C077S377 C077S378** C077S385 C077S386** C077S387	TPH as gasoline	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Laboratory Blank Data Qualification Summary - SDG 49212/49213

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Field Blank Data Qualification Summary - SDG 49212/49213

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14417

TPH as Extractables

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: November 29, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49199/49200

Sample Identification

C077G103
C077G101
C077R001
C077S361
C077S362
C077S363
C077S368
C077S369
C077S364
C077S365
C077S366
C077S370
C077S371
C077S372
C077S367

Introduction

This data review covers 12 soil samples and 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Extractables.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J *Indicates an estimated value.*

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample C077R001 was identified as a rinsate. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for samples C077S366 and C077S372. Since these samples were diluted out, no data were qualified.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49199/49200	TPH as extractables	No MS/MSD associated with these samples.	MS/MSD required.	None	P

c. *Laboratory Control Samples*

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

Raw data were not reviewed for this SDG.

VI. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

VII. System Performance

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG *49199/49200*

SDG	Sample	Compound	Flag	A or P	Reason
49199/49200	C077G103 C077G101 C077R001 C077S361 C077S362 C077S363 C077S368 C077S369 C077S364 C077S365 C077S366 C077S370 C077S371 C077S372 C077S367	TPH as extractables	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 49199/49200

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG *49199/49200*

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: November 30, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49212/49213

Sample Identification

C077G105
C077R003
C077G106
C077G109
C077S376**
C077S377
C077S378**
C077S385
C077S386**
C077S387
C077G106MS
C077G106MSD
C077S376MS
C077S376MSD

**Indicates sample underwent Level IV review

Introduction

This data review covers 8 soil samples and 6 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Extractables.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent Level IV review. Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

The percent relative standard deviations (%RSD) of calibration factors for selected compounds were less than or equal to 20.0% .

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample C077R003 was identified as a rinsate. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S387	Octacosane ortho-Terphenyl	175 (47-140) 147 (58-128)	TPH as extractables	J (all detects)	P

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 49212/49213

SDG	Sample	Compound	Flag	A or P	Reason
49212/49213	C077S387	TPH as extractables	J (all detects)	P	Surrogate recovery (%R)

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 49212/49213

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 49212/49213

No Sample Data Qualified in this SDG

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Bechtel Environmental
1230 Columbia Street, Suite 400
San Diego, CA 92101
Attn: Ms. Toni Kuzmack

December 23, 2005

Project Name : NAS Alameda Point
Project # : CTO 077

On December 20, 2005 the following data packages were received by Laboratory Data Consultants, Inc. from Bechtel Environmental. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 14428:

SDG #	Fraction
49232/49233, 49235/49236	Volatiles, Semivolatiles, Polynuclear Aromatic Hydrocarbons, Chlorinated Pesticides & PCBs, Metals, TPH as Gasoline, TPH as Extractables

The above SDGs were reviewed using Level III and Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- NFESC Special Publication SP-2056-ENV, Navy Installation Restoration Chemical Data Quality Manual, Naval Facilities Engineering Command, September 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998

The data validators did utilize their professional judgement when evaluating the data to achieve the most complete and accurate assessment of the data. The data packages were reviewed according to the above stated validation procedures.

For GC/MS volatile analyses, the primary findings consisted of:

a) Initial and continuing calibration factors exceeded acceptance criteria in SDGs 49232/49233 and 49235/49236. Since the laboratory met the protocol requirement, this finding should be considered advisory.

b) Matrix spike analyses were not performed for all batches in SDGs 49232/49233 and 49235/49236.

c) Matrix spike/matrix spike duplicate percent recoveries and relative percent differences exceeded acceptance criteria for several compounds in SDGs 49232/49233 and 49235/49236. Since the laboratory met the protocol requirement, this finding should be considered advisory.

d) Laboratory control sample percent recoveries exceeded acceptance criteria for several samples in SDG 49232/49233 and 49235/49236.

e) Several volatile compounds were detected in the method and field blanks in SDG 49232/49233 and methylene chloride was detected in the method blanks in SDG 49235/49236. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For GC/MS semivolatile analyses, the primary findings consisted of:

a) Continuing calibration factors exceeded acceptance criteria in SDG 49232/49233. Since the laboratory met the protocol requirement, this finding should be considered advisory.

b) Surrogate percent recoveries exceeded acceptance criteria for sample C077S438 in SDG 49235/49236.

c) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDGs 49232/49233 and 49235/49236.

d) Matrix spike/matrix spike duplicate percent recoveries exceeded acceptance criteria for several compounds in SDGs 49232/49233 and 49235/49236. . Since the laboratory met the protocol requirement, this finding should be considered advisory.

e) Laboratory control sample percent recoveries exceeded acceptance criteria for 4-chloroaniline and n-nitrosodiphenylamine in SDG 49232/49233 and 4-chloroaniline, n-nitrosodiphenylamine and pentachlorophenol in SDG 49235/49236.

f) Internal standard areas exceeded acceptance criteria for sample C077S436 in SDG 49235/49236.

For GC/MS PAH analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49232/49233.

b) Laboratory control sample percent recoveries exceeded acceptance criteria for 2-methylnaphthalene in SDG 49235/49236.

c) Surrogate percent recoveries exceeded acceptance criteria for sample C077S438 in SDG 49235/49236.

d) Benzo(b)fluoranthene and benzo(k)fluoranthene coeluted for several samples in SDGs 49232/49233 and 49235/49236. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For chlorinated pesticide analyses, the primary findings consisted of:

a) Continuing calibration factors exceeded acceptance criteria in SDGs 49232/49233 and 49235/49236. Since the laboratory met the protocol requirement, this finding should be considered advisory.

b) Matrix spike analyses were not performed for all batches in SDGs 49232/49233 and 49235/49236.

For metal analyses, the primary findings consisted of:

a) Matrix spike analyses were not performed for all batches in SDGs 49232/49233 and 49235/49236.

b) Duplicate analyses were not performed for all batches in SDGs 49232/49233 and 49235/49236.

c) Matrix spike/matrix spike duplicate percent recoveries exceeded acceptance criteria for several compounds in SDG 49235/49236. Since the laboratory met the protocol requirement, this finding should be considered advisory.

d) Incorrect sample container was used for mercury in SDG 49235/49236.

e) ICP serial dilution percent differences exceeded acceptance criteria for cobalt in SDG 49232/49233 and for lead in SDG 49235/49236. Since the laboratory met the protocol requirement, this finding should be considered advisory.

f) Several metals were detected in the method and field blanks in SDGs 49232/49233 and 49235/49236. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For TPH as gasoline analyses, the primary finding consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDGs 49232/49233 and 49235/49236.

For TPH as extractable analyses, the primary finding consisted of:

a) Matrix spike analyses were not performed for all batches in SDGs 49232/49233 and 49235/49236.

In general, the data for all analyses appear usable with the limitations noted in the Data Validation Reports. Data validation flags were noted on the Laboratory Form 1s and included with each validation report.

Sincerely,

Richard M. Amano
President/Principal Chemist

Attachment 1

1 Week TAT

LDC #14428 (Bechtel Environmental-San Diego / Alameda Point, CTO 077)

LDC	SDG#	DATE REC'D	(2) DATE DUE	VOA (8260B)		SVOA (8270C)		PAHs (8270C -SIM)		Pest. /PCBs (SW846)		Metals (SW846)		Diss. Metals (SW846)		Hg (1631E)		TPH-G (8015)		TPH-E (8015)																			
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	49232/49233	12/20/05	12/27/05	10	[redacted]	9	16	10	16	9	16	0	16	9	0	-	-	[redacted]		9	14																		
B	49235/49236	12/20/05	12/27/05	7	16	2	10	6	10	6	12	0	15	8	0	9	0	3	9	3	10																
B	49235/49236	12/20/05	12/27/05	1	4	1	3	1	3	1	3	0	4	1	0	1	0	1	3	1	3																
Total	B/LR			18	37	12	29	17	29	16	31	0	35	18	0	10	0	14	29	13	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	335

Shaded cells indicate Level IV validation (all other cells are Level III validation)

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14428

Volatiles

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 3, 2005

LDC Report Date: December 22, 2005

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49232/49233

Sample Identification

C077TB07	C077S502
C077G145	C077S503
C077G191	C077S521
C077G143	C077S522
C077G185	C077S523
C077G187	C077S521MS
C077G183	C077S521MSD
C077G181	
C077G182	
C077R005	
C077S507	
C077S508	
C077S509	
C077S510	
C077S511	
C077S512	
C077S504	
C077S505	
C077S506	
C077S501	

Introduction

This data review covers 17 soil samples and 10 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all volatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs) with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/10/05	Dichlorodifluoromethane Vinyl chloride Acetone 1,2-Dibromo-3-chloropropane	33 32 34 27	C077S521 C077S521MS C077S521MSD 051210S	J (all detects) UJ (all non-detects)	P

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/8/05	Methylene chloride	61	C077G181 C077G182 C077R005 051208W	J (all detects) UJ (all non-detects)	A

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051207W	12/7/05	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene	0.72 ug/L 0.32 ug/L 0.39 ug/L 0.47 ug/L	C077TB07 C077G145 C077G191 C077G143 C077G185 C077G187 C077G183
051208S	12/8/05	Methylene chloride Acetone Toluene	0.20 ug/L 0.046 ug/L 0.001 ug/L	C077S507 C077S508 C077S509 C077S510 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502
051209S	12/9/05	Methylene chloride Acetone cis-1,2-Dichloroethene	0.081 mg/Kg 0.0042 mg/Kg 0.00057 mg/Kg	C077S503 C077S522 C077S523

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077S507	Acetone	0.08 mg/Kg	0.1U mg/Kg
C077S508	Acetone	0.006 mg/Kg	0.1U mg/Kg
C077S505	Acetone	0.0085 mg/Kg	0.1U mg/Kg
C077S506	Acetone	0.014 mg/Kg	0.1U mg/Kg
C077S502	Acetone	0.0087 mg/Kg	0.1U mg/Kg
C077S503	Methylene chloride Acetone cis-1,2-Dichloroethene	0.014 mg/Kg 0.017 mg/Kg 0.00048 mg/Kg	0.06U mg/Kg 0.1U mg/Kg 0.006U mg/Kg
C077S522	Methylene chloride Acetone	0.0081 mg/Kg 0.022 mg/Kg	0.06U mg/Kg 0.1U mg/Kg
C077S523	cis-1,2-Dichloroethene	0.0005 mg/Kg	0.006U mg/Kg

Sample C077TB07 was identified as a trip blank. No volatile contaminants were found in this blank with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
C077TB07	12/3/05	Methylene chloride Methyl-tert-butyl ether	4.3 ug/L 0.21 ug/L	C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077G182 C077R005 C077S507 C077S508 C077S509 C077S510 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523

Sample C077R005 was identified as a rinsate. No volatile contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Compound	Concentration	Associated Samples
C077R005	12/3/05	Bromodichloromethane Bromoform Chloroform Dibromochloromethane	2.1 ug/L 0.65 ug/L 2.7 ug/L 1.4 ug/L	C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077G182 C077S507 C077S508 C077S509 C077S510 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
C077G145	Methyl-tert-butyl ether	1.1 ug/L	1.1U ug/L
C077S503	Methylene chloride	0.014 mg/Kg	0.06U mg/Kg
C077S522	Methylene chloride	0.0081 mg/Kg	0.06U mg/Kg

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S503	1,2-Dichloroethane-d4 Dibromofluoromethane	116 (52-149) 136 (65-135)	All TCL compounds	J (all detects)	A
C077S522	1,2-Dichloroethane-d4	161 (52-149)	All TCL compounds	J (all detects)	A

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49232/49233 *except* C077S521	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S521MS/MSD (C077S521)	1,1,1-Trichloroethane	44.2 (70-135)	42.2 (70-135)	-	J (all detects) UJ (all non-detects)	A
	1,1-Dichloroethene	61.2 (65-135)	60.6 (65-135)	-		
	1,2-Dichloroethane	-	61.4 (70-135)	-		
	Benzene	64.2 (75-125)	57.0 (75-125)	-		
	Chloroethane	48.0 (75-125)	33.4 (75-125)	35.9 (≤30)		
	Ethylbenzene	37.2 (75-125)	26.2 (75-125)	34.7 (≤30)		
	m,p-Xylenes	38.1 (80-125)	25.0 (80-125)	41.5 (≤30)		
	o-Xylene	37.2 (75-125)	27.0 (75-125)	31.8 (≤30)		
	Trichloroethene	46.0 (75-125)	42.8 (75-125)	-		
	Tetrachloroethene	35.6 (65-140)	23.8 (65-140)	39.7 (≤30)		
	Toluene	44.4 (70-125)	42.4 (70-125)	-		
	trans-1,2-Dichloroethene	-	64.2 (65-135)	-		

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051207WLCS	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene	185 (55-140) 146 (65-135) 145 (50-140) 176 (55-140)	C077TB07 C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 051207W	J (all detects) J (all detects) J (all detects) J (all detects)	P
051208WLCS	Methylene chloride	150 (55-140)	C077G181 C077G182 C077R005 051208W	J (all detects)	P
052105LCS	Vinyl chloride	59.2 (60-125)	C077S521 051210S	J (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

Samples C077G181 and C077G182 were identified as field duplicates. No volatiles were detected in any of the samples.

NAS Alameda Point, CTO 077
Volatiles - Data Qualification Summary - SDG 49232/49233

SDG	Sample	Compound	Flag	A or P	Reason
49232/ 49233	C077S521	Dichlorodifluoromethane Vinyl chloride Acetone 1,2-Dibromo-3-chloropropane	J (all detects) UJ (all non-detects)	P	Continuing calibration (%D)
49232/ 49233	C077G181 C077G182 C077R005	Methylene chloride	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49232/ 49233	C077S503 C077S522	All TCL compounds	J (all detects)	A	Surrogate recovery (%R)
49232/ 49233	C077TB07 C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077G182 C077R005 C077S507 C077S508 C077S509 C077S510 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S522 C077S523	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49232/ 49233	C077S521	1,1,1-Trichloroethane 1,1-Dichloroethene 1,2-Dichloroethane Benzene Trichloroethene Toluene trans-1,2-Dichloroethene	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49232/ 49233	C077S521	Chloroethane Ethylbenzene m,p-Xylenes o-Xylene Tetrachloroethene	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)(RPD)

SDG	Sample	Compound	Flag	A or P	Reason
49232/ 49233	C077TB07 C077G145 C077G191 C077G143 C077G185 C077G187 C077G183	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene	J (all detects) J (all detects) J (all detects) J (all detects)	P	Laboratory control samples (%R)
49232/ 49233	C077G181 C077G182 C077R005	Methylene chloride	J (all detects)	P	Laboratory control samples (%R)
49232/ 49233	C077S521	Vinyl chloride	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)

NAS Alameda Point, CTO 077
Volatiles - Laboratory Blank Data Qualification Summary - SDG 49232/49233

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49232/49233	C077S507	Acetone	0.1U mg/Kg	A
49232/49233	C077S508	Acetone	0.1U mg/Kg	A
49232/49233	C077S505	Acetone	0.1U mg/Kg	A
49232/49233	C077S506	Acetone	0.1U mg/Kg	A
49232/49233	C077S502	Acetone	0.1U mg/Kg	A
49232/49233	C077S503	Methylene chloride Acetone cis-1,2-Dichloroethene	0.06U mg/Kg 0.1U mg/Kg 0.006U mg/Kg	A
49232/49233	C077S522	Methylene chloride Acetone	0.06U mg/Kg 0.1U mg/Kg	A
49232/49233	C077S523	cis-1,2-Dichloroethene	0.006U mg/Kg	A

NAS Alameda Point, CTO 077
Volatiles - Field Blank Data Qualification Summary - SDG 49232/49233

SDG	Sample	Compound	Modified Final Concentration	A or P
49232/49233	C077G145	Methyl-tert-butyl ether	1.1U ug/L	A
49232/49233	C077S503	Methylene chloride	0.06U mg/Kg	A
49232/49233	C077S522	Methylene chloride	0.06U mg/Kg	A

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 3, 2005

LDC Report Date: December 22, 2005

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49232/49233

Sample Identification

C077TB07	C077S502
C077G145	C077S503
C077G191	C077S521
C077G143	C077S522
C077G185	C077S523
C077G187	C077S521MS
C077G183	C077S521MSD
C077G181	
C077G182	
C077R005	
C077S507	
C077S508	
C077S509	
C077S510	
C077S511	
C077S512	
C077S504	
C077S505	
C077S506	
C077S501	

Introduction

This data review covers 17 soil samples and 10 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all volatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs) with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/10/05	Dichlorodifluoromethane Vinyl chloride Acetone 1,2-Dibromo-3-chloropropane	33 32 34 27	C077S521 C077S521MS C077S521MSD 051210S	J (all detects) UJ (all non-detects)	P

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/8/05	Methylene chloride	61	C077G181 C077G182 C077R005 051208W	J (all detects) UJ (all non-detects)	A

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051207W	12/7/05	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene	0.72 ug/L 0.32 ug/L 0.39 ug/L 0.47 ug/L	C077TB07 C077G145 C077G191 C077G143 C077G185 C077G187 C077G183
051208S	12/8/05	Methylene chloride Acetone Toluene	0.20 ug/L 0.046 ug/L 0.001 ug/L	C077S507 C077S508 C077S509 C077S510 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502
051209S	12/9/05	Methylene chloride Acetone cis-1,2-Dichloroethene	0.081 mg/Kg 0.0042 mg/Kg 0.00057 mg/Kg	C077S503 C077S522 C077S523

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077S507	Acetone	0.08 mg/Kg	0.1U mg/Kg
C077S508	Acetone	0.006 mg/Kg	0.1U mg/Kg
C077S505	Acetone	0.0085 mg/Kg	0.1U mg/Kg
C077S506	Acetone	0.014 mg/Kg	0.1U mg/Kg
C077S502	Acetone	0.0087 mg/Kg	0.1U mg/Kg
C077S503	Methylene chloride Acetone cis-1,2-Dichloroethene	0.014 mg/Kg 0.017 mg/Kg 0.00048 mg/Kg	0.06U mg/Kg 0.1U mg/Kg 0.006U mg/Kg
C077S522	Methylene chloride Acetone	0.0081 mg/Kg 0.022 mg/Kg	0.06U mg/Kg 0.1U mg/Kg
C077S523	cis-1,2-Dichloroethene	0.0005 mg/Kg	0.006U mg/Kg

Sample C077TB07 was identified as a trip blank. No volatile contaminants were found in this blank with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
C077TB07	12/3/05	Methylene chloride Methyl-tert-butyl ether	4.3 ug/L 0.21 ug/L	C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077G182 C077R005 C077S507 C077S508 C077S509 C077S510 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523

Sample C077R005 was identified as a rinsate. No volatile contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Compound	Concentration	Associated Samples
C077R005	12/3/05	Bromodichloromethane Bromoform Chloroform Dibromochloromethane	2.1 ug/L 0.65 ug/L 2.7 ug/L 1.4 ug/L	C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077G182 C077S507 C077S508 C077S509 C077S510 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
C077G145	Methyl-tert-butyl ether	1.1 ug/L	1.1U ug/L
C077S503	Methylene chloride	0.014 mg/Kg	0.06U mg/Kg
C077S522	Methylene chloride	0.0081 mg/Kg	0.06U mg/Kg

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S503	1,2-Dichloroethane-d4 Dibromofluoromethane	116 (52-149) 136 (65-135)	All TCL compounds	J (all detects)	A
C077S522	1,2-Dichloroethane-d4	161 (52-149)	All TCL compounds	J (all detects)	A

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG *49232/49233 except* C077S521	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S521MS/MSD (C077S521)	1,1,1-Trichloroethane	44.2 (70-135)	42.2 (70-135)	-	J (all detects) UJ (all non-detects)	A
	1,1-Dichloroethene	61.2 (65-135)	60.6 (65-135)	-		
	1,2-Dichloroethane	-	61.4 (70-135)	-		
	Benzene	64.2 (75-125)	57.0 (75-125)	-		
	Chloroethane	48.0 (75-125)	33.4 (75-125)	35.9 (≤30)		
	Ethylbenzene	37.2 (75-125)	26.2 (75-125)	34.7 (≤30)		
	m,p-Xylenes	38.1 (80-125)	25.0 (80-125)	41.5 (≤30)		
	o-Xylene	37.2 (75-125)	27.0 (75-125)	31.8 (≤30)		
	Trichloroethene	46.0 (75-125)	42.8 (75-125)	-		
	Tetrachloroethene	35.6 (65-140)	23.8 (65-140)	39.7 (≤30)		
	Toluene	44.4 (70-125)	42.4 (70-125)	-		
	trans-1,2-Dichloroethene	-	64.2 (65-135)	-		

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051207WLCS	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene	185 (55-140) 146 (65-135) 145 (50-140) 176 (55-140)	C077TB07 C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 051207W	J (all detects) J (all detects) J (all detects) J (all detects)	P
051208WLCS	Methylene chloride	150 (55-140)	C077G181 C077G182 C077R005 051208W	J (all detects)	P
052105LCS	Vinyl chloride	59.2 (60-125)	C077S521 *051210S*	J (all detects) *UJ (all non-detects)*	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

Samples C077G181 and C077G182 were identified as field duplicates. No volatiles were detected in any of the samples.

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Volatiles - Data Qualification Summary - SDG 49232/49233

SDG	Sample	Compound	Flag	A or P	Reason
49232/ 49233	C077S521	Dichlorodifluoromethane Vinyl chloride Acetone 1,2-Dibromo-3-chloropropane	J (all detects) UJ (all non-detects)	P	Continuing calibration (%D)
49232/ 49233	C077G181 C077G182 C077R005	Methylene chloride	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49232/ 49233	C077S503 C077S522	All TCL compounds	J (all detects)	A	Surrogate recovery (%R)
49232/ 49233	C077TB07 C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077G182 C077R005 C077S507 C077S508 C077S509 C077S510 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S522 C077S523	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49232/ 49233	C077S521	1,1,1-Trichloroethane 1,1-Dichloroethene 1,2-Dichloroethane Benzene Trichloroethene Toluene trans-1,2-Dichloroethene	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49232/ 49233	C077S521	Chloroethane Ethylbenzene m,p-Xylenes o-Xylene Tetrachloroethene	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)(RPD)

SDG	Sample	Compound	Flag	A or P	Reason
49232/ 49233	C077TB07 C077G145 C077G191 C077G143 C077G185 C077G187 C077G183	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene	J (all detects) J (all detects) J (all detects) J (all detects)	P	Laboratory control samples (%R)
49232/ 49233	C077G181 C077G182 C077R005	Methylene chloride	J (all detects)	P	Laboratory control samples (%R)
49232/ 49233	C077S521	Vinyl chloride	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)

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Volatiles - Laboratory Blank Data Qualification Summary - SDG 49232/49233

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49232/49233	C077S507	Acetone	0.1U mg/Kg	A
49232/49233	C077S508	Acetone	0.1U mg/Kg	A
49232/49233	C077S505	Acetone	0.1U mg/Kg	A
49232/49233	C077S506	Acetone	0.1U mg/Kg	A
49232/49233	C077S502	Acetone	0.1U mg/Kg	A
49232/49233	C077S503	Methylene chloride Acetone cis-1,2-Dichloroethene	0.06U mg/Kg 0.1U mg/Kg 0.006U mg/Kg	A
49232/49233	C077S522	Methylene chloride Acetone	0.06U mg/Kg 0.1U mg/Kg	A
49232/49233	C077S523	cis-1,2-Dichloroethene	0.006U mg/Kg	A

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Volatiles - Field Blank Data Qualification Summary - SDG 49232/49233

SDG	Sample	Compound	Modified Final Concentration	A or P
49232/49233	C077G145	Methyl-tert-butyl ether	1.1U ug/L	A
49232/49233	C077S503	Methylene chloride	0.06U mg/Kg	A
49232/49233	C077S522	Methylene chloride	0.06U mg/Kg	A

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 2, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49235/49236

Sample Identification

C077TB05	C077S433
C077G151	C077S434**
C077G152	C077S435**
C077G154	C077S430**
C077G148	C077S431
C077G147**	C077S432
C077TB06	C077S438MS
C077R004	C077S438MSD
C077S436	
C077S437	
C077S438	
C077S445	
C077S446	
C077S447	
C077S448	
C077S449	
C077S450**	
C077S439	
C077S440	
C077S441	

**Indicates sample underwent Level IV review

Introduction

This data review covers 20 soil samples and 8 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

All samples were received in good condition with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077TB05 C077TB06	All TCL compounds	Air bubbles were apparent in the sample containers.	There should be no air bubbles in the sample containers.	J (all detects) UJ (all non-detects)	A

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all volatile target compounds were within method and validation criteria with the following exceptions:

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
12/5/05	Vinyl chloride	0.03 (≥0.05)	C077S436 C077S437 C077S438 C077S439 C077S440 C077S441 C077S433 C077S434** C077S435** 051206S	J (all detects) UJ (all non-detects)	A

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/8/05	Methylene chloride	61	All water samples in SDG 49235/49236	J (all detects) UJ (all non-detects)	A
12/6/05	Acetone	38	C077S436 C077S437 C077S438 C077S439 C077S440 C077S441 C077S433 C077S434** C077S435** 051206S	J (all detects) UJ (all non-detects)	A
12/10/05	Dichlorodifluoromethane Vinyl chloride Acetone 1,2-Dibromo-3-chloropropane	33 32 34 27	C077S445 C077S446 C077S447 C077S448 051210S	J (all detects) UJ (all non-detects)	P

All of the continuing calibration RRF values were within method and validation criteria with the following exceptions:

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
12/6/05	Vinyl chloride	0.0374 (≥0.05)	C077S436 C077S437 C077S438 C077S439 C077S440 C077S441 C077S433 C077S434** C077S435** 051206S	J (all detects) UJ (all non-detects)	A

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051206S-BLK	12/6/05	Methylene chloride	0.0052 mg/Kg	C077S436 C077S437 C077S438 C077S439 C077S440 C077S441 C077S433 C077S434** C077S435**
051209S-BLK	12/9/05	Acetone	0.0052 mg/Kg	C077S449 C077S450** C077S430** C077S431 C077S432

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077S436	Methylene chloride	0.015 mg/Kg	0.06U mg/Kg
C077S440	Methylene chloride	0.0099 mg/Kg	0.05U mg/Kg
C077S434**	Methylene chloride	0.017 mg/Kg	0.05U mg/Kg

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077S435**	Methylene chloride	0.013 mg/Kg	0.06U mg/Kg

Samples C077TB05 and C077TB06 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
C077TB05	12/2/05	Methylene chloride	0.93 ug/L	All soil samples in SDG 49235/49236
C077TB06	12/2/05	Methylene chloride	3.6 ug/L	All water samples in SDG 49235/49236

Sample C077R004 was identified as a rinsate. No volatile contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Compound	Concentration	Associated Samples
C077R004	12/2/05	Chloroform Bromodichloromethane Dibromochloromethane	3.3 ug/L 2.6 ug/L 1.6 ug/L	C077G151 C077G152 C077G154 C077G148 C077G147** C077S436 C077S437 C077S438 C077S445 C077S446 C077S447 C077S448 C077S449 C077S450** C077S439 C077S440 C077S441 C077S433 C077S434** C077S435** C077S430** C077S431 C077S432

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077TB05 C077G151 C077G152 C077G154 C077G148 C077G147** C077TB06 C077R004 C077S436 C077S437 C077S438 C077S445 C077S446 C077S447 C077S448 C077S439 C077S440 C077S441 C077S433 C077S434** C077S435**	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S438MS/MSD	1,1,1-Trichloroethane	57.8 (70-135)	59.2 (70-135)	-	J (all detects)	A
(C077S449	1,1-Dichloroethene	59.6 (65-135)	-	-	UJ (all non-detects)	
C077S450**	1,2-Dichloroethane	60.6 (70-135)	66.2 (70-135)	-		
C077S430**	Benzene	65.2 (75-125)	70.2 (75-125)	-		
C077S431	Chlorobenzene	66.6 (75-125)	73.0 (75-125)	-		
C077S432)	Ethylbenzene	63.8 (75-125)	67.6 (75-125)	-		
	m,p-Xylenes	62.6 (80-125)	71.3 (80-125)	-		
	o-Xylene	66.6 (75-125)	-	-		
	Trichloroethene	64.0 (75-125)	68.4 (75-125)	-		
	Tetrachloroethene	56.2 (65-140)	62.4 (65-140)	-		
	Toluene	67.0 (70-125)	-	-		
	trans-1,2-Dichloroethene	59.4 (65-135)	-	-		

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051208WLCS	Methylene chloride	150 (55-140)	All water samples in SDG 49235/49236	J (all detects)	P
051210WLCS	Vinyl chloride	59.2 (60-125)	C077S445 C077S446 C077S447 C077S448 051212S	J (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

Samples C077G151 and C077G152 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD
	C077G151	C077G152	
Carbon disulfide	0.39	0.32	20
Toluene	0.23	0.19	19

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Volatiles - Data Qualification Summary - SDG 49235/49236

SDG	Sample	Compound	Flag	A or P	Reason
49235/ 49236	C077TB05 C077TB06	All TCL compounds	J (all detects) UJ (all non-detects)	A	Sample condition
49235/ 49236	C077S436 C077S437 C077S438 C077S439 C077S440 C077S441 C077S433 C077S434** C077S435**	Vinyl chloride	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF)
49235/ 49236	C077TB05 C077G151 C077G152 C077G154 C077G148 C077G147** C077TB06 C077R004	Methylene chloride	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49235/ 49236	C077S436 C077S437 C077S438 C077S439 C077S440 C077S441 C077S433 C077S434** C077S435**	Acetone	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49235/ 49236	C077S445 C077S446 C077S447 C077S448	Dichlorodifluoromethane Vinyl chloride Acetone 1,2-Dibromo-3-chloropropane	J (all detects) UJ (all non-detects)	P	Continuing calibration (%D)
49235/ 49236	C077S436 C077S437 C077S438 C077S439 C077S440 C077S441 C077S433 C077S434** C077S435**	Vinyl chloride	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF)

SDG	Sample	Compound	Flag	A or P	Reason
49235/ 49236	C077TB05 C077G151 C077G152 C077G154 C077G148 C077G147** C077TB06 C077R004 C077S436 C077S437 C077S438 C077S445 C077S446 C077S447 C077S448 C077S439 C077S440 C077S441 C077S433 C077S434** C077S435**	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49235/ 49236	C077S449 C077S450** C077S430** C077S431 C077S432	1,1,1-Trichloroethane 1,1-Dichloroethene 1,2-Dichloroethane Benzene Chlorobenzene *Ethylbenzene* m,p-Xylenes o-Xylene Trichloroethene Tetrachloroethene Toluene *trans-1,2-Dichloroethene*	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49235/ 49236	C077TB05 C077G151 C077G152 C077G154 C077G148 C077G147** C077TB06 C077R004	Methylene chloride	J (all detects)	P	Laboratory control samples (%R)
49235/ 49236	C077S445 C077S446 C077S447 C077S448	Vinyl chloride	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)

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Volatiles - Laboratory Blank Data Qualification Summary - SDG 49235/49236

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49235/49236	C077S436	Methylene chloride	0.06U mg/Kg	A

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49235/49236	C077S440	Methylene chloride	0.05U mg/Kg	A
49235/49236	C077S434**	Methylene chloride	0.05U mg/Kg	A
49235/49236	C077S435**	Methylene chloride	0.06U mg/Kg	A

NAS Alameda Point, CTO 077
Volatiles - Field Blank Data Qualification Summary - SDG 49235/49236

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14428

Semivolatiles

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 3, 2005

LDC Report Date: December 22, 2005

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49232/49233

Sample Identification

C077G145	C077S521
C077G191	C077S522
C077G143	C077S523
C077G185	C077S522MS
C077G187	C077S522MSD
C077G183	
C077G181	
C077R005	
C077G186	
C077S507	
C077S508	
C077S509	
C077S511	
C077S512	
C077S504	
C077S505	
C077S506	
C077S501	
C077S502	
C077S503	

Introduction

This data review covers 18 soil samples and 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program *National Functional Guidelines for Organic Data Review (October 1999)* as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/15/05	4-Nitrophenol	31	C077S522 C077S523 C077S522MS C077S522MSD	J (all detects) UJ (all non-detects)	A

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No semivolatile contaminants were found in the method blanks.

Sample C077R005 was identified as a rinsate. No semivolatile contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49232/49233	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S522MS/MSD (All soil samples in SDG 49232/49233)	2,4,5-Trichlorophenol	-	47.1 (50-110)	-	J (all detects) UJ (all non-detects)	A
	2,4-Dichlorophenol	-	44.2 (45-110)	-		
	2,4-Dinitrotoluene	-	48.4 (50-115)	-		
	2,6-Dinitrotoluene	-	47.8 (50-110)	-		
	2-Methylnaphthalene	-	41.0 (45-105)	-		
	Aniline	22.9 (25-135)	21.8 (25-135)	-		
	Bis(2-chloroethoxy)methane	-	43.9 (45-110)	-		
	Di-n-butylphthalate	-	49.1 (55-110)	-		
	Dibenzofuran	-	49.4 (50-105)	-		
	Diethylphthalate	-	47.5 (50-115)	-		
	Dimethylphthalate	-	48.1 (50-110)	-		
	Pentachlorophenol	44.2 (50-115)	39.6 (50-115)	-		
	Pyridine	3.8 (15-115)	3.6 (15-115)	-		

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
052106WLCS	4-Chloroaniline	111 (15-110)	All water samples in SDG 49232/49233	J (all detects)	P
052106WLCS	N-Nitrosodiphenylamine	36.6 (15-110)	All water samples in SDG 49232/49233	J (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

Samples C077G185 and C077G186 were identified as field duplicates. No semivolatiles were detected in any of the samples.

NAS Alameda Point, CTO 077
Semivolatiles - Data Qualification Summary - SDG 49232/49233

SDG	Sample	Compound	Flag	A or P	Reason
49232/ 49233	C077S522 C077S523	4-Nitrophenol	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49232/ 49233	C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077R005 C077G186	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49232/ 49233	C077S507 C077S508 C077S509 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523	2,4,5-Trichlorophenol 2,4-Dichlorophenol 2,4-Dinitrotoluene 2,6-Dinitrotoluene 2-Methylnaphthalene Aniline Bis(2-chloroethoxy)methane Di-n-butylphthalate Dibenzofuran Diethylphthalate Dimethylphthalate Pentachlorophenol Pyridine	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49232/ 49233	C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077R005 C077G186	4-Chloroaniline	J (all detects)	P	Laboratory control samples (%R)
49232/ 49233	C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077R005 C077G186	N-Nitrosodiphenylamine	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)

NAS Alameda Point, CTO 077
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 49232/49233

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Semivolatiles - Field Blank Data Qualification Summary - SDG 49232/49233

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 2, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49235/49236

Sample Identification

C077G148
C077G147**
C077R004
C077S436
C077S437
C077S438
C077S439
C077S441
C077S433
C077S434**
C077S435**
C077S430**
C077S431
C077S432
C077S433MS
C077S433MSD

**Indicates sample underwent Level IV review

Introduction

This data review covers 13 soil samples and 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals with the following exceptions:

Sample	Compound	Total Time From DFTPP Tuning Until Analysis	Required Analysis Time (in Hours) From DFTPP Tuning Until Analysis	Flag	A or P
C077S433MSD	All TCL compounds	12 hours 14 minutes	12 hours	None	P

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No semivolatile contaminants were found in the method blanks.

Sample C077R004 was identified as a rinsate. No semivolatile contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S438	2-Fluorobiphenyl Nitrobenzene-d5	42.5 (45-105) 30.9 (35-100)	All base neutral compounds	J (all detects) UJ (all non-detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077G148 C077G147** C077R004 C077S434** C077S435**	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S433MS/MSD (C077S436 C077S437 C077S438 C077S439 C077S441 C077S433 C077S430** C077S431 C077S432)	2,4-Dinitrotoluene 2,6-Dinitrotoluene 2-Methyl-4,6-dinitrophenol Hexachloroethane Pentachlorophenol Pyridine	49.1 (50-115) - 19.6 (30-135) 29.2 (35-110) 48.9 (50-115) 3.1 (15-115)	48.6 (50-115) 47.2 (50-110) 18.4 (30-135) 29.0 (35-110) 47.4 (50-115) 2.4 (15-115)	- - - - - -	J (all detects) UJ (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051206WLCS	4-Chloroaniline	111 (15-110)	All water samples in SDG 49235/492356	J (all detects)	P
051206WLCS	N-Nitrosodiphenylamine	36.6 (50-110)	All water samples in SDG 49235/492356	J (all detects) UJ (all non-detects)	P
051215SLCS	Pentachlorophenol	42.9 (50-115)	C077S434** C077S435** 051215S	J (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits with the following exceptions:

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S436	Acenaphthene-d10	7437150 (1821402-7285608)	2,4,6-Trichlorophenol 2,4,5-Trichlorophenol 2-Nitroaniline Dimethylphthalate 2,6-Dinitrotoluene 3-Nitroaniline 2,4-Dinitrophenol 4-Nitrophenol Dibenzofuran 2,4-Dinitrotoluene Diethylphthalate 4-Nitroaniline	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Semivolatiles - Data Qualification Summary - SDG 49235/49236

SDG	Sample	Compound	Flag	A or P	Reason
49235/ 49236	C077S438	Bis(2-chloroethyl) ether N-Nitroso-di-n-propylamine Hexachloroethane Nitrobenzene Isophorone Bis(2-chloroethoxy)methane 4-Chloroaniline Hexachlorobutadiene 2-Methylnaphthalene 2-Nitroaniline Dimethylphthalate 2,6-Dinitrotoluene 3-Nitroaniline Dibenzofuran 2,4-Dinitrotoluene Diethylphthalate 4-Chlorophenylphenyl ether 4-Nitroaniline N-Nitrosodiphenylamine 4-Bromophenyphenyl ether Hexachlorobenzene Carbozole Di-n-butylphthalate Butylbenzylphthalate 3,3'-Dichlorobenzidine Bis(2-ethyhexyl)phthalate Di-n-octylphthalate Bis(2-chloroisopropyl)ether Aniline N-Nitrosodimethylamine Benzyl alcohol Pyridine	J (all detects) UJ (all non-detects)	P	Surrogate recovery (%R)
49235/ 49236	C077G148 C077G147** C077R004 C077S434** C077S435**	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49235/ 49236	C077S436 C077S437 C077S438 C077S439 C077S441 C077S433 C077S430** C077S431 C077S432	2,4-Dinitrotoluene 2,6-Dinitrotoluene 2-Methyl-4,6-dinitrophenol Hexachloroethane Pentachlorophenol Pyridine	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49235/ 49236	C077G148 C077G147** C077R004	4-Chloroaniline	J (all detects)	P	Laboratory control samples (%R)

SDG	Sample	Compound	Flag	A or P	Reason
49235/ 49236	C077G148 C077G147** C077R004	N-Nitrosodiphenylamine	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)
49235/ 49236	C077S434** C077S435**	Pentachlorophenol	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)
49235/ 49236	C077S436	2,4,6-Trichlorophenol 2,4,5-Trichlorophenol 2-Nitroaniline Dimethylphthalate 2,6-Dinitrotoluene 3-Nitroaniline 2,4-Dinitrophenol 4-Nitrophenol Dibenzofuran 2,4-Dinitrotoluene Diethylphthalate 4-Nitroaniline	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P	Internal standards (area)

NAS Alameda Point, CTO 077
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 49235/49236

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Semivolatiles - Field Blank Data Qualification Summary - SDG 49235/49236

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14428

Polynuclear Aromatic Hydrocarbons

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 3, 2005

LDC Report Date: December 22, 2005

Matrix: Soil/Water

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49232/49233

Sample Identification

C077G145	C077S503
C077G191	C077S521
C077G143	C077S522
C077G185	C077S523
C077G187	C077S512MS
C077G183	C077S512MSD
C077G181	
C077R005	
C077G188	
C077G146	
C077S507	
C077S508	
C077S509	
C077S511	
C077S512	
C077S504	
C077S505	
C077S506	
C077S501	
C077S502	

Introduction

This data review covers 16 soil samples and 10 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C using Selected Ion Monitoring (SIM) for Polynuclear Aromatic Hydrocarbons.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds.

Average relative response factors (RRF) for all target compounds and system monitoring compounds

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0% .

All of the continuing calibration RRF values were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polynuclear aromatic hydrocarbon contaminants were found in the method blanks.

Sample C077R005 was identified as a rinsate. No polynuclear aromatic hydrocarbon contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051206SLCS	2-Methylnaphthalene	105 (53-101)	All soil samples in SDG 49232/49233	J (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Flag	A or P
C077S505 C077S502 C077S522	Benzo(b)fluoranthene Benzo(k)fluoranthene	Due to lack of resolution between these compounds in the samples, the laboratory performed the quantitation using the total peak area.	J (all detects) J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

Samples C077G145 and C077G146 and samples C077G187 and C077G188 were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (mg/Kg)		RPD
	C077G145	C077G146	
Acenaphthene	0.88	1.0	13
Acenaphthylene	0.28	0.30	7
Anthracene	0.36	0.45	22
Fluoranthene	0.91	0.95	4
Fluorene	0.40	0.44	10
Phenanthrene	2.1	2.2	5
Pyrene	2.2	2.4	9

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 49232/49233

SDG	Sample	Compound	Flag	A or P	Reason
49232/ 49233	C077S507 C077S508 C077S509 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523	2-Methylnaphthalene	J (all detects)	P	Laboratory control samples (%R)
49232/ 49233	C077S505 C077S502 C077S522	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) J (all detects)	A	Compound quantitation and CRQLs

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 49232/49233

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary - SDG 49232/49233

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

***Collection* Date:** December 2, 2005

LDC Report Date: December 22, 2005

Matrix: Soil/Water

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49235/49236

Sample Identification

C077G147**
C077R004
C077G109A
C077S436
C077S437
C077S438
C077S439
C077S441
C077S433
C077S434**
C077S435**
C077S430**
C077S431
C077S432
C077G105
C077G147MS
C077G147MSD
C077S441MS
C077S441MSD
C077G148

**Indicates sample underwent Level IV review

Introduction

This data review covers 13 soil samples and 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C using Selected Ion Monitoring (SIM) for Polynuclear Aromatic Hydrocarbons.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds.

Average relative response factors (RRF) for all target compounds and system monitoring compounds

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0% .

All of the continuing calibration RRF values were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polynuclear aromatic hydrocarbon contaminants were found in the method blanks.

Sample C077R004 was identified as a rinsate. No polynuclear aromatic hydrocarbon contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S438	2-Fluorobiphenyl Nitrobenzene-d5	50.6 (54-125) 45.2 (49-121)	All TCL compounds	J (all detects) UJ (all non-detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077S434** C077S435**	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Flag	A or P
C077S437 C077S438 C077S439 C077S441 C077S433 C077S431 C077S432	Benzo(b)fluoranthene Benzo(k)fluoranthene	Due to lack of resolution between these compounds in the samples, the laboratory performed the quantitation using the total peak area.	J (all detects) J (all detects)	A

Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 49235/49236

SDG	Sample	Compound	Flag	A or P	Reason
49235/ 49236	C077S438	All TCL compounds	J (all detects) UJ (all non-detects)	P	Surrogate recovery (%R)
49235/ 49236	C077S434** C077S435**	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49235/ 49236	C077S437 C077S438 C077S439 C077S441 C077S433 C077S431 C077S432	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) J (all detects)	A	Compound quantitation and CRQLs

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 49235/49236

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary - SDG 49235/49236

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14428

Chlorinated Pesticides & PCBs

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 3, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Chlorinated Pesticides & PCBs

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): *49232/49233*

Sample Identification

C077G145	C077S521
C077G191	C077S522
C077G143	C077S523
C077G185	C077S512MS
C077G187	C077S512MSD
C077G183	
C077G181	
C077R005	
C077G144	
C077S507	
C077S508	
C077S509	
C077S511	
C077S512	
C077S504	
C077S505	
C077S506	
C077S501	
C077S502	
C077S503	

Introduction

This data review covers 16 soil samples and 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 8081A and 8082 for Chlorinated Pesticides and PCBs.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical or advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Associated Compounds	Flag	A or P
12/12/05	1212006	DB-35MS	Toxaphene	16.0	All water samples in SDG 49232/49233	Toxaphene	J (all detects) UJ (all non-detects)	A
12/12/05	1212003	DB-XLB	Endrin	51	All soil samples in SDG 49232/49233	Endrin	J (all detects) UJ (all non-detects)	A

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide or PCB contaminants were found in the method blanks.

Sample C077R005 was identified as a rinsate. No chlorinated pesticide or PCB contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for samples C077S506 and C077S502. Since these samples were diluted out, no data were qualified.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49232/49233	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and Reported CRQLs

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples C077G143 and C077G144 were identified as field duplicates. No chlorinated pesticides or PCBs were detected in any of the samples.

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Data Qualification Summary - SDG 49232/49233

SDG	Sample	Compound	Flag	A or P	Reason
49232/ 49233	C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077R005 C077G144	Toxaphene	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49232/ 49233	C077S507 C077S508 C077S509 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523	Endrin	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49232/ 49233	C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077R005 C077G144	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Laboratory Blank Data Qualification Summary - SDG 49232/49233

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Field Blank Data Qualification Summary - SDG 49232/49233

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 2, 2005

LDC Report Date: December 22, 2005

Matrix: Soil/Water

Parameters: Chlorinated Pesticides & PCBs

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49235/49236

Sample Identification

C077G148
C077G147**
C077R004
C077G109A
C077G105A
C077S436
C077S437
C077S438
C077S439
C077S441
C077S433
C077S434**
C077S435**
C077S430**
C077S431
C077G105AMS
C077G105AMSD
C077S436MS
C077S436MSD
C077S432MS
C077S432MSD
C077S432

**Indicates sample underwent Level IV review.

Introduction

This data review covers 15 soil samples and 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 8081A and 8082 for Chlorinated Pesticides and PCBs.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical or advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

Retention time windows were evaluated and considered technically acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Associated Compounds	Flag	A or P
12/12/05	1212006	DB-35MS	Toxaphene	16.0	C077G148 051206A-BLK1	Toxaphene	J (all detects) UJ (all non-detects)	A
12/12/05	1212021	DB-35MS	alpha-BHC Heptachlor 4,4'-DDE Endrin 4,4'-DDD 4,4'-DDT	20.2 25.3 17.6 21.2 23.3 18.7	C077G147** C077R004 C077G109A C077G105A C077G105AMS C077G105AMSD	alpha-BHC Heptachlor 4,4'-DDE Endrin 4,4'-DDD 4,4'-DDT	J (all detects) UJ (all non-detects)	A
12/12/05	1212022	DB-XLB	Aroclor-1260	17.1	C077G147** C077R004 C077G109A C077G105A C077G105AMS C077G105AMSD	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A

Date	Standard	Column	Compound	%D	Associated Samples	Associated Compounds	Flag	A or P
12/12/05	1212023	DB-XLB	Toxaphene	17.7	C077G147** C077R004 C077G109A C077G105A C077G105AMS C077G105AMSD	Toxaphene	J (all detects) UJ (all non-detects)	A
12/13/05	1212042	DB-35MS	4,4'-DDD	15.9	C077S436 C077S439 051208A-BLK	4,4'-DDD	J (all detects) UJ (all non-detects)	A
12/14/05	1212080	DB-XLB	Endrin	24.6	C077S438 C077S441 C077S433 C077S434** C077S435** C077S430** C077S431	Endrin	J (all detects) UJ (all non-detects)	A
12/14/05	1212081	DB-35MS	Toxaphene	15.2	C077S438 C077S441 C077S433 C077S434** C077S435** C077S430** C077S431	Toxaphene	J (all detects) UJ (all non-detects)	A
12/14/05	1212094	DB-35MS	4,4'-DDT	22.5	C077S432MS C077S432MSD C077S432	4,4'-DDT	J (all detects) UJ (all non-detects)	A
12/15/05	1212126	DB-35MS	alpha-BHC gamma-BHC Heptachlor 4,4'-DDE Endrin 4,4'-DDD 4,4'-DDT	21.2 16.3 18.0 17.8 20.5 24.6 28.2	C077S437 C077S436MS C077S436MSD 051214A-BLK	alpha-BHC gamma-BHC Heptachlor 4,4'-DDE Endrin 4,4'-DDD 4,4'-DDT	J (all detects) UJ (all non-detects)	P
12/15/05	1212128	DB-XLB	Aroclor-1260	17.6	C077S437 C077S436MS C077S436MSD 051214A-BLK	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A

Retention times (RT) of all compounds in the calibration standards were within QC limits for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide or PCB contaminants were found in the method blanks.

Sample C077R004 was identified as a rinsate. No chlorinated pesticide or PCB contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077S437	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and Reported CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which an Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Data Qualification Summary - SDG 49235/49236

SDG	Sample	Compound	Flag	A or P	Reason
49235/ 49236	C077G148	Toxaphene	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49235/ 49236	C077G147** C077R004 C077G109A C077G105A	alpha-BHC Heptachlor 4,4'-DDE Endrin 4,4'-DDD 4,4'-DDT Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260 Toxaphene	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49235/ 49236	C077S436 C077S439	4,4'-DDD	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49235/ 49236	C077S438 C077S441 C077S433 C077S434** C077S435** C077S430** C077S431	Endrin Toxaphene	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49235/ 49236	C077S432	4,4'-DDT	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49235/ 49236	C077S437	alpha-BHC gamma-BHC Heptachlor 4,4'-DDE Endrin 4,4'-DDD 4,4'-DDT	J (all detects) UJ (all non-detects)	P	Continuing calibration (%D)
49235/ 49236	C077S437	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49235/ 49236	C077S437	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Laboratory Blank Data Qualification Summary - SDG 49235/49236

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Field Blank Data Qualification Summary - SDG 49235/49236

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14428

Metals

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 3, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Chlorinated Pesticides & PCBs

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49232/49233

Sample Identification

C077G145	C077S521
C077G191	C077S522
C077G143	C077S523
C077G185	C077S512MS
C077G187	C077S512MSD
C077G183	
C077G181	
C077R005	
C077G144	
C077S507	
C077S508	
C077S509	
C077S511	
C077S512	
C077S504	
C077S505	
C077S506	
C077S501	
C077S502	
C077S503	

Introduction

This data review covers 16 soil samples and 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 8081A and 8082 for Chlorinated Pesticides and PCBs.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical or advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Associated Compounds	Flag	A or P
12/12/05	1212006	DB-35MS	Toxaphene	16.0	All water samples in SDG 49232/49233	Toxaphene	J (all detects) UJ (all non-detects)	A
12/12/05	1212003	DB-XLB	Endrin	51	All soil samples in SDG 49232/49233	Endrin	J (all detects) UJ (all non-detects)	A

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide or PCB contaminants were found in the method blanks.

Sample C077R005 was identified as a rinsate. No chlorinated pesticide or PCB contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for samples C077S506 and C077S502. Since these samples were diluted out, no data were qualified.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49232/49233	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and Reported CRQLs

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples C077G143 and C077G144 were identified as field duplicates. No chlorinated pesticides or PCBs were detected in any of the samples.

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Data Qualification Summary - SDG 49232/49233

SDG	Sample	Compound	Flag	A or P	Reason
49232/ 49233	C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077R005 C077G144	Toxaphene	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49232/ 49233	C077S507 C077S508 C077S509 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523	Endrin	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49232/ 49233	C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077R005 C077G144	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Laboratory Blank Data Qualification Summary - SDG 49232/49233

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Field Blank Data Qualification Summary - SDG 49232/49233

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 2, 2005

LDC Report Date: December 22, 2005

Matrix: Soil/Water

Parameters: Chlorinated Pesticides & PCBs

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49235/49236

Sample Identification

C077G148	C077S432MSD
C077G147**	C077S432
C077R004	
C077G109A	
C077G105A	
C077S436	
C077S437	
C077S438	
C077S439	
C077S441	
C077S433	
C077S434**	
C077S435**	
C077S430**	
C077S431	
C077G105AMS	
C077G105AMSD	
C077S436MS	
C077S436MSD	
C077S432MS	

**Indicates sample underwent Level IV review.

Introduction

This data review covers 15 soil samples and 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 8081A and 8082 for Chlorinated Pesticides and PCBs.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical or advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

Retention time windows were evaluated and considered technically acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Associated Compounds	Flag	A or P
12/12/05	1212006	DB-35MS	Toxaphene	16.0	C077G148 051206A-BLK1	Toxaphene	J (all detects) UJ (all non-detects)	A
12/12/05	1212021	DB-35MS	alpha-BHC Heptachlor 4,4'-DDE Endrin 4,4'-DDD 4,4'-DDT	20.2 25.3 17.6 21.2 23.3 18.7	C077G147** C077R004 C077G109A C077G105A C077G105AMS C077G105AMSD	alpha-BHC Heptachlor 4,4'-DDE Endrin 4,4'-DDD 4,4'-DDT	J (all detects) UJ (all non-detects)	A
12/12/05	1212022	DB-XLB	Aroclor-1260	17.1	C077G147** C077R004 C077G109A C077G105A C077G105AMS C077G105AMSD	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A

Date	Standard	Column	Compound	%D	Associated Samples	Associated Compounds	Flag	A or P
12/12/05	1212023	DB-XLB	Toxaphene	17.7	C077G147** C077R004 C077G109A C077G105A C077G105AMS C077G105AMSD	Toxaphene	J (all detects) UJ (all non-detects)	A
12/13/05	1212042	DB-35MS	4,4'-DDD	15.9	C077S436 C077S439 051208A-BLK	4,4'-DDD	J (all detects) UJ (all non-detects)	A
12/14/05	1212080	DB-XLB	Endrin	24.6	C077S438 C077S441 C077S433 C077S434** C077S435** C077S430** C077S431	Endrin	J (all detects) UJ (all non-detects)	A
12/14/05	1212081	DB-35MS	Toxaphene	15.2	C077S438 C077S441 C077S433 C077S434** C077S435** C077S430** C077S431	Toxaphene	J (all detects) UJ (all non-detects)	A
12/14/05	1212094	DB-35MS	4,4'-DDT	22.5	C077S432MS C077S432MSD C077S432	4,4'-DDT	J (all detects) UJ (all non-detects)	A
12/15/05	1212126	DB-35MS	alpha-BHC gamma-BHC Heptachlor 4,4'-DDE Endrin 4,4'-DDD 4,4'-DDT	21.2 16.3 18.0 17.8 20.5 24.6 28.2	C077S437 C077S436MS C077S436MSD 051214A-BLK	alpha-BHC gamma-BHC Heptachlor 4,4'-DDE Endrin 4,4'-DDD 4,4'-DDT	J (all detects) UJ (all non-detects)	P
12/15/05	1212128	DB-XLB	Aroclor-1260	17.6	C077S437 C077S436MS C077S436MSD 051214A-BLK	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A

Retention times (RT) of all compounds in the calibration standards were within QC limits for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide or PCB contaminants were found in the method blanks.

Sample C077R004 was identified as a rinsate. No chlorinated pesticide or PCB contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077S437	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and Reported CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which an Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Data Qualification Summary - SDG 49235/49236

SDG	Sample	Compound	Flag	A or P	Reason
49235/ 49236	C077G148	Toxaphene	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49235/ 49236	C077G147** C077R004 C077G109A C077G105A	alpha-BHC Heptachlor 4,4'-DDE Endrin 4,4'-DDD 4,4'-DDT Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260 Toxaphene	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49235/ 49236	C077S436 C077S439	4,4'-DDD	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49235/ 49236	C077S438 C077S441 C077S433 C077S434** C077S435** C077S430** C077S431	Endrin Toxaphene	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49235/ 49236	C077S432	4,4'-DDT	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49235/ 49236	C077S437	alpha-BHC gamma-BHC Heptachlor 4,4'-DDE Endrin 4,4'-DDD 4,4'-DDT	J (all detects) UJ (all non-detects)	P	Continuing calibration (%D)
49235/ 49236	C077S437	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49235/ 49236	C077S437	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Laboratory Blank Data Qualification Summary - SDG 49235/49236

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Field Blank Data Qualification Summary - SDG 49235/49236

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14428

Metals

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 3, 2005

LDC Report Date: December 22, 2005

Matrix: Soil/Water

Parameters: Metals

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49232/49233

Sample Identification

C077G145	C077S521
C077G191	C077S522
C077G143	C077S523
C077G192	C077S509MS
C077G185	C077S509MSD
C077G187	
C077G183	
C077G181	
C077R005	
C077S507	
C077S508	
C077S509	
C077S511	
C077S512	
C077S504	
C077S505	
C077S506	
C077S501	
C077S502	
C077S503	

Introduction

This data review covers 16 soil samples and 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 6010B and 7000 for Metals. The metals analyzed were Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Antimony Manganese	2.512 ug/L 1.536 ug/L	All water samples in SDG 49232/49233
ICB/CCB	Mercury	0.107 ug/L	C077G191 C077G192 C077G185 C077G187 C077G183 C077G181 C077R005
PBS1 (prep blank)	Chromium Manganese	0.036 mg/Kg 0.161 mg/Kg	C077S507 C077S508 C077S509 C077S511 C077S512
PBS2 (prep blank)	Calcium Chromium Manganese	5.816 mg/Kg 0.055 mg/Kg 0.157 mg/Kg	C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S522 C077S523 C077S521

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Antimony Chromium Lead Manganese Mercury Silver	2.593 ug/L 0.531 ug/L 0.998 ug/L 1.536 ug/L 0.092 ug/L 0.46 ug/L	All soil samples in SDG 49232/49233

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G191	Mercury	0.16 ug/L	0.16U ug/L
C077G192	Mercury	0.18 ug/L	0.18U ug/L
C077G185	Mercury	0.13 ug/L	0.13U ug/L
C077G187	Mercury	0.050 ug/L	0.050U ug/L
C077G183	Mercury	0.074 ug/L	0.074U ug/L
C077G181	Mercury	0.044 ug/L	0.044U ug/L
C077R005	Manganese	1.8 ug/L	1.8U ug/L
C077S508	Mercury Silver	0.037 mg/Kg 0.19 mg/Kg	0.037U mg/Kg 0.19U mg/Kg
C077S509	Silver	0.21 mg/Kg	0.21U mg/Kg
C077S511	Silver	0.18 mg/Kg	0.18U mg/Kg
C077S512	Mercury Silver	0.026 mg/Kg 0.18 mg/Kg	0.026U mg/Kg 0.18U mg/Kg
C077S504	Mercury	0.043 mg/Kg	0.043U mg/Kg
C077S505	Mercury	0.02 mg/Kg	0.02U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S506	Mercury	0.037 mg/Kg	0.037U mg/Kg
C077S502	Mercury	0.026 mg/Kg	0.026U mg/Kg
C077S522	Mercury	0.022 mg/Kg	0.022U mg/Kg
C077S523	Mercury	0.03 mg/Kg	0.03U mg/Kg

Sample C077R005 was identified as a rinsate. No metal contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
C077R005	12/3/05	Calcium Iron Magnesium Manganese Sodium	57.6 ug/L 39.1 ug/L 76.0 ug/L 1.8 ug/L 216 ug/L	C077G145 C077G191 C077G143 C077G192 C077G185 C077G187 C077G183 C077G181 C077S507 C077S508 C077S509 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S509	Sodium	79.9 mg/Kg	79.9U mg/Kg
C077S511	Sodium	58 mg/Kg	58U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S512	Sodium	92.4 mg/Kg	92.4U mg/Kg

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All water samples in SDG 49232/49233	All TAL metals	No MS associated with these samples.	MS required.	None	P
C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523	All TAL metals except Mercury	No MS associated with these samples.	MS required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S509MS/MSD (C077S507 C077S508 C077S509 C077S511 C077S512)	Antimony Manganese	54.4 (80-120) -	53.1 (80-120) 69.0 (80-120)	- -	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All water samples in SDG 49232/49233	All TAL metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P
C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523	All TAL metals except Mercury	No DUP analysis associated with these samples.	DUP analysis required.	None	P

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Internal Standards

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
C077S509L	Cobalt	23.2 (≤10)	C077S507 C077S508 C077S509 C077S511 C077S512	J (all detects)	A

XI. Sample Result Verification

Raw data were not reviewed for this SDG.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been qualified.

XIII. Field Duplicates

Samples C077G191 and C077G192 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD
	C077G191	C077G192	
Barium	306	232	28
Calcium	69300	53900	25
Chromium	9.5	7.7	21
Iron	1390	1160	18
Magnesium	86000	66600	25
Manganese	407	310	27
Mercury	0.16	0.18	12
Potassium	61000	47200	26
Selenium	17.3	25U	200
Sodium	1650000	1310000	23
Vanadium	8.1	25U	200

NAS Alameda Point, CTO 077
Metals - Data Qualification Summary - SDG 49232/49233

SDG	Sample	Analyte	Flag	A or P	Reason
49232/ 49233	C077G145 C077G191 C077G143 C077G192 C077G185 C077G187 C077G183 C077G181 C077R005	All TAL metals	None	P	Matrix spike analysis
49232/ 49233	C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523	All TAL metals except Mercury	None	P	Matrix spike analysis
49232/ 49233	C077S507 C077S508 C077S509 C077S511 C077S512	Antimony Manganese	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Matrix spike analysis (%R)
49232/ 49233	C077G145 C077G191 C077G143 C077G192 C077G185 C077G187 C077G183 C077G181 C077R005	All TAL metals	None	P	Duplicate analysis
49232/ 49233	C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523	All TAL metals except Mercury	None	P	Duplicate analysis
49232/ 49233	C077S507 C077S508 C077S509 C077S511 C077S512	Cobalt	J (all detects)	A	ICP serial dilution (%D)

NAS Alameda Point, CTO 077
Metals - Laboratory Blank Data Qualification Summary - SDG 49232/49233

SDG	Sample	Analyte	Modified Final Concentration	A or P
49232/49233	C077G191	Mercury	0.16U ug/L	A
49232/49233	C077G192	Mercury	0.18U ug/L	A
49232/49233	C077G185	Mercury	0.13U ug/L	A
49232/49233	C077G187	Mercury	0.050U ug/L	A
49232/49233	C077G183	Mercury	0.074U ug/L	A
49232/49233	C077G181	Mercury	0.044U ug/L	A
49232/49233	C077R005	Manganese	1.8U ug/L	A
49232/49233	C077S508	Mercury Silver	0.037U mg/Kg 0.19U mg/Kg	A
49232/49233	C077S509	Silver	0.21U mg/Kg	A
49232/49233	C077S511	Silver	0.18U mg/Kg	A
49232/49233	C077S512	Mercury Silver	0.026U mg/Kg 0.18U mg/Kg	A
49232/49233	C077S504	Mercury	0.043U mg/Kg	A
49232/49233	C077S505	Mercury	0.02U mg/Kg	A
49232/49233	C077S506	Mercury	0.037U mg/Kg	A
49232/49233	C077S502	Mercury	0.026U mg/Kg	A
49232/49233	C077S522	Mercury	0.022U mg/Kg	A
49232/49233	C077S523	Mercury	0.03U mg/Kg	A

NAS Alameda Point, CTO 077
Metals - Field Blank Data Qualification Summary - SDG 49232/49233

SDG	Sample	Analyte	Modified Final Concentration	A or P
49232/49233	C077S509	Sodium	79.9U mg/Kg	A
49232/49233	C077S511	Sodium	58U mg/Kg	A
49232/49233	C077S512	Sodium	92.4U mg/Kg	A

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 2, 2005

LDC Report Date: December 22, 2005

Matrix: Soil/Water

Parameters: Metals

Validation Level: Level III & IV

Laboratory: APPL, Inc./Brooks Rand

Sample Delivery Group (SDG): 49235/49236/05BR1817

Sample Identification

C077G151	C077S433
C077G152	C077S434**
C077G154	C077S435**
C077G148	C077S430**
C077G147**	C077S431
C077R004	C077S432
C077G109A	C077G154MS
C077G109	C077G154MSD
C077G105A	C077S445MS
C077S436	C077S445MSD
C077S437	
C077S438	
C077S445	
C077S446	
C077S447	
C077S448	
C077S449	
C077S450**	
C077S439	
C077S441	

**Indicates sample underwent Level IV review

Introduction

This data review covers 19 soil samples and 11 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 1631E, EPA SW 846 Methods 6010B and 7000 for Metals. The metals analyzed were Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

All samples were received in good condition with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
C077G151 C077G152 C077G154 C077G148 C077G147** C077R004 C077G109 C077G154MS C077G154MSD	Mercury	For this analyte, these samples arrived in Polyethylene (HDPE) bottles	All samples must be stored in fluoropolymer or glass bottles per EPA Method 1613E.	J (all detects) UJ (all non-detects)	A

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Antimony Cobalt Lead	2.217 ug/L 1.915 ug/L 2.197 ug/L	C077G151 C077G152 C077G154 C077G148 C077G147** C077R004 C077G109A C077G105A
ICB/CCB	Mercury	0.107 ug/L	C077G105A

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Potassium	138.4 ug/L	C077G151 C077G152 C077G154 C077G148 C077G147** C077R004 C077G109A
ICB/CCB	Sodium	828.4 ug/L	C077R004
PB (prep blank)	Calcium Chromium Manganese	5.816 mg/Kg 0.055 mg/Kg 0.157 mg/Kg	C077S436
ICB/CCB	Chromium Lead Manganese Silver	0.531 ug/L 0.998 ug/L 1.451 ug/L 0.46 ug/L	C077S436
PB (prep blank)	Calcium Lead Vanadium	1.041 mg/Kg 0.157 mg/Kg 0.06 mg/Kg	C077S437
ICB/CCB	Antimony Lead Mercury Nickel Vanadium	3.308 ug/L 2.217 ug/L 0.177 ug/L 0.742 ug/L 0.844 ug/L	C077S437
PB (prep blank)	Calcium Chromium Sodium	1.131 mg/Kg 0.087 mg/Kg 9.053 mg/Kg	C077S438 C077S445 C077S446 C077S447 C077S448 C077S449 C077S450** C077S439 C077S441 C077S433 C077S434** C077S435** C077S430** C077S431 C077S432
ICB/CCB	Aluminum	41.28 ug/L	C077S434**

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Antimony Arsenic Chromium Lead Nickel Silver	4.532 ug/L 2.196 ug/L 0.57 ug/L 1.623 ug/L 0.952 ug/L 0.642 ug/L	C077S438 C077S445 C077S446 C077S447 C077S448 C077S449 C077S450** C077S439 C077S441 C077S433 C077S434** C077S435** C077S430** C077S431 C077S432
ICB/CCB	Mercury	0.119 ug/L	C077S436 C077S438 C077S445 C077S446 C077S447 C077S448 C077S449 C077S450** C077S439 C077S441 C077S433 C077S434** C077S435** C077S430** C077S431 C077S432

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G151	Cobalt	0.76 ug/L	0.76U ug/L
C077R004	Cobalt Sodium	1.3 ug/L 579 ug/L	1.3U ug/L 579U ug/L
C077G105A	Cobalt	0.63 ug/L	0.63U ug/L
C077S437	Mercury	0.12 mg/Kg	0.12U mg/Kg
C077S436	Mercury	0.06 mg/Kg	0.06U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S438	Antimony	0.45 mg/Kg	0.45U mg/Kg
C077S445	Mercury Silver	0.028 mg/Kg 0.13 mg/Kg	0.028U mg/Kg 0.13U mg/Kg
C077S446	Silver	0.07 mg/Kg	0.07U mg/Kg
C077S447	Silver	0.13 mg/Kg	0.13U mg/Kg
C077S448	Antimony Silver	0.59 mg/Kg 0.16 mg/Kg	0.59U mg/Kg 0.16U mg/Kg
C077S449	Silver	0.2 mg/Kg	0.2U mg/Kg
C077S450**	Mercury Silver	0.075 mg/Kg 0.18 mg/Kg	0.075U mg/Kg 0.18U mg/Kg
C077S441	Silver	0.077 mg/Kg	0.077U mg/Kg
C077S433	Mercury Silver	0.055 mg/Kg 0.18 mg/Kg	0.055U mg/Kg 0.18U mg/Kg
C077S434**	Mercury Silver	0.021 mg/Kg 0.14 mg/Kg	0.021U mg/Kg 0.14U mg/Kg
C077S435**	Mercury Silver	0.03 mg/Kg 0.2 mg/Kg	0.03U mg/Kg 0.2U mg/Kg
C077S430**	Antimony Mercury Silver	0.24 mg/Kg 0.082 mg/Kg 0.088 mg/Kg	0.24U mg/Kg 0.082U mg/Kg 0.088U mg/Kg
C077S431	Mercury Silver	0.025 mg/Kg 0.15 mg/Kg	0.025U mg/Kg 0.15U mg/Kg
C077S432	Silver	0.27 mg/Kg	0.27U mg/Kg

Sample C077R004 was identified as a rinsate. No metal contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
C077R004	12/2/05	Calcium Cobalt Magnesium Manganese Sodium Mercury	33.9 ug/L 1.3 ug/L 43.2 ug/L 3.8 ug/L 579 ug/L 0.230 ng/L	C077G151 C077G152 C077G154 C077G148 C077G147** C077G109A C077G109 C077G105A C077S436 C077S437 C077S438 C077S445 C077S446 C077S447 C077S448 C077S449 C077S450** C077S439 C077S441 C077S433 C077S434** C077S435** C077S430** C077S431 C077S432

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G151	Cobalt	0.76 ug/L	0.76U ug/L
C077G105A	Cobalt	0.63 ug/L	0.63U ug/L
C077S436	Sodium	65.1 mg/Kg	65.1U mg/Kg
C077S437	Sodium	139 mg/Kg	139U mg/Kg
C077S445	Sodium	101 mg/Kg	101U mg/Kg
C077S446	Sodium	77.4 mg/Kg	77.4U mg/Kg
C077S447	Sodium	120 mg/Kg	120U mg/Kg
C077S448	Sodium	283 mg/Kg	283U mg/Kg

Sample	Analyte	Reported *Concentration*	Modified Final *Concentration*
C077S449	Sodium	274 mg/Kg	274U mg/Kg
C077S450**	Sodium	199 mg/Kg	199U mg/Kg
C077S439	Sodium	89.9 mg/Kg	89.9U mg/Kg
C077S441	Sodium	146 mg/Kg	146U mg/Kg
C077S433	Sodium	274 mg/Kg	274U mg/Kg
C077S434**	Sodium	138 mg/Kg	138U mg/Kg
C077S435**	Sodium	267 mg/Kg	267U mg/Kg
C077S431	Sodium	168 mg/Kg	168U mg/Kg

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
C077G151 C077G152 C077G154 C077G148 C077G147** C077R004 C077G109A C077G105A	All ICP metals	No MS associated with these samples.	MS required.	None	P
C077S436 C077S437	All ICP metals	No MS associated with these samples.	MS required.	None	P
C077S437	Mercury	No MS associated with these samples.	MS required.	None	P

Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S445MS/MSD	Antimony	34.4 (80-120)	30.2 (80-120)	-	J (all detects)	A
(C077S438	Barium	-	74.8 (80-120)	-	UJ (all non-detects)	
C077S445	Chromium	-	73.8 (80-120)	-		
C077S446	Lead	-	69.0 (80-120)	-		
C077S447	Manganese	-	57.4 (80-120)	-		
C077S448	Potassium	-	72.1 (80-120)	-		
C077S449	Silver	50.9 (80-120)	42.9 (80-120)	-		
C077S450**						
C077S439						
C077S441						
C077S433						
C077S434**						
C077S435**						
C077S430**						
C077S431						
C077S432)						

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
C077G151 C077G152 C077G154 C077G148 C077G147** C077R004 C077G109A C077G105A	All ICP metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P
C077S436 C077S437	All ICP metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P
C077S437	Mercury	No DUP analysis associated with these samples.	DUP analysis required.	None	P

Results were within QC limits.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Internal Standards

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
C077S445L	Lead	10.7 (≤10)	C077S436 C077S445 C077S446 C077S447 C077S448 C077S449 C077S450** C077S439 C077S441 C077S433 C077S434** C077S435** C077S430** C077S431 C077S432	J (all detects)	P

XI. Sample Result Verification

All sample result verifications were acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been qualified.

XIII. Field Duplicates

Samples C077G151 and C077G152 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Analyte	Concentration		RPD
	C077G151	C077G152	
Barium	44.0 ug/L	43.4 ug/L	1

Analyte	Concentration		RPD
	C077G151	C077G152	
Beryllium	0.28 ug/L	2U ug/L	200
Calcium	20300 ug/L	21100 ug/L	4
Chromium	3.1 ug/L	3.2 ug/L	3
Cobalt	0.76 ug/L	5U ug/L	200
Iron	73.7 ug/L	64.0 ug/L	14
Magnesium	17500 ug/L	18300 ug/L	4
Manganese	84.9 ug/L	89.0 ug/L	5
Mercury	2.040 ng/L	2.080 ng/L	2
Potassium	19800 ug/L	19800 ug/L	0
Selenium	4.0 ug/L	5U ug/L	200
Sodium	476000 ug/L	406000 ug/L	16
Vanadium	4.3 ug/L	4.6 ug/L	7

NAS Alameda Point, CTO 077
Metals - Data Qualification Summary - SDG 49235/49236/05BR1817

SDG	Sample	Analyte	Flag	A or P	Reason
49235/49236/ 05BR1817	C077G151 C077G152 C077G154 C077G148 C077G147** C077R004 C077G109	Mercury	J (all detects) UJ (all non-detects)	A	Sample condition
49235/49236/ 05BR1817	C077G151 C077G152 C077G154 C077G148 C077G147** C077R004 C077G109A C077G105A C077S436 C077S437	Aluminum Antimony Arsenic Barium Beryllium Cadmium Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Potassium Selenium Silver Sodium Thallium Vanadium Zinc	None None None None None None None None None None None None None None None None None None None None None None	P	Matrix spike analysis
49235/49236/ 05BR1817	C077S437	Mercury	None	P	Matrix spike analysis
49235/49236/ 05BR1817	C077S438 C077S445 C077S446 C077S447 C077S448 C077S449 C077S450** C077S439 C077S441 C077S433 C077S434** C077S435** C077S430** C077S431 C077S432)	Antimony Barium Chromium Lead Manganese Potassium Silver	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)

SDG	Sample	Analyte	Flag	A or P	Reason
49235/49236/ 05BR1817	C077G151 C077G152 C077G154 C077G148 C077G147** C077R004 C077G109A C077G105A C077S436 C077S437	Aluminum Antimony Arsenic Barium Beryllium Cadmium Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Potassium Selenium Silver Sodium Thallium Vanadium Zinc	None None None None None None None None None None None None None None None None None None None None None None	P	Duplicate analysis
49235/49236/ 05BR1817	C077S437	Mercury	None	P	Duplicate analysis
49235/49236/ 05BR1817	C077S438 C077S445 C077S446 C077S447 C077S448 C077S449 C077S450** C077S439 C077S441 C077S433 C077S434** C077S435** C077S430** C077S431 C077S432	Lead	J (all detects)	P	ICP serial dilution (%D)

NAS Alameda Point, CTO 077
Metals - Laboratory Blank Data Qualification Summary - SDG 49235/49236/05BR1817

SDG	Sample	Analyte	Modified Final Concentration	A or P
49235/49236/ 05BR1817	C077G151	Cobalt	0.76U ug/L	A
49235/49236/ 05BR1817	C077R004	Cobalt Sodium	1.3U ug/L 579U ug/L	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49235/49236/ 05BR1817	C077G105A	Cobalt	0.63U ug/L	A
49235/49236/ 05BR1817	C077S437	Mercury	0.12U mg/Kg	A
49235/49236/ 05BR1817	C077S436	Mercury	0.06U mg/Kg	A
49235/49236/ 05BR1817	C077S438	Antimony	0.45U mg/Kg	A
49235/49236/ 05BR1817	C077S445	Mercury Silver	0.028U mg/Kg 0.13U mg/Kg	A
49235/49236/ 05BR1817	C077S446	Silver	0.07U mg/Kg	A
49235/49236/ 05BR1817	C077S447	Silver	0.13U mg/Kg	A
49235/49236/ 05BR1817	C077S448	Antimony Silver	0.59U mg/Kg 0.16U mg/Kg	A
49235/49236/ 05BR1817	C077S449	Silver	0.2U mg/Kg	A
49235/49236/ 05BR1817	C077S450**	Mercury Silver	0.075U mg/Kg 0.18U mg/Kg	A
49235/49236/ 05BR1817	C077S441	Silver	0.077U mg/Kg	A
49235/49236/ 05BR1817	C077S433	Mercury Silver	0.055U mg/Kg 0.18U mg/Kg	A
49235/49236/ 05BR1817	C077S434**	Mercury Silver	0.021U mg/Kg 0.14U mg/Kg	A
49235/49236/ 05BR1817	C077S435**	Mercury Silver	0.03U mg/Kg 0.2U mg/Kg	A
49235/49236/ 05BR1817	C077S430**	Antimony Mercury Silver	0.24U mg/Kg 0.062U mg/Kg 0.088U mg/Kg	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49235/49236/ 05BR1817	C077S431	Mercury Silver	0.025U mg/Kg 0.15U mg/Kg	A
49235/49236/ 05BR1817	C077S432	Silver	0.27U mg/Kg	A

NAS Alameda Point, CTO 077
Metals - Field Blank Data Qualification Summary - SDG 49235/49236/05BR1817

SDG	Sample	Analyte	Modified Final Concentration	A or P
49235/49236/ 05BR1817	C077G151	Cobalt	0.76U ug/L	A
49235/49236/ 05BR1817	C077G105A	Cobalt	0.63U ug/L	A
49235/49236/ 05BR1817	C077S436	Sodium	65.1U mg/Kg	A
49235/49236/ 05BR1817	C077S437	Sodium	139U mg/Kg	A
49235/49236/ 05BR1817	C077S445	Sodium	101U mg/Kg	A
49235/49236/ 05BR1817	C077S446	Sodium	77.4U mg/Kg	A
49235/49236/ 05BR1817	C077S447	Sodium	120U mg/Kg	A
49235/49236/ 05BR1817	C077S448	Sodium	283U mg/Kg	A
49235/49236/ 05BR1817	C077S449	Sodium	274U mg/Kg	A
49235/49236/ 05BR1817	C077S450**	Sodium	199U mg/Kg	A
49235/49236/ 05BR1817	C077S439	Sodium	89.9U mg/Kg	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49235/49236/ 05BR1817	C077S441	Sodium	146U mg/Kg	A
49235/49236/ 05BR1817	C077S433	Sodium	274U mg/Kg	A
49235/49236/ 05BR1817	C077S434**	Sodium	138U mg/Kg	A
49235/49236/ 05BR1817	C077S435**	Sodium	267U mg/Kg	A
49235/49236/ 05BR1817	C077S431	Sodium	168U mg/Kg	A

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14428

TPH as Gasoline

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 3, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Gasoline

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49232/49233

Sample Identification

C077G145	C077S502
C077G191	C077S503
C077G143	C077S521
C077G192	C077S522
C077G185	C077S523
C077G187	C077S504MS
C077G183	C077S504MSD
C077G181	
C077G182	
C077R005	
C077S507	
C077S508	
C077S509	
C077S510	
C077S511	
C077S512	
C077S504	
C077S505	
C077S506	
C077S501	

Introduction

This data review covers 17 soil samples and 10 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Gasoline.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as gasoline contaminants were found in the method blanks.

Sample C077R005 was identified as a rinsate. No total petroleum hydrocarbons as gasoline contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077G145 C077G191 C077G143 C077G192 C077G185 C077G187 C077G183 C077G181 C077G182 C077R005 C077S507 C077S508 C077S509 C077S510 C077S511 C077S512	TPH as gasoline	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

Raw data were not reviewed for this SDG.

VI. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

VII. System Performance

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

Samples C077G191 and C077G192 and samples C077G181 and C077G182 were identified as field duplicates. No total petroleum hydrocarbons as gasoline were detected in any of the samples.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Data Qualification Summary - SDG 49232/49233

SDG	Sample	Compound	Flag	A or P	Reason
49232/ 49233	C077G145 C077G191 C077G143 C077G192 C077G185 C077G187 C077G183 C077G181 C077G182 C077R005 C077S507 C077S508 C077S509 C077S510 C077S511 C077S512	TPH as gasoline	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Laboratory Blank Data Qualification Summary - SDG 49232/49233

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Field Blank Data Qualification Summary - SDG 49232/49233

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 2, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Gasoline

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49235/49236

Sample Identification

C077G148
C077G149
C077G147**
C077R004
C077S436
C077S437
C077S438
C077S439
C077S440
C077S441
C077S433
C077S434**
C077S435**
C077S430**
C077S431
C077S432

**Indicates sample underwent Level IV review

Introduction

This data review covers 12 soil samples and 4 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Gasoline.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent Level IV review. Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as gasoline contaminants were found in the method blanks.

Sample C077R004 was identified as a rinsate. No total petroleum hydrocarbons as gasoline contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077G148 C077G149 C077G147** C077R004 C077S436 C077S437 C077S439 C077S440 C077S441 C077S433 C077S434** C077S435** C077S430** C077S431 C077S432	TPH as gasoline	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

Samples C077G148 and C077G149 were identified as field duplicates. No total petroleum hydrocarbons as gasoline were detected in any of the samples with the following exceptions:

Compound	Concentration (mg/L)		RPD
	C077G148	C077G149	
TPH as gasoline	0.0097	0.1U	200

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Data Qualification Summary - SDG 49235/49236

SDG	Sample	Compound	Flag	A or P	Reason
49235/ 49236	C077G148 C077G149 C077G147** C077R004 C077S436 C077S437 C077S439 C077S440 C077S441 C077S433 C077S434** C077S435** C077S430** C077S431 C077S432	TPH as gasoline	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Laboratory Blank Data Qualification Summary - SDG 49235/49236

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Field Blank Data Qualification Summary - SDG 49235/49236

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14428

TPH as Extractables

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 3, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49232/49233

Sample Identification

C077G145	C077S521
C077G191	C077S522
C077G143	C077S523
C077G185	
C077G187	
C077G183	
C077G181	
C077R005	
C077G184	
C077S507	
C077S508	
C077S509	
C077S511	
C077S512	
C077S504	
C077S505	
C077S506	
C077S501	
C077S502	
C077S503	

Introduction

This data review covers 14 soil samples and 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Extractables.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

The percent relative standard deviations (%RSD) of calibration factors for selected compounds were less than or equal to 20.0% .

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample C077R005 was identified as a rinsate. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49232/49233	TPH as extractables	No MS/MSD associated with these samples.	MS/MSD required.	None	P

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

Raw data were not reviewed for this SDG.

VI. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

VII. System Performance

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. *Field Duplicates*

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 49232/49233

SDG	Sample	Compound	Flag	A or P	Reason
49232/ 49233	C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077R005 C077G184 C077S507 C077S508 C077S509 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523	TPH as extractables	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 49232/49233

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 49232/49233

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 3, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49232/49233

Sample Identification

C077G145	C077S521
C077G191	C077S522
C077G143	C077S523
C077G185	
C077G187	
C077G183	
C077G181	
C077R005	
C077G184	
C077S507	
C077S508	
C077S509	
C077S511	
C077S512	
C077S504	
C077S505	
C077S506	
C077S501	
C077S502	
C077S503	

Introduction

This data review covers 14 soil samples and 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Extractables.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A *Indicates the finding is based upon technical validation criteria.*

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

The percent relative standard deviations (%RSD) of calibration factors for selected compounds were less than or equal to 20.0% .

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample C077R005 was identified as a rinsate. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49232/49233	TPH as extractables	No MS/MSD associated with these samples.	MS/MSD required.	None	P

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

Raw data were not reviewed for this SDG.

VI. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

VII. System Performance

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 49232/49233

SDG	Sample	Compound	Flag	A or P	Reason
49232/ 49233	C077G145 C077G191 C077G143 C077G185 C077G187 C077G183 C077G181 C077R005 C077G184 C077S507 C077S508 C077S509 C077S511 C077S512 C077S504 C077S505 C077S506 C077S501 C077S502 C077S503 C077S521 C077S522 C077S523	TPH as extractables	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 49232/49233

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 49232/49233

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: *December 2, 2005*

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49235/49236

Sample Identification

C077G148
C077G149
C077G147**
C077R004
C077S436
C077S437
C077S438
C077S439
C077S441
C077S433
C077S434**
C077S435**
C077S430**
C077S431
C077S432
C077S433MS
C077S433MSD

**Indicates sample underwent Level IV review

Introduction

This data review covers 13 soil samples and 4 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Extractables.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent Level IV review. Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

The percent relative standard deviations (%RSD) of calibration factors for selected compounds were less than or equal to 20.0% .

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample C077R004 was identified as a rinsate. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for sample C077S438. Since the sample was diluted out, no data were qualified.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49235/49236	TPH as extractables	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

Samples C077G148 and C077G149 were identified as field duplicates. No total petroleum hydrocarbons as extractable were detected in any of the samples.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 49235/49236

SDG	Sample	Compound	Flag	A or P	Reason
49235/ 49236	C077G148 C077G149 C077G147** C077R004	TPH as extractables	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 49235/49236

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 49235/49236

No Sample Data Qualified in this SDG

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Bechtel Environmental
1230 Columbia Street, Suite 400
San Diego, CA 92101
Attn: Ms. Toni Kuzmack

December 27, 2005

Project Name : NAS Alameda Point
Project # : CTO 077

On December 21, 2005 the following data packages were received by Laboratory Data Consultants, Inc. from Bechtel Environmental. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 14434:

SDG #	Fraction
49247/49249	Volatiles, Semivolatiles, Polynuclear Aromatic Hydrocarbons, Chlorinated Pesticides & PCBs, Metals, TPH as Gasoline, TPH as Extractables

The above SDGs were reviewed using Level III and Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- NFESC Special Publication SP-2056-ENV, Navy Installation Restoration Chemical Data Quality Manual, Naval Facilities Engineering Command, September 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998

The data validators did utilize their professional judgement when evaluating the data to achieve the most complete and accurate assessment of the data. The data packages were reviewed according to the above stated validation procedures.

For GC/MS volatile analyses, the primary findings consisted of:

a) Surrogate percent recoveries exceeded acceptance criteria for sample C077S530 in SDG 49247/49249.

b) Matrix spike analyses were not performed for all batches in SDG 49247/49249.

c) Laboratory control sample percent recoveries exceeded acceptance criteria hexachlorobutadiene, naphthalene and methylene chloride in SDG 49247/49249.

d) Internal standard areas exceeded acceptance criteria for samples C077S524 and C077S530 in SDG 49247/49249.

e) Several volatile compounds were detected in the method and field blanks in SDG 49247/49249. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For GC/MS semivolatile analyses, the primary finding consisted of:

a) Matrix spike/matrix spike duplicate percent recoveries and relative percent differences exceeded acceptance criteria for several compounds in SDG 49247/49249. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For GC/MS PAH analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49247/49249.

b) Laboratory control sample percent recoveries exceeded acceptance criteria for benzo(g,h,i)perylene, dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene in SDG 49247/49249.

c) Matrix spike/matrix spike duplicate percent recoveries exceeded acceptance criteria for several compounds in SDG 49247/49249. Since the laboratory met the protocol requirement, this finding should be considered advisory.

d) Benzo(b)fluoranthene and benzo(k)fluoranthene coeluted for several samples in SDG 49247/49249. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For chlorinated pesticide and PCB analyses, the primary findings consisted of:

a) Continuing calibration factors exceeded acceptance criteria in SDG 49247/49249. Since the laboratory met the protocol requirement, this finding should be considered advisory.

b) Matrix spike analyses were not performed for all batches in SDG 49247/49249.

For metal analyses, the primary findings consisted of:

a) Matrix spike analyses were not performed for all batches in SDG 49247/49249.

b) Duplicate analyses were not performed for all batches in SDG 49247/49249.

c) Laboratory control sample percent recoveries and relative percent differences exceeded acceptance criteria for manganese in SDG 49247/49249.

d) ICP serial dilution percent differences exceeded acceptance criteria for lead in SDG 49247/49249. Since the laboratory met the protocol requirement, this finding should be considered advisory.

e) Several metals were detected in the method and field blanks in SDG 49247/49249. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For TPH as gasoline analyses, the primary finding consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49247/49249.

For TPH as extractable analyses, the primary findings consisted of:

a) Matrix spike analyses were not performed for all batches in SDG 49247/49249.

b) Surrogate percent recoveries exceeded acceptance criteria for sample C077S381 in SDG 49247/49249.

c) TPH as motor oil exceeded the calibration range for sample C077S381 in SDG 49247/49249. Since the laboratory met the protocol requirement, this finding should be considered advisory.

d) Data was qualified as unusable in dilutions by the validators in order to yield only one complete set of data for a given sample and eliminate redundant data.

In general, the data for all analyses appear usable with the limitations noted in the Data Validation Reports. Data validation flags were noted on the Laboratory Form 1s and included with each validation report.

Sincerely,

Richard M. Amano
President/Principal Chemist

Attachment 1

1 Week TAT

LDC #14434 (Bechtel Environmental-San Diego / Alameda Point, CTO 077)

LDC	SDG#	DATE REC'D	(2) DATE DUE	VOA (8260B)		SVOA (8270C)		PAHs (8270C -SIM)		Pest. /PCBs (SW846)		Metals (SW846)		Diss. Metals (SW846)		TPH-G (8015)		TPH-E (8015)																			
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	49247/49249	12/21/05	12/28/05	5	10	6	12	6	10	6	18	0	18	5	0	4	14	4	11																
A	49247/49249	12/21/05	12/28/05	1	2	1	2	1	2	1	2	0	2	1	0	1	2	1	2																
Total	B/LR			6	12	7	14	7	12	7	20	0	20	6	0	5	16	5	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150

Shaded cells indicate Level IV validation (all other cells are Level III validation)

14434ST.wpd

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14434

Volatiles

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 5, 2005

LDC Report Date: December 22, 2005

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49247/49249

Sample Identification

C077S524
C077S525**
C077S526
C077S530**
C077S531
C077S532
C077S527
C077S528
C077S529
C077S379
C077S380
C077S381
C077G193
C077G111**
C077G196
C077G195
C077R006
C077T08

**Indicates sample underwent Level IV review

Introduction

This data review covers 12 soil samples and 6 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all volatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051214A-BLK	12/14/05	1,2,3-Trichlorobenzene Hexachlorobutadiene Naphthalene	0.64 ug/L 0.48 ug/L 0.45 ug/L	C077G193 C077G111** C077G196 C077G195 C077T08
051215A-BLK	12/15/05	1,2,3-Trichlorobenzene cis-1,2-Dichloroethene Methylene chloride Naphthalene	0.0005 mg/Kg 0.00025 mg/Kg 0.008 mg/Kg 0.00056 mg/Kg	C077S528 C077S380 C077S381
051213A2-BLK	12/13/05	cis-1,2-Dichloroethene	0.00026 mg/Kg	C077S524 C077S525** C077S526
051213B-BLK	12/14/05	cis-1,2-Dichloroethene	0.00027 mg/Kg	C077S530** C077S379

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077S528	cis-1,2-Dichloroethene Methylene chloride	0.00058 mg/Kg 0.019 mg/Kg	0.005U mg/Kg 0.05U mg/Kg
C077S380	cis-1,2-Dichloroethene	0.00042 mg/Kg	0.006U mg/Kg
C077S525**	cis-1,2-Dichloroethene	0.0003 mg/Kg	0.005U mg/Kg
C077S526	cis-1,2-Dichloroethene	0.00032 mg/Kg	0.006U mg/Kg
C077S379	cis-1,2-Dichloroethene	0.00039 mg/Kg	0.005U mg/Kg

Sample C077T08 was identified as a trip blank. No volatile contaminants were found in this blank with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
C077TB08	12/5/05	Acetone Methylene chloride	4.0 ug/L 4.2 ug/L	C077S524 C077S525** C077S526 C077S530** C077S531 C077S532 C077S527 C077S528 C077S529 C077S379 C077S380 C077S381 C077G193 C077G111** C077G196 C077G195 C077R006

Sample C077R006 was identified as a rinsate. No volatile contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Compound	Concentration	Associated Samples
C077R006	12/5/05	Bromodichloromethane Chloroform Dibromochloromethane	1.9 ug/L 2.7 ug/L 1.2 ug/L	C077S524 C077S525** C077S526 C077S530** C077S531 C077S532 C077S527 C077S528 C077S529 C077S379 C077S380 C077S381 C077G193 C077G111** C077G196 C077G195

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
C077G193	Acetone	1.7 ug/L	2U ug/L
C077S524	Methylene chloride Chloroform	0.02 mg/Kg 0.0052 mg/Kg	0.05U mg/Kg 0.0052U mg/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
C077S530**	Acetone	0.014 mg/Kg	0.01U mg/Kg
C077S527	Acetone Methylene chloride Chloroform	0.011 mg/Kg 0.013 mg/Kg 0.0016 mg/Kg	0.01U mg/Kg 0.05U mg/Kg 0.005U mg/Kg
C077S528	Acetone Methylene chloride	0.0094 mg/Kg 0.019 mg/Kg	0.1U mg/Kg 0.05U mg/Kg
C077S529	Acetone Methylene chloride	0.0061 mg/Kg 0.0089 mg/Kg	0.1U mg/Kg 0.06U mg/Kg
C077S380	Acetone	0.0036 mg/Kg	0.1U mg/Kg
C077S381	Acetone	0.016 mg/Kg	0.1U mg/Kg

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S530**	Bromofluorobenzene Toluene-d8	80.5 (85-120) 116 (85-115)	All TCL compounds	J (all detects) UJ (all non-detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49247/49249	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051214A-LCS	Hexachlorobutadiene Naphthalene	145 (50-140) 212 (55-140)	C077G193 C077G111** C077G196 C077G195 C077T08 051214A-BLK	J (all detects) J (all detects)	P
051213A2-LCS	Methylene chloride	149 (55-140)	C077S524 C077S525** C077S526 051213A-BLK	J (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits with the following exceptions:

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S524	1,4-Dichlorobenzene-d4	28240 (37892-151568)	Bromoform 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S530**	1,4-Dichlorobenzene-d4	16672 (37892-151568)	Bromoform 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Volatiles - Data Qualification Summary - SDG 49247/49249

SDG	Sample	Compound	Flag	A or P	Reason
49247/ 49249	C077S530**	All TCL compounds	J (all detects) UJ (all non-detects)	P	Surrogate recovery (%R)
49247/ 49249	C077S524 C077S525** C077S526 C077S530** C077S531 C077S532 C077S527 C077S528 C077S529 C077S379 C077S380 C077S381 C077G193 C077G111** C077G196 C077G195 C077R006 C077T08	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49247/ 49249	C077G193 C077G111** C077G196 C077G195 C077T08	Hexachlorobutadiene Naphthalene	J (all detects) J (all detects)	P	Laboratory control samples (%R)
49247/ 49249	C077S524 C077S525** C077S526	Methylene chloride	J (all detects)	P	Laboratory control samples (%R)
49247/ 49249	C077S524 C077S530**	Bromoform 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P	Internal standards (area)

NAS Alameda Point, CTO 077
Volatiles - Laboratory Blank Data Qualification Summary - SDG 49247/49249

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49247/49249	C077S528	cis-1,2-Dichloroethene Methylene chloride	0.005U mg/Kg 0.05U mg/Kg	A
49247/49249	C077S380	cis-1,2-Dichloroethene	0.006U mg/Kg	A
49247/49249	C077S525**	cis-1,2-Dichloroethene	0.005U mg/Kg	A
49247/49249	C077S526	cis-1,2-Dichloroethene	0.006U mg/Kg	A
49247/49249	C077S379	cis-1,2-Dichloroethene	0.005U mg/Kg	A

NAS Alameda Point, CTO 077
Volatiles - Field Blank Data Qualification Summary - SDG 49247/49249

SDG	Sample	Compound	Modified Final Concentration	A or P
49247/49249	C077G193	Acetone	2U ug/L	A
49247/49249	C077S524	Methylene chloride Chloroform	0.05U mg/Kg 0.0052U mg/Kg	A
49247/49249	C077S530**	Acetone	0.01U mg/Kg	A
49247/49249	C077S527	Acetone Methylene chloride Chloroform	0.01U mg/Kg 0.05U mg/Kg 0.005U mg/Kg	A
49247/49249	C077S528	Acetone Methylene chloride	0.1U mg/Kg 0.05U mg/Kg	A
49247/49249	C077S529	Acetone Methylene chloride	0.1U mg/Kg 0.06U mg/Kg	A
49247/49249	C077S380	Acetone	0.1U mg/Kg	A
49247/49249	C077S381	Acetone	0.1U mg/Kg	A

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14434

Semivolatiles

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 5, 2005

LDC Report Date: December 22, 2005

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49247/49249

Sample Identification

C077S524
C077S525**
C077S526
C077S530**
C077S531
C077S532
C077S527
C077S528
C077S529
C077S379
C077S380
C077S381
C077G193
C077G111**
C077G196
C077R006
C077G194
C077S532MS
C077S532MSD
C077G193MS
C077G193MSD

**Indicates sample underwent Level IV review

Introduction

This data review covers 14 soil samples and 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are *no current guidelines for the method* stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ *Indicates the compound or analyte was analyzed for but not detected. The sample* detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No semivolatile contaminants were found in the method blanks.

Sample C077R006 was identified as a rinsate. No semivolatile contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077G193MS/MSD (All water samples in SDG 49247/49249)	2,4-Dinitrophenol 4,6-Dinitro-2-methylphenol 2-Methylnaphthalene Hexachloroethane	8.5 (15-140) 11.3 (40-130) - 27.8 (30-95)	7.0 (15-140) 9.6 (40-130) 43.8 (45-105) 25.8 (30-95)	- - - -	J (all detects) UJ (all non-detects)	A
C077S532MS/MSD (All soil samples in SDG 49247/49249)	2,4-Dinitrophenol 4,6-Dinitro-2-methylphenol Pyridine	12.5 (15-130) 17.2 (30-135) 12.6 (15-115)	8.3 (15-130) 13.0 (30-135) -	40.5 (≤30) - 67.1 (≤30)	J (all detects) UJ (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Semivolatiles - Data Qualification Summary - SDG 49247/49249

SDG	Sample	Compound	Flag	A or P	Reason
49247/ 49249	*C077G193* C077G111** C077G196 C077R006 C077G194	*2,4-Dinitrophenol* 4,6-Dinitro-2-methylphenol 2-Methylnaphthalene Hexachloroethane	*J (all detects)* UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49247/ 49249	C077S524 C077S525** C077S526 C077S530** C077S531 C077S532 C077S527 C077S528 C077S529 C077S379 C077S380 C077S381	2,4-Dinitrophenol Pyridine	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)(RPD)
49247/ 49249	C077S524 C077S525** C077S526 C077S530** C077S531 C077S532 C077S527 C077S528 C077S529 C077S379 C077S380 C077S381	4,6-Dinitro-2-methylphenol	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)

NAS Alameda Point, CTO 077
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 49247/49249

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Semivolatiles - Field Blank Data Qualification Summary - SDG 49247/49249

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14434

Polynuclear Aromatic Hydrocarbons

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 5, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49247/49249

Sample Identification

C077S524
C077S525**
C077S526
C077S530**
C077S531
C077S532
C077S527
C077S528
C077S529
C077S379
C077S380
C077S381
C077G193
C077G111**
C077G196
C077R006
C077G194
C077G196MS
C077G196MSD

**Indicates sample underwent Level IV review

Introduction

This data review covers 12 soil samples and 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C using Selected Ion Monitoring (SIM) for Polynuclear Aromatic Hydrocarbons.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are *no current guidelines for the method stated above.*

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds.

Average relative response factors (RRF) for all target compounds and system monitoring compounds

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0% .

All of the continuing calibration RRF values were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polynuclear aromatic hydrocarbon contaminants were found in the method blanks.

Sample C077R006 was identified as a rinsate. No polynuclear aromatic hydrocarbon contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All soil samples in SDG 49247/49249	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077G196MS/MSD (All water samples in SDG 49247/49249)	Benzo(b)fluoranthene	-	45.0 (47-168)	-	J (all detects) UJ (all non-detects)	A
	Benzo(g,h,i)perylene	-	42.5 (46-110)	-		
	Dibenz(a,h)anthracene	-	44.5 (48-109)	-		
	Indeno(1,2,3-cd)pyrene	40.8 (44-112)	38.8 (44-112)	-		

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051208B-LCS	Benzo(g,h,i)perylene	49.9 (51-107)	All soil samples in SDG 49247/49249	J (all detects) UJ (all non-detects)	P
	Dibenz(a,h)anthracene	52.4 (53-105)			
	Indeno(1,2,3-cd)pyrene	42.7 (47-109)			

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Flag	A or P
C077S524 C077S530** C077S379 C077S380 C077S381	*Benzo(b)fluoranthene* Benzo(k)fluoranthene	Due to lack of resolution between these compounds in the samples, the laboratory performed the quantitation using the total peak area.	J (all detects) J (all detects)	A

Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 49247/49249

SDG	Sample	Compound	Flag	A or P	Reason
49247/ 49249	C077S524 C077S525** C077S526 C077S530** C077S531 C077S532 C077S527 C077S528 C077S529 C077S379 C077S380 C077S381	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49247/ 49249	C077G193 C077G111** C077G196 C077R006 C077G194	Benzo(b)fluoranthene Benzo(g,h,i)perylene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49247/ 49249	C077S524 C077S525** C077S526 C077S530** C077S531 C077S532 C077S527 C077S528 C077S529 C077S379 C077S380 C077S381	Benzo(g,h,i)perylene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)
49247/ 49249	C077S524 C077S530** C077S379 C077S380 C077S381	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) J (all detects)	A	Compound quantitation and CRQLs

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 49247/49249

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary - SDG 49247/49249

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14434

Chlorinated Pesticides & PCBs

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 5, 2005

LDC Report Date: December 23, 2005

Matrix: Soil/Water

Parameters: Chlorinated Pesticides & PCBs

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49247/49249

Sample Identification

C077S524	C077G196
C077S525**	C077R006
C077S526	C077G194
C077S530**	C077G120
C077S531	C077S529MS
C077S532	C077S529MSD
C077S527	C077G195
C077S528	
C077S529	
C077S394	
C077S395	
C077S396	
C077S397	
C077S398	
C077S399	
C077S379	
C077S380	
C077S381	
C077G193	
C077G111**	

**Indicates sample underwent Level IV review.

Introduction

This data review covers 20 soil samples and 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 8081A and 8082 for Chlorinated Pesticides and PCBs.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical or advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

Retention time windows were evaluated and considered technically acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
12/15/05	1215003	DB-35MS	alpha-BHC Endrin 4,4'-DDT Endosulfan sulfate	17 21 20 18	C077G195	J (all detects) UJ (all non-detects)	A
12/15/05	1215003	DB-XLB	4,4'-DDD	16	C077G195	J (all detects) UJ (all non-detects)	A
12/13/05	1212091	DB-XLB	Endrin	23	C077S525** C077S526 051208B-BLKS	J (all detects) UJ (all non-detects)	A

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
12/13/05	1212107	DB-35MS	alpha-BHC	24	C077S530**	J (all detects)	A
			gamma-BHC	20	C077S531	UJ (all non-detects)	
			Heptachlor	19	C077S532		
			Aldrin	18	C077S527		
			4,4'-DDE	22	C077S528		
			Endrin	25	C077S529		
			4,4'-DDD	25			
			4,4'-DDT	18			
			Endosulfan sulfate	21			
12/13/05	1212107	DB-XLB	alpha-BHC	25	C077S530**	J (all detects)	P
			gamma-BHC	22	C077S531	UJ (all non-detects)	
			Heptachlor	16	C077S532		
			Aldrin	18	C077S527		
			gamma-Chlordane	16	C077S528		
			Endosulfan I	21	C077S529		
			4,4'-DDE	24			
			Dieldrin	21			
			Endrin	30			
			Endosulfan II	22			
			4,4'-DDD	22			
			4,4'-DDT	21			
			Endosulfan sulfate	25			

Retention times (RT) of all compounds in the calibration standards were within QC limits for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide or PCB contaminants were found in the method blanks.

Sample C077R006 was identified as a rinsate. No chlorinated pesticide or PCB contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for several samples. Since the samples were diluted out, no data were qualified.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49247/49249	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and Reported CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which an Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples C077G194 and C077G195 were identified as field duplicates. No chlorinated pesticides or PCBs were detected in any of the samples.

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Data Qualification Summary - SDG 49247/49249

SDG	Sample	Compound	Flag	A or P	Reason
49247/ 49249	C077G195	alpha-BHC Endrin 4,4'-DDT Endosulfan sulfate 4,4'-DDD	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49247/ 49249	C077S525** C077S526	Endrin	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49247/ 49249	C077S530** C077S531 C077S532 C077S527 C077S528 C077S529	alpha-BHC gamma-BHC Heptachlor Aldrin 4,4'-DDE Endrin 4,4'-DDD 4,4'-DDT Endosulfan sulfate	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49247/ 49249	C077S530** C077S531 C077S532 C077S527 C077S528 C077S529	alpha-BHC gamma-BHC Heptachlor Aldrin gamma-Chlordane Endosulfan I 4,4'-DDE Dieldrin Endrin Endosulfan II 4,4'-DDD 4,4'-DDT Endosulfan sulfate	J (all detects) UJ (all non-detects)	P	Continuing calibration (%D)
49247/ 49249	C077G193 C077G111** C077G196 C077R006 C077G194 C077G120 C077G195	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Laboratory Blank Data Qualification Summary - SDG 49247/49249

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Field Blank Data Qualification Summary - SDG 49247/49249

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14434

Metals

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 5, 2005

LDC Report Date: December 22, 2005

Matrix: Soil/Water

Parameters: Metals

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49247/49249

Sample Identification

C077S524	C077G196
C077S525**	C077R006
C077S526	C077G194
C077S530**	C077G120
C077S531	C077S380MS
C077S532	C077S380DUP
C077S527	
C077S528	
C077S529	
C077S394	
C077S395	
C077S396	
C077S397	
C077S398	
C077S399	
C077S379	
C077S380	
C077S381	
C077G193	
C077G111**	

**Indicates sample underwent Level IV review

Introduction

This data review covers 20 soil samples and 6 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 6010B and 7000 for Metals. The metals analyzed were Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Antimony Cobalt Lead Mercury	4.744 ug/L 4.085 ug/L 2.197 ug/L 0.108 ug/L	All water samples in SDG 49247/49249
ICB/CCB	Potassium	138.4 ug/L	C077G193 C077G196 C077R006 C077G194 C077G120
ICB/CCB	Sodium	824.8 ug/L	C077R006
PB (prep blank)	Calcium Chromium Sodium	1.71 mg/Kg 0.093 mg/Kg 12.85 mg/Kg	All soil samples in SDG 49247/49249
ICB/CCB	Aluminum Antimony Arsenic Chromium Lead Nickel Silver	41.28 ug/L 4.532 ug/L 2.196 ug/L 0.57 ug/L 1.623 ug/L 0.952 ug/L 0.642 ug/L	C077S524

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Antimony Arsenic Chromium Cobalt Lead Silver	4.462 ug/L 2.837 ug/L 0.449 ug/L 1.753 ug/L 2.929 ug/L 0.443 ug/L	C077S525** C077S526 C077S530** C077S531 C077S532 C077S527 C077S528 C077S529 C077S394 C077S395 C077S396 C077S397 C077S398 C077S399 C077S379 C077S380 C077S381

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077R006	Cobalt Mercury Potassium Sodium	2.3 ug/L 0.14 ug/L 199 ug/L 1170 ug/L	2.3U ug/L 0.14U ug/L 199U ug/L 1170U ug/L
C077G193	Mercury	0.44 ug/L	0.44U ug/L
C077G111**	Mercury	0.066 ug/L	0.066U ug/L
C077G196	Mercury	0.068 ug/L	0.068U ug/L
C077G194	Mercury	0.43 ug/L	0.43U ug/L
C077G120	Mercury	0.062 ug/L	0.062U ug/L
C077S524	Silver	0.12 mg/Kg	0.12U mg/Kg
C077S525**	Antimony	0.23 mg/Kg	0.23U mg/Kg
C077S530**	Silver	0.072 mg/Kg	0.072U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S531	Arsenic Lead Sodium	1.1 mg/Kg 1.1 mg/Kg 51.2 mg/Kg	1.1U mg/Kg 1.1U mg/Kg 51.2U mg/Kg
C077S527	Silver	0.06 mg/Kg	0.06U mg/Kg
C077S528	Antimony	0.33 mg/Kg	0.33U mg/Kg
C077S395	Silver	0.1 mg/Kg	0.1U mg/Kg
C077S397	Antimony Silver	0.91 mg/Kg 0.042 mg/Kg	0.91U mg/Kg 0.042U mg/Kg
C077S379	Silver	0.097 mg/Kg	0.097U mg/Kg
C077S380	Silver	0.16 mg/Kg	0.16U mg/Kg

Sample C077R006 was identified as a rinsate. No metal contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
C077R006	12/5/05	Beryllium Calcium Cobalt Iron Magnesium Manganese Mercury Potassium Sodium	0.27 ug/L 38.8 ug/L 2.3 ug/L 35.7 ug/L 50.7 ug/L 2.8 ug/L 0.14 ug/L 199 ug/L 1170 ug/L	C077S524 C077S525** C077S526 C077S530** C077S531 C077S532 C077S527 C077S528 C077S529 C077S394 C077S395 C077S396 C077S397 C077S398 C077S399 C077S379 C077S380 C077S381 C077G193 C077G111** C077G196 C077G196 C077G194 C077G120

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G193	Beryllium Mercury	0.28 ug/L 0.44 ug/L	0.28U ug/L 0.44U ug/L
C077G111**	Mercury	0.066 ug/L	0.066U ug/L
C077G196	Beryllium Mercury	0.30 ug/L 0.068 ug/L	0.30U ug/L 0.068U ug/L
C077G194	Beryllium Mercury	0.28 ug/L 0.43 ug/L	0.28U ug/L 0.43U ug/L
C077G120	Mercury	0.062 ug/L	0.062U ug/L
C077S524	Beryllium Mercury Sodium	0.082 mg/Kg 0.039 mg/Kg 87.6 mg/Kg	0.082U mg/Kg 0.039U mg/Kg 87.6U mg/Kg
C077S525**	Beryllium Mercury Sodium	0.13 mg/Kg 0.024 mg/Kg 68.9 mg/Kg	0.13U mg/Kg 0.024U mg/Kg 68.9U mg/Kg
C077S526	Mercury Sodium	0.022 mg/Kg 217 mg/Kg	0.022U mg/Kg 217U mg/Kg
C077S530**	Sodium	71.6 mg/Kg	71.6U mg/Kg
C077S531	Beryllium Mercury Sodium	0.091 mg/Kg 0.025 mg/Kg 51.2 mg/Kg	0.091U mg/Kg 0.025U mg/Kg 51.2U mg/Kg
C077S532	Sodium	354 mg/Kg	354U mg/Kg
C077S527	Mercury Sodium	0.021 mg/Kg 120 mg/Kg	0.021U mg/Kg 120U mg/Kg
C077S528	Beryllium Sodium	0.13 mg/Kg 69.7 mg/Kg	0.13U mg/Kg 69.7U mg/Kg
C077S529	Mercury Sodium	0.028 mg/Kg 466 mg/Kg	0.028U mg/Kg 466U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S394	Mercury Sodium	0.02 mg/Kg 66.3 mg/Kg	0.02U mg/Kg 66.3U mg/Kg
C077S395	Sodium	76.4 mg/Kg	76.4U mg/Kg
C077S396	Mercury	0.07 mg/Kg	0.07U mg/Kg
C077S397	Mercury Sodium	0.11 mg/Kg 248 mg/Kg	0.11U mg/Kg 248U mg/Kg
C077S398	Beryllium Mercury Sodium	0.13 mg/Kg 0.029 mg/Kg 83.9 mg/Kg	0.13U mg/Kg 0.029U mg/Kg 83.9U mg/Kg
C077S379	Beryllium Mercury Sodium	0.13 mg/Kg 0.025 mg/Kg 120 mg/Kg	0.13U mg/Kg 0.025U mg/Kg 120U mg/Kg
C077S380	Beryllium Sodium	0.11 mg/Kg 65.2 mg/Kg	0.11U mg/Kg 65.2U mg/Kg

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All water samples in SDG 49247/49249	All TAL metals	No MS associated with these samples.	MS required.	None	P
All soil samples in SDG 49247/49249	All ICP metals	No MS associated with these samples.	MS required.	None	P

Percent recoveries (%R) were within QC limits.

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All water samples in SDG 49247/49249	All TAL metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P
All soil samples in SDG 49247/49249	All ICP metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P

Results were within QC limits.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
LCS/LCSD (All soil samples in SDG 49247/49249)	Manganese	-	149 (80-120)	28.5 (≤20)	J (all detects) UJ (all non-detects)	P

VIII. Internal Standards

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
C077S524L	Lead	17.3 (≤10)	All soil samples in SDG 49247/49249	J (all detects)	A

XI. Sample Result Verification

All sample result verifications were acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been qualified.

XIII. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Metals - Data Qualification Summary - SDG 49247/49249

SDG	Sample	Analyte	Flag	A or P	Reason
49247/ 49249	C077G193 C077G111** C077G196 C077R006 C077G194 C077G120	All TAL metals	None	P	Matrix spike analysis
49247/ 49249	C077S524 C077S525** C077S526 C077S530** C077S531 C077S532 C077S527 C077S528 C077S529 C077S394 C077S395 C077S396 C077S397 C077S398 C077S399 C077S379 C077S380 C077S381	Aluminum Antimony Arsenic Barium Beryllium Cadmium Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Potassium Selenium Silver Sodium Thallium Vanadium Zinc	None None None None None None None None None None None None None None None None None None None None None None	P	Matrix spike analysis
49247/ 49249	C077G193 C077G111** C077G196 C077R006 C077G194 C077G120	All TAL metals	None	P	Duplicate analysis

SDG	Sample	Analyte	Flag	A or P	Reason
49247/ 49249	C077S524 C077S525** C077S526 C077S530** C077S531 C077S532 C077S527 C077S528 C077S529 C077S394 C077S395 C077S396 C077S397 C077S398 C077S399 C077S379 C077S380 C077S381	Aluminum Antimony Arsenic Barium Beryllium Cadmium Calcium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Potassium Selenium Silver Sodium Thallium Vanadium Zinc	None None None None None None None None None None None None None None None None None None None None None None	P	Duplicate analysis
49247/ 49249	C077S524 C077S525** C077S526 C077S530** C077S531 C077S532 C077S527 C077S528 C077S529 C077S394 C077S395 C077S396 C077S397 C077S398 C077S399 C077S379 C077S380 C077S381	Manganese	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)(RPD)
49247/ 49249	C077S524 C077S525** C077S526 C077S530** C077S531 C077S532 C077S527 C077S528 C077S529 C077S394 C077S395 C077S396 C077S397 C077S398 C077S399 C077S379 C077S380 C077S381	Lead	J (all detects)	A	ICP serial dilution (%D)

NAS Alameda Point, CTO 077
Metals - Laboratory Blank Data Qualification Summary - SDG 49247/49249

SDG	Sample	Analyte	Modified Final Concentration	A or P
49247/49249	C077R006	Cobalt Mercury Potassium Sodium	2.3U ug/L 0.14U ug/L 199U ug/L 1170U ug/L	A
49247/49249	C077G193	Mercury	0.44U ug/L	A
49247/49249	C077G111**	Mercury	0.066U ug/L	A
49247/49249	C077G196	Mercury	0.068U ug/L	A
49247/49249	C077G194	Mercury	0.43U ug/L	A
49247/49249	C077G120	Mercury	0.062U ug/L	A
49247/49249	C077S524	Silver	0.12U mg/Kg	A
49247/49249	C077S525**	Antimony	0.23U mg/Kg	A
49247/49249	C077S530**	Silver	0.072U mg/Kg	A
49247/49249	C077S531	Arsenic Lead Sodium	1.1U mg/Kg 1.1U mg/Kg 51.2U mg/Kg	A
49247/49249	C077S527	Silver	0.06U mg/Kg	A
49247/49249	C077S528	Antimony	0.33U mg/Kg	A
49247/49249	C077S395	Silver	0.1U mg/Kg	A
49247/49249	C077S397	Antimony Silver	0.91U mg/Kg 0.042U mg/Kg	A
49247/49249	C077S379	Silver	0.097U mg/Kg	A
49247/49249	C077S380	Silver	0.16U mg/Kg	A

NAS Alameda Point, CTO 077
Metals - Field Blank Data Qualification Summary - SDG 49247/49249

SDG	Sample	Analyte	Modified Final Concentration	A or P
49247/49249	C077G193	Beryllium Mercury	0.28U ug/L 0.44U ug/L	A
49247/49249	C077G111**	Mercury	0.066U ug/L	A
49247/49249	C077G196	Beryllium Mercury	0.30U ug/L 0.068U ug/L	A
49247/49249	C077G194	Beryllium Mercury	0.28U ug/L 0.43U ug/L	A
49247/49249	C077G120	Mercury	0.062U ug/L	A
49247/49249	C077S524	Beryllium Mercury Sodium	0.082U mg/Kg 0.039U mg/Kg 87.6U mg/Kg	A
49247/49249	C077S525**	Beryllium Mercury Sodium	0.13U mg/Kg 0.024U mg/Kg 68.9U mg/Kg	A
49247/49249	C077S526	Mercury Sodium	0.022U mg/Kg 217U mg/Kg	A
49247/49249	C077S530**	Sodium	71.6U mg/Kg	A
49247/49249	C077S531	Beryllium Mercury Sodium	0.091U mg/Kg 0.025U mg/Kg 51.2U mg/Kg	A
49247/49249	C077S532	Sodium	354U mg/Kg	A
49247/49249	C077S527	Mercury Sodium	0.021U mg/Kg 120U mg/Kg	A
49247/49249	C077S528	Beryllium Sodium	0.13U mg/Kg 69.7U mg/Kg	A
49247/49249	C077S529	Mercury Sodium	0.028U mg/Kg 466U mg/Kg	A
49247/49249	C077S394	Mercury Sodium	0.02U mg/Kg 66.3U mg/Kg	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49247/49249	C077S395	Sodium	76.4U mg/Kg	A
49247/49249	C077S396	Mercury	0.07U mg/Kg	A
49247/49249	C077S397	Mercury Sodium	0.11U mg/Kg 248U mg/Kg	A
49247/49249	C077S398	Beryllium Mercury Sodium	0.13U mg/Kg 0.029U mg/Kg 83.9U mg/Kg	A
49247/49249	C077S379	Beryllium Mercury Sodium	0.13U mg/Kg 0.025U mg/Kg 120U mg/Kg	A
49247/49249	C077S380	Beryllium Sodium	0.11U mg/Kg 65.2U mg/Kg	A

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14434

TPH as Gasoline

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 5, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Gasoline

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49247/49249

Sample Identification

C077S524	C077S380MSD
C077S525**	
C077S526	
C077S530**	
C077S531	
C077S532	
C077S527	
C077S528	
C077S529	
C077S379	
C077S380	
C077S381	
C077G193	
C077G111**	
C077G196	
C077G195	
C077R006	
C077S528MS	
C077S528MSD	
C077S380MS	

**Indicates sample underwent Level IV review

Introduction

This data review covers 16 soil samples and 5 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Gasoline.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent Level IV review. Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as gasoline contaminants were found in the method blanks.

Sample C077R006 was identified as a rinsate. No total petroleum hydrocarbons as gasoline contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49247/49249	TPH as gasoline	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Data Qualification Summary - SDG 49247/49249

SDG	Sample	Compound	Flag	A or P	Reason
49247/ 49249	C077G193 C077G111** C077G196 C077G195 C077R006	TPH as gasoline	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Laboratory Blank Data Qualification Summary - SDG 49247/49249

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Field Blank Data Qualification Summary - SDG 49247/49249

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14434

TPH as Extractables

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 5, 2005

LDC Report Date: December 21, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49247/49249

Sample Identification

C077S524
C077S525**
C077S526
C077S530**
C077S531
C077S532
C077S527
C077S528
C077S529
C077S379
C077S380
C077S381
C077G193
C077G111**
C077G196
C077R006
C077G194
C077S381DL

**Indicates sample underwent Level IV review

Introduction

This data review covers 13 soil samples and 5 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 *Method 8015 for Total Petroleum Hydrocarbons (TPH) as Extractables.*

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A *qualification summary table is provided at the end of this report if* data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent Level IV review. Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

The percent relative standard deviations (%RSD) of calibration factors for selected compounds were less than or equal to 20.0% .

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample C077R006 was identified as a rinsate. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
051209A-BLK	Octacosane	160 (28-142)	TPH as extractables	J (all detects)	P
C077S381	Octacosane ortho-Terphenyl	226 (47-140) 179 (58-128)	TPH as extractables	J (all detects)	P

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49247/49249	TPH as extractables	No MS/MSD associated with these samples.	MS/MSD required.	None	P

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077S381	TPH as motor oil	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	A

Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
C077S381	TPH as motor oil	R	A
C077S381DL	TPH as diesel	R	A

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 49247/49249

SDG	Sample	Compound	Flag	A or P	Reason
49247/ 49249	C077S524 C077S525** C077S526 C077S530** C077S531 C077S532 C077S527 C077S528 C077S529 C077S379 C077S380 C077S381 C077G193 C077G111** C077G196 C077R006 C077G194 C077S381DL	TPH as extractables	None	P	Matrix spike/Matrix spike duplicates
49247/ 49249	C077S381	TPH as extractables	J (all detects)	P	Surrogate recovery (%R)
49247/ 49249	C077S381	TPH as motor oil	J (all detects)	A	Compound quantitation and CRQLs
49247/ 49249	C077S381	TPH as motor oil	R	A	Overall assessment of data
49247/ 49249	C077S381DL	TPH as diesel	R	A	Overall assessment of data

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 49247/49249

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 49247/49249

No Sample Data Qualified in this SDG

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Bechtel Environmental
1230 Columbia Street, Suite 400
San Diego, CA 92101
Attn: Ms. Toni Kuzmack

December 28, 2005

Project Name : NAS Alameda Point
Project # : CTO 077

On December 22, 2005 the following data packages were received by Laboratory Data Consultants, Inc. from Bechtel Environmental. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 14443:

SDG #	Fraction
49257/49262	Volatiles, Semivolatiles, Polynuclear Aromatic Hydrocarbons, Chlorinated Pesticides & PCBs, Metals, TPH as Gasoline, TPH as Extractables

The above SDGs were reviewed using Level III and Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- NFESC Special Publication SP-2056-ENV, Navy Installation Restoration Chemical Data Quality Manual, Naval Facilities Engineering Command, September 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998

The data validators did utilize their professional judgement when evaluating the data to achieve the most complete and accurate assessment of the data. The data packages were reviewed according to the above stated validation procedures.

For GC/MS volatile analyses, the primary findings consisted of:

a) Air bubbles were apparent in the sample containers for sample C077TB09. Since the laboratory met the protocol requirement, this finding should be considered advisory

b) Continuing calibration factors exceeded acceptance criteria in SDG 49257/49262. Since the laboratory met the protocol requirement, this finding should be considered advisory.

c) Surrogate percent recoveries exceeded acceptance criteria for samples C077S384, C077S390, C077S400 and C077S402 in SDG 49257/49262.

d) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49257/49262.

e) Laboratory control sample percent recoveries exceeded acceptance criteria for several compounds in SDG 49257/49262.

f) Internal standard areas exceeded acceptance criteria for samples C077S400 C077S402, C077S453 and C077S451 in SDG 49257/49262.

g) Several volatile compounds were detected in the method and field blanks in SDG 49257/49262. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For GC/MS semivolatile analyses, the primary findings consisted of:

a) Initial and continuing calibration factors exceeded acceptance criteria in SDG 49257/49262.The associated non-detect results were qualified as unusable for 4-nitrophenol for all samples.

b) Surrogate percent recoveries exceeded acceptance criteria for sample C077G122 in SDG 49257/49262.

c) Matrix spike/matrix spike duplicate percent recoveries and relative percent differences exceeded acceptance criteria for several compounds in SDG 49257/49262. Since the laboratory met the protocol requirement, this finding should be considered advisory.

d) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49257/49262.

For GC/MS PAH analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49257/49262.

b) Laboratory control sample percent recoveries exceeded acceptance criteria for several compounds in SDG 49257/49262.

c) Benzo(b)fluoranthene and benzo(k)fluoranthene coeluted for several samples

in SDG 49247/49249. Since the laboratory met the protocol requirement, this finding should be considered advisory.

d) Surrogate percent recoveries exceeded acceptance criteria for sample C077S390 in SDG 49257/49262.

For chlorinated pesticide and PCB analyses, the primary findings consisted of:

a) Continuing calibration factors exceeded acceptance criteria in SDG 49257/49262. Since the laboratory met the protocol requirement, this finding should be considered advisory.

b) Matrix spike analyses were not performed for all batches in SDG 49257/49262.

c) Matrix spike/matrix spike duplicate relative percent differences exceeded acceptance criteria for aroclor 1242, aroclor 1248, aroclor 1254 and aroclor 1260 in SDG 49257/49262. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For metal analyses, the primary findings consisted of:

a) Matrix spike analyses were not performed for all batches in SDG 49257/49262.

b) Duplicate analyses were not performed for all batches in SDG 49257/49262.

c) Laboratory control sample percent recoveries exceeded acceptance criteria for iron in SDG 49257/49262

d) Matrix spike percent recoveries exceeded acceptance criteria for several compounds in SDG 49257/49262. The associated non-detect results were qualified as unusable for antimony Since the laboratory met the protocol requirement, this finding should be considered advisory.

e) Several metals were detected in the method and field blanks in SDG 49257/49262. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For TPH as gasoline analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49257/49262.

b) Continuing calibration factors exceeded acceptance criteria in SDG 49257/49262. Since the laboratory met the protocol requirement, this finding

should be considered advisory

For TPH as extractable analyses, the primary findings consisted of:

a) Matrix spike analyses were not performed for all batches in SDG 49257/49262.

b) Surrogate percent recoveries exceeded acceptance criteria for several samples in SDG 49257/49262.

c) Continuing calibration factors exceeded acceptance criteria in SDG 49257/49262. Since the laboratory met the protocol requirement, this finding should be considered advisory.

d) TPH as diesel and motor oil exceeded calibration range for samples C077S384 and C077S390 in SDG. 49257/49262. Since the laboratory met the protocol requirement, this finding should be considered advisory.

e) Data was qualified as unusable in dilutions by the validators in order to yield only one complete set of data for a given sample and eliminate redundant data.

In general, the data for all analyses appear usable with the limitations noted in the Data Validation Reports. Data validation flags were noted on the Laboratory Form 1s and included with each validation report.

Sincerely,

Richard M. Amano
President/Principal Chemist

Attachment 1

1 Week TAT

LDC #14443 (Bechtel Environmental-San Diego / Alameda Point, CTO 077)

LDC	SDG#	DATE REC'D	(2) DATE DUE	VOA (8260B)		SVOA (8270C)		PAHs (8270C -SIM)		Pest. /PCBs (SW846)		Metals (SW846)		Diss. Metals (SW846)		TPH-G (8015)		TPH-E (8015)																			
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	49257/49262	12/22/05	12/29/05	11	11	7	13	7	11	9	11	0	13	7	0	8	11	9	13																		
A	49257/49262	12/22/05	12/29/05	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1																		
Total	B/LR			12	12	8	14	8	12	10	12	0	14	8	0	9	12	10	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	155

Shaded cells indicate Level IV validation (all other cells are Level III validation)

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14443

Volatiles

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 6, 2005

LDC Report Date: December 23, 2005

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49257/49262

Sample Identification

C077S451	C077G113
C077S452	C077G114
C077S453**	C077G112MS
C077S401	C077G112MSD
C077S402	
C077S388	
C077S389	
C077S390	
C077S382	
C077S383	
C077S384	
C077S400	
C077G122	
C077TB09	
C077G112	
C077R007	
C077G115**	
C077G116	
C077G128	
C077G129	

**Indicates sample underwent Level IV review

Introduction

This data review covers 12 soil samples and 12 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

All samples were received in good condition with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077TB09	All TCL compounds	Air bubbles were apparent in the sample containers.	There should be no air bubbles in the sample containers.	J (all detects) UJ (all non-detects)	A

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all volatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/12/05	Acetone Hexachlorobutadiene	43 26	C077G115** 051212W	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A
12/16/05	Dichlorodifluoromethane	38	C077S402 051216S	J (all detects) UJ (all non-detects)	A

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051214W	12/14/05	1,2,3-Trichlorobenzene Hexachlorobutadiene Naphthalene	0.64 ug/L 0.48 ug/L 0.45 ug/L	C077G122 C077TB09
051212W	12/12/05	Chloroform 1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene	0.25 ug/L 0.51 ug/L 0.26 ug/L 0.32 ug/L	C077G115**
051214S	12/14/05	cis-1,2-Dichloroethene	0.00027 mg/Kg	C077S389 C077S390 C077S382 C077S383 C077S384
051215S	12/15/05	1,2,3-Trichlorobenzene cis-1,2-Dichloroethene Methylene chloride Naphthalene	0.0005 mg/Kg 0.00025 mg/Kg 0.008 mg/Kg 0.00056 mg/Kg	C077S451 C077S452 C077S453** C077S401 C077S388
051216S	12/16/05	Methylene chloride	0.0062 mg/Kg	C077S402
051215S2	12/15/05	1,2,3-Trichlorobenzene cis-1,2-Dichloroethene Naphthalene	0.00066 mg/Kg 0.00045 mg/Kg 0.00075 mg/Kg	C077S400

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077S389	cis-1,2-Dichloroethene	0.0004 mg/Kg	0.005U mg/Kg
C077S382	cis-1,2-Dichloroethene	0.00052 mg/Kg	0.006U mg/Kg
C077S383	cis-1,2-Dichloroethene	0.00038 mg/Kg	0.006U mg/Kg
C077S451	cis-1,2-Dichloroethene Methylene chloride	0.00029 mg/Kg 0.016 mg/Kg	0.006U mg/Kg 0.06U mg/Kg
C077S452	cis-1,2-Dichloroethene Methylene chloride	0.00034 mg/Kg 0.0068 mg/Kg	0.005U mg/Kg 0.05U mg/Kg
C077S453**	cis-1,2-Dichloroethene Methylene chloride	0.00056 mg/Kg 0.0064 mg/Kg	0.006U mg/Kg 0.06U mg/Kg
C077S401	cis-1,2-Dichloroethene Methylene chloride	0.00037 mg/Kg 0.01 mg/Kg	0.006U mg/Kg 0.06U mg/Kg
C077S388	cis-1,2-Dichloroethene Methylene chloride	0.00046 mg/Kg 0.0056 mg/Kg	0.005U mg/Kg 0.05U mg/Kg
C077S402	Methylene chloride	0.025 mg/Kg	0.09U mg/Kg
C077S400	cis-1,2-Dichloroethene	0.0012 mg/Kg	0.006U mg/Kg

Sample C077TB09 was identified as a trip blank. No volatile contaminants were found in this blank.

Sample C077R007 was identified as a rinsate. No volatile contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Compound	Concentration	Associated Samples
C077R007	12/6/05	Acetone Chloroform Bromodichloromethane Dibromochloromethane	1.0 ug/L 2.5 ug/L 1.8 ug/L 1.2 ug/L	C077S451 C077S452 C077S453** C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400 C077G122 C077G112 C077G115** C077G116 C077G128 C077G129 C077G113 C077G114

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
C077S401	Acetone	0.0098 mg/Kg	0.1U mg/Kg
C077S402	Chloroform	0.0028 mg/Kg	0.009U mg/Kg
C077S382	Acetone	0.0059 mg/Kg	0.1U mg/Kg
C077S384	Chloroform	0.005 mg/Kg	0.009U mg/Kg
C077S400	Chloroform	0.003 mg/Kg	0.006U mg/Kg

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S402	Bromofluorobenzene Toluene-d8	134 (85-120) 121 (85-115)	All TCL compounds	J (all detects)	P

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S390	Bromofluorobenzene	123 (85-120)	All TCL compounds	J (all detects)	P
C077S384	Bromofluorobenzene	79.3 (85-120)	All TCL compounds	J (all detects) UJ (all non-detects)	P
C077S400	Toluene-d8	116 (85-115)	All TCL compounds	J (all detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49257/49262	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051214WLCS	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene 1,2-Dibromo-3-chloropropane Hexachlorobutadiene Naphthalene	223 (55-140) 169 (65-135) 155 (50-130) 145 (50-140) 212 (55-140)	C077G122 C077TB09 051214W	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P
051210WLCS	Chloromethane Dichlorodifluoromethane	135 (50-130) 326 (35-135)	C077S400 051215S	J (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits with the following exceptions:

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S400	Chlorobenzene-d5 1,4-Dichlorobenzene-d4	116896 (123552-494208) 34584 (50192-200768)	Dibromochloromethane Bromoform 2-Hexanone Tetrachloroethene Chlorobenzene Ethylbenzene Styrene 1,3-Dichloropropane 1,2-Dibromoethane 1,1,1,2-Tetrachloroethane m,p-Xylenes o-Xylene 4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P
C077S453**	Fluorobenzene Chlorobenzene-d5 1,4-Dichlorobenzene-d4	133440 (174614-698456) 87400 (129248-516992) 36960 (56324-225296)	All TCL compounds	J (all detects) UJ (all non-detects)	P
C077S451	1,4-Dichlorobenzene-d4	48008 (56324-225296)	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S402	Fluorobenzene Chlorobenzene-d5 1,4-Dichlorobenzene-d4	132928 (318626-1274506) 85856 (260224-1040896) 37240 (158720-634880)	All TCL compounds	J (all detects) UJ (all non-detects)	P

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

Samples C077G128 and C077G129 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD
	C077G128	C077G129	
Carbon disulfide	0.5U	0.96	200
Toluene	0.5U	0.42	200

NAS Alameda Point, CTO 077
Volatiles - Data Qualification Summary - SDG 49257/49262

SDG	Sample	Compound	Flag	A or P	Reason
49257/ 49262	C077TB09	All TCL compounds	J (all detects) UJ (all non-detects)	A	Sample condition
49257/ 49262	C077G115**	Acetone Hexachlorobutadiene	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49257/ 49262	C077S402	Dichlorodifluoromethane	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49257/ 49262	C077S402 C077S390 C077S400	All TCL compounds	J (all detects)	P	Surrogate spikes (%R)
49257/ 49262	C077S384	All TCL compounds	J (all detects) UJ (all non-detects)	P	Surrogate spikes (%R)
49257/ 49262	C077S451 C077S452 C077S453** C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400 C077G122 C077TB09 C077G112 C077R007 C077G115** C077G116 C077G128 C077G129 C077G113 C077G114	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49257/ 49262	C077G122 C077TB09	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene 1,2-Dibromo-3-chloropropane Hexachlorobutadiene Naphthalene	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P	Laboratory control samples (%R)
49257/ 49262	C077S400	Chloromethane Dichlorodifluoromethane	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)

SDG	Sample	Compound	Flag	A or P	Reason
49257/ 49262	C077S400	Dibromochloromethane Bromoform 2-Hexanone Tetrachloroethene Chlorobenzene Ethylbenzene Styrene 1,3-Dichloropropane 1,2-Dibromoethane 1,1,1,2-Tetrachloroethane m,p-Xylenes o-Xylene 4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P	Internal standards (area)
49257/ 49262	C077S453** C077S402	All TCL compounds	J (all detects) UJ (all non-detects)	P	Internal standards (area)
49257/ 49262	C077S451	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P	Internal standards (area)

NAS Alameda Point, CTO 077
Volatiles - Laboratory Blank Data Qualification Summary - SDG 49257/49262

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49257/49262	C077S389	cis-1,2-Dichloroethene	0.005U mg/Kg	A
49257/49262	C077S382	cis-1,2-Dichloroethene	0.006U mg/Kg	A
49257/49262	C077S383	cis-1,2-Dichloroethene	0.006U mg/Kg	A
49257/49262	C077S451	cis-1,2-Dichloroethene Methylene chloride	0.006U mg/Kg 0.06U mg/Kg	A
49257/49262	C077S452	cis-1,2-Dichloroethene Methylene chloride	0.005U mg/Kg 0.05U mg/Kg	A
49257/49262	C077S453**	cis-1,2-Dichloroethene Methylene chloride	0.006U mg/Kg 0.06U mg/Kg	A
49257/49262	C077S401	cis-1,2-Dichloroethene Methylene chloride	0.006U mg/Kg 0.06U mg/Kg	A
49257/49262	C077S388	cis-1,2-Dichloroethene Methylene chloride	0.005U mg/Kg 0.05U mg/Kg	A
49257/49262	C077S402	Methylene chloride	0.09U mg/Kg	A
49257/49262	C077S400	cis-1,2-Dichloroethene	0.006U mg/Kg	A

NAS Alameda Point, CTO 077
Volatiles - Field Blank Data Qualification Summary - SDG 49257/49262

SDG	Sample	Compound	Modified Final Concentration	A or P
49257/49262	C077S401	Acetone	0.1U mg/Kg	A
49257/49262	C077S402	Chloroform	0.009U mg/Kg	A
49257/49262	C077S382	Acetone	0.1U mg/Kg	A
49257/49262	C077S384	Chloroform	0.009U mg/Kg	A
49257/49262	C077S400	Chloroform	0.006U mg/Kg	A

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14443

Semivolatiles

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 6, 2005

LDC Report Date: December 23, 2005

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49257/49262

Sample Identification

C077S451	C077S402MS
C077S452	C077S402MSD
C077S453**	
C077S401	
C077S402	
C077S388	
C077S389	
C077S390	
C077S382	
C077S383	
C077S384	
C077S400	
C077G122	
C077G112	
C077R007	
C077G115**	
C077G116	
C077G128	
C077G113	
C077G114	

**Indicates sample underwent Level IV review

Introduction

This data review covers 14 soil samples and 8 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals. All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required with the following exceptions:

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
12/18/05	4-Nitrophenol	0.0158 (≥0.05)	All samples in SDG 49257/49262	J (all detects) R (all non-detects)	P

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

All of the continuing calibration RRF values were greater than or equal to 0.05 with the following exceptions:

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
12/19/05	4-Nitrophenol	0.0149 (≥0.05)	051209W	J (all detects) R (all non-detects)	P
12/19/05	4-Nitrophenol	0.0142 (≥0.05)	C077S451 C077S452 C077S453** C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400 C077G122 C077G112 C077R007 C077G115** C077G116 C077G128 C077G113 C077G114 C077S402MS C077S402MSD 051212S	J (all detects) R (all non-detects)	P

V. Blanks

Method blanks were reviewed for each matrix as applicable. No semivolatile contaminants were found in the method blanks.

Sample C077R007 was identified as a rinsate. No semivolatile contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077G122	2-Fluorobiphenyl Terphenyl-d14	48.4 (50-110) 44.4 (50-135)	All base neutral compounds	J (all detects) UJ (all non-detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49257/49262	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S402MS/MSD (All soil samples in SDG 49257/49262)	2,4-Dinitrophenol	6.5 (15-130)	0.2 (15-130)	185.7 (≤30)	J (all detects) UJ (all non-detects)	A
	2,4-Dinitrotoluene	-	-	33.6 (≤30)		
	2,6-Dinitrotoluene	-	-	36.6 (≤30)		
	4,6-Dinitro-2-methylphenol	27.7 (30-135)	4.8 (30-135)	141.2 (≤30)		
	2-Nitrophenol	-	38.3 (40-110)	58.7 (≤30)		
	3,3'-Dichlorobenzidine	-	-	48.0 (≤30)		
	3-Nitroaniline	-	20.1 (25-110)	92.3 (≤30)		
	4-Chloroaniline	-	-	62.1 (≤30)		
	4-Nitroaniline	-	25.1 (35-115)	69.5 (≤30)		
	4-Nitrophenol	-	-	51.4 (≤30)		
	Aniline	-	-	44.2 (≤30)		
	Benzoic acid	2.0 (10-110)	1.5 (10-110)	-		
	Carbazole	12.6 (45-115)	-	136.4 (≤30)		
	Hexachloroethane	-	-	32.1 (≤30)		
	Pyridine	10.5 (15-115)	5.3 (15-115)	65.2 (≤30)		
C077S402MS/MSD (All soil samples in SDG 49257/49262)	4-Methylphenol	154 (40-105)	140 (40-105)	-	J (all detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Semivolatiles - Data Qualification Summary - SDG 49257/49262

SDG	Sample	Compound	Flag	A or P	Reason
49257/ 49262	C077S451 C077S452 C077S453** C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400 C077G122 C077G112 C077R007 C077G115** C077G116 C077G128 C077G113 C077G114	4-Nitrophenol	J (all detects) R (all non-detects)	P	Initial calibration (RRF)
49257/ 49262	C077S451 C077S452 C077S453** C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400 C077G122 C077G112 C077R007 C077G115** C077G116 C077G128 C077G113 C077G114	4-Nitrophenol	J (all detects) R (all non-detects)	P	Continuing calibration (RRF)

SDG	Sample	Compound	Flag	A or P	Reason
49257/ 49262	C077G122	Bis(2-chloroethyl) ether N-Nitroso-di-n-propylamine Hexachloroethane Nitrobenzene Isophorone Bis(2-chloroethoxy)methane 4-Chloroaniline Hexachlorobutadiene 2-Methylnaphthalene 2-Nitroaniline Dimethylphthalate 2,6-Dinitrotoluene 3-Nitroaniline Dibenzofuran 2,4-Dinitrotoluene Diethylphthalate 4-Chlorophenylphenyl ether 4-Nitroaniline N-Nitrosodiphenylamine 4-Bromophenyphenyl ether Hexachlorobenzene Carbozole Di-n-butylphthalate Butylbenzylphthalate 3,3'-Dichlorobenzidine Bis(2-ethyhexyl)phthalate Di-n-octylphthalate Bis(2-chloroisopropyl)ether Aniline N-Nitrosodimethylamine Benzyl alcohol Pyridine	J (all detects) UJ (all non-detects)	P	Surrogate recovery (%R)
49257/ 49262	C077G122 C077G112 C077R007 C077G115** C077G116 C077G128 C077G113 C077G114	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49257/ 49262	C077S451 C077S452 C077S453** C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400	2,4-Dinitrophenol 4,6-Dinitro-2-methylphenol 2-Nitrophenol 3-Nitroaniline 4-Nitroaniline Carbazole Pyridine	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)(RPD)

SDG	Sample	Compound	Flag	A or P	Reason
49257/ 49262	C077S451 C077S452 C077S453** C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400	2,4-Dinitrotoluene 2,6-Dinitrotoluene 3,3'-Dichlorobenzidine 4-Chloroaniline 4-Nitrophenol Aniline Hexachloroethane	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (RPD)
49257/ 49262	C077S451 C077S452 C077S453** C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400	Benzoic acid	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49257/ 49262	C077S451 C077S452 C077S453** C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400	4-Methylphenol	J (all detects)	A	Matrix spike/Matrix spike duplicates (%R)

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Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 49257/49262

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Semivolatiles - Field Blank Data Qualification Summary - SDG 49257/49262

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14443

Polynuclear Aromatic Hydrocarbons

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 6, 2005

LDC Report Date: December 23, 2005

Matrix: Soil/Water

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49257/49262

Sample Identification

C077S451
C077S452
C077S453**
C077S401
C077S402
C077S388
C077S389
C077S390
C077S382
C077S383
C077S384
C077S400
C077G122
C077G112
C077R007
C077G115**
C077G116
C077G128
C077G113
C077G114

**Indicates sample underwent Level IV review

Introduction

This data review covers 12 soil samples and 8 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C using Selected Ion Monitoring (SIM) for Polynuclear Aromatic Hydrocarbons.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds.

Average relative response factors (RRF) for all target compounds and system monitoring compounds

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0% .

All of the continuing calibration RRF values were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polynuclear aromatic hydrocarbon contaminants were found in the method blanks.

Sample C077R007 was identified as a rinsate. No polynuclear aromatic hydrocarbon contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S390	2-Fluorobiphenyl Nitrobenzene-d5 Terphenyl-d14	40.0 (54-125) 47.4 (49-121) 53.8 (57-126)	All TCL compounds	J (all detects) UJ (all non-detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49257/49262	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051212SLCS	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Dibenz(a,h)anthracene Phenanthrene Pyrene	110 (56-103) 110 (53-103) 128 (49-113) 109 (53-105) 111 (54-105) 108 (55-104)	All soil samples in SDG 49257/49262	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Flag	A or P
C077S402 C077S382 C077S400	Benzo(b)fluoranthene Benzo(k)fluoranthene	Due to lack of resolution between these compounds in the samples, the laboratory performed the quantitation using the total peak area.	J (all detects) J (all detects)	A

Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 49257/49262

SDG	Sample	Compound	Flag	A or P	Reason
49257/ 49262	C077S390	All TCL compounds	J (all detects) UJ (all non-detects)	P	Surrogate spikes (%R)
49257/ 49262	C077S451 C077S452 C077S453** C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400 C077G122 C077G112 C077R007 C077G115** C077G116 C077G128 C077G113 C077G114	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49257/ 49262	C077S451 C077S452 C077S453** C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Dibenz(a,h)anthracene Phenanthrene Pyrene	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P	Laboratory control samples (%R)
49257/ 49262	C077S402 C077S382 C077S400	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) J (all detects)	A	Compound quantitation and CRQLs

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 49257/49262

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary - SDG 49257/49262

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14443

Chlorinated Pesticides & PCBs

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 6, 2005

LDC Report Date: December 23, 2005

Matrix: Soil/Water

Parameters: Chlorinated Pesticides & PCBs

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49257/49262

Sample Identification

C077S451	C077G122MS
C077S452	C077G122MSD
C077S453**	
C077S401	
C077S402	
C077S388	
C077S389	
C077S390	
C077S382	
C077S383	
C077S384	
C077S400	
C077G122	
C077G112	
C077R007	
C077G115**	
C077G116	
C077G128	
C077G113	
C077G114	

**Indicates sample underwent Level IV review.

Introduction

This data review covers 12 soil samples and 10 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 8081A and 8082 for Chlorinated Pesticides and PCBs.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical or advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

Retention time windows were evaluated and considered technically acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Associated Compounds	Flag	A or P
12/14/05	1212094	DB-35MS	4,4'-DDT	22.5	051212A-BLK	4,4'-DDT	J (all detects) UJ (all non-detects)	A
12/14/05	1212111	DB-35MS	alpha-BHC beta-BHC gamma-BHC Endrin Endosulfan II 4,4'-DDD 4,4'-DDT	17.0 15.5 15.8 15.6 17.5 20.0 18.6	C077G112 C077R007 C077G116 C077G128 C077G113 C077G114	alpha-BHC beta-BHC gamma-BHC Endrin Endosulfan II 4,4'-DDD 4,4'-DDT	J (all detects) UJ (all non-detects)	A

Date	Standard	Column	Compound	%D	Associated Samples	Associated Compounds	Flag	A or P
12/14/05	1212111	DB-XLB	Endrin	18.3	C077G112 C077R007 C077G116 C077G128 C077G113 C077G114	Endrin	J (all detects) UJ (all non-detects)	A
12/14/05	1212175	DB-35MS	4,4'-DDT	17	C077S401 C077S388 C077S389 C077S390 C077S382	4,4'-DDT	J (all detects) UJ (all non-detects)	A
12/14/05	1212175	DB-XLB	4,4'-DDD Endosulfan sulfate	16 18	C077S401 C077S388 C077S389 C077S390 C077S382	4,4'-DDD Endosulfan sulfate	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A
12/14/05	1212177	DB-XLB	Aroclor-1260	15.8	C077S401 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/15/05	1215003	DB-XLB	alpha-BHC Endrin 4,4'-DDT Endosulfan sulfate	17 21 20 18	C077S402	alpha-BHC Endrin 4,4'-DDT Endosulfan sulfate	J (all detects) UJ (all non-detects)	A

Retention times (RT) of all compounds in the calibration standards were within QC limits for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide or PCB contaminants were found in the method blanks.

Sample C077R007 was identified as a rinsate. No chlorinated pesticide or PCB contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All soil samples in SDG 49257/49262	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Associated Compounds	Flag	A or P
C077G122MS/MSD (All water samples in SDG 49257/49262)	Aroclor-1260	-	-	31.6 (≤25)	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and Reported CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which an Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Data Qualification Summary - SDG 49257/49262

SDG	Sample	Compound	Flag	A or P	Reason
49257/ 49262	C077G112 C077R007 C077G116 C077G128 C077G113 C077G114	alpha-BHC beta-BHC gamma-BHC Endrin Endosulfan II 4,4'-DDD 4,4'-DDT	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49257/ 49262	C077S401 C077S388 C077S389 C077S390 C077S382	4,4'-DDT 4,4'-DDD Endosulfan sulfate	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49257/ 49262	C077S401 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49257/ 49262	C077S402	alpha-BHC Endrin 4,4'-DDT Endosulfan sulfate	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49257/ 49262	C077S451 C077S452 C077S453** C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49257/ 49262	C077G122 C077G112 C077R007 C077G115** C077G116 C077G128 C077G113 C077G114	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (RPD)

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Laboratory Blank Data Qualification Summary - SDG 49257/49262

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Field Blank Data Qualification Summary - SDG 49257/49262

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14443

Metals

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 6, 2005

LDC Report Date: December 22, 2005

Matrix: Soil/Water

Parameters: Metals

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49257/49262

Sample Identification

C077S451	C077S384MS
C077S452	C077S384MSD
C077S453**	
C077S401	
C077S402	
C077S388	
C077S389	
C077S390	
C077S382	
C077S383	
C077S384	
C077S400	
C077G122	
C077G112	
C077R007	
C077G115**	
C077G116	
C077G128	
C077G113	
C077G114	

**Indicates sample underwent Level IV review

Introduction

This data review covers 14 soil samples and 8 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 *Methods 6010B and 7000 for Metals. The metals analyzed were Aluminum*, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

This review follows a modified outline of the USEPA Contract Laboratory Program *National Functional Guidelines for Inorganic Data Review* (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Antimony Cobalt Manganese Sodium	2.441 ug/L 0.799 ug/L 1.768 ug/L 182.7 ug/L	All water samples in SDG 49257/49262
ICB/CCB	Antimony Cobalt Mercury	4.744 ug/L 4.3 ug/L 0.167 ug/L	All water samples in SDG 49257/49262
ICB/CCB	Potassium	138.4 ug/L	C077G112 C077R007 C077G116 C077G128 C077G113 C077G114
ICB/CCB	Sodium	828.4 ug/L	C077R007
PB (prep blank)	Sodium	9.853 mg/Kg	All soil samples in SDG 49257/49262
ICB/CCB	Arsenic Chromium Mercury Selenium	2.277 ug/L 0.84 ug/L 0.111 ug/L 3.891 ug/L	All soil samples in SDG 49257/49262

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G112	Cobalt	2.2 ug/L	2.2U ug/L
C077R007	Cobalt Manganese Potassium Sodium	2.3 ug/L 1.4 ug/L 142 ug/L 978 ug/L	2.3U ug/L 1.4U ug/L 142U ug/L 978U ug/L
C077G115**	Antimony	3.2 ug/L	3.2U ug/L
C077G116	Cobalt	4.6 ug/L	4.6U ug/L
C077G128	Cobalt	4.7 ug/L	4.7U ug/L
C077G113	Cobalt	2.5 ug/L	2.5U ug/L
C077G114	Cobalt	4.2 ug/L	4.2U ug/L
C077S451	Selenium	0.52 mg/Kg	0.52U mg/Kg
C077S452	Mercury Selenium	0.051 mg/Kg 0.85 mg/Kg	0.051U mg/Kg 0.85U mg/Kg
C077S453**	Mercury	0.024 mg/Kg	0.024U mg/Kg
C077S401	Mercury Selenium	0.034 mg/Kg 0.83 mg/Kg	0.034U mg/Kg 0.83U mg/Kg
C077S402	Selenium	0.82 mg/Kg	0.82U mg/Kg
C077S388	Mercury	0.052 mg/Kg	0.052U mg/Kg
C077S389	Mercury Selenium	0.026 mg/Kg 0.26 mg/Kg	0.026U mg/Kg 0.26U mg/Kg
C077S390	Mercury	0.039 mg/Kg	0.039U mg/Kg
C077S382	Mercury	0.038 mg/Kg	0.038U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S383	Mercury Selenium	0.057 mg/Kg 0.3 mg/Kg	0.057U mg/Kg 0.3U mg/Kg
C077S384	Mercury Selenium	0.05 mg/Kg 0.46 mg/Kg	0.05U mg/Kg 0.46U mg/Kg
C077S400	Selenium	0.64 mg/Kg	0.64U mg/Kg

Sample C077R007 was identified as a rinsate. No metal contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
C077R007	12/6/05	Cobalt Magnesium Manganese Potassium Sodium	2.3 ug/L 78.8 ug/L 1.4 ug/L 142 ug/L 978 ug/L	C077S451 C077S452 C077S453** C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400 C077G122 C077G112 C077G115** C077G116 C077G128 C077G113 C077G114

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S451	Sodium	332 mg/Kg	332U mg/Kg
C077S452	Sodium	361 mg/Kg	361U mg/Kg
C077S453**	Sodium	195 mg/Kg	195U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S401	Sodium	94 mg/Kg	94U mg/Kg
C077S388	Sodium	71.3 mg/Kg	71.3U mg/Kg
C077S389	Sodium	120 mg/Kg	120U mg/Kg
C077S390	Sodium	106 mg/Kg	106U mg/Kg
C077S382	Sodium	113 mg/Kg	113U mg/Kg
C077S383	Sodium	102 mg/Kg	102U mg/Kg
C077S400	Sodium	147 mg/Kg	147U mg/Kg
C077G112	Cobalt	2.2 ug/L	2.2U ug/L
C077G116	Cobalt	4.6 ug/L	4.6U ug/L
C077G128	Cobalt	4.7 ug/L	4.7U ug/L
C077G113	Cobalt	2.5 ug/L	2.5U ug/L
C077G114	Cobalt	4.2 ug/L	4.2U ug/L

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All water samples in SDG 49257/49262	All TAL metals	No MS associated with these samples.	MS required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S384MS/MSD (All soil samples in SDG 49257/49262)	Antimony	28.9 (80-120)	33.1 (80-120)	-	J (all detects) R (all non-detects)	A
C077S384MS/MSD (All soil samples in SDG 49257/49262)	Barium Chromium Nickel Selenium Thallium Vanadium	74.7 (80-120) 69.9 (80-120) 65.9 (80-120) 79.5 (80-120) 79.8 (80-120) 78.0 (80-120)	- - - - - -	- - - - - -	J (all detects) UJ (all non-detects)	A

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All water samples in SDG 49257/49262	All TAL metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P

Results were within QC limits.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
LCS/LCSD (All water samples in SDG 49257/49262)	Iron	122 (80-120)	-	-	J (all detects)	P

VIII. Internal Standards

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met.

XI. Sample Result Verification

All sample result verifications were acceptable for samples on which a NFESC Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been qualified.

XIII. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Metals - Data Qualification Summary - SDG 49257/49262

SDG	Sample	Analyte	Flag	A or P	Reason
49257/ 49262	C077G122 C077G112 C077R007 C077G115** C077G116 C077G128 C077G113 C077G114	All TAL metals	None	P	Matrix spike analysis
49257/ 49262	C077S451 C077S452 C077S453** C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400	Antimony	J (all detects) R (all non-detects)	A	Matrix spike analysis (%R)
49257/ 49262	C077S451 C077S452 C077S453** C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400	Barium Chromium Nickel Selenium Thallium Vanadium	J (all detects) UJ (all non-detects)	A	Matrix spike analysis (%R)
49257/ 49262	C077G122 C077G112 C077R007 C077G115** C077G116 C077G128 C077G113 C077G114	All TAL metals	None	P	Duplicate sample analysis
49257/ 49262	C077G122 C077G112 C077R007 C077G115** C077G116 C077G128 C077G113 C077G114	Iron	J (all detects)	P	Laboratory control samples (%R)

Metals - Laboratory Blank Data Qualification Summary - SDG 49257/49262

SDG	Sample	Analyte	Modified Final Concentration	A or P
49257/49262	C077G112	Cobalt	2.2U ug/L	A
49257/49262	C077R007	Cobalt Manganese Potassium Sodium	2.3U ug/L 1.4U ug/L 142U ug/L 978U ug/L	A
49257/49262	C077G115**	Antimony	3.2U ug/L	A
49257/49262	C077G116	Cobalt	4.6U ug/L	A
49257/49262	C077G128	Cobalt	4.7U ug/L	A
49257/49262	C077G113	Cobalt	2.5U ug/L	A
49257/49262	C077G114	Cobalt	4.2U ug/L	A
49257/49262	C077S451	Selenium	0.52U mg/Kg	A
49257/49262	C077S452	Mercury Selenium	0.051U mg/Kg 0.85U mg/Kg	A
49257/49262	C077S453**	Mercury	0.024U mg/Kg	A
49257/49262	C077S401	Mercury Selenium	0.034U mg/Kg 0.83U mg/Kg	A
49257/49262	C077S402	Selenium	0.82U mg/Kg	A
49257/49262	C077S388	Mercury	0.052U mg/Kg	A
49257/49262	C077S389	Mercury Selenium	0.026U mg/Kg 0.26U mg/Kg	A
49257/49262	C077S390	Mercury	0.039U mg/Kg	A
49257/49262	C077S382	Mercury	0.038U mg/Kg	A
49257/49262	C077S383	Mercury Selenium	0.057U mg/Kg 0.3U mg/Kg	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49257/49262	C077S384	Mercury Selenium	0.05U mg/Kg 0.46U mg/Kg	A
49257/49262	C077S400	Selenium	0.64U mg/Kg	A

NAS Alameda Point, CTO 077
Metals - Field Blank Data Qualification Summary - SDG 49257/49262

SDG	Sample	Analyte	Modified Final Concentration	A or P
49257/49262	C077S451	Sodium	332U mg/Kg	A
49257/49262	C077S452	Sodium	361U mg/Kg	A
49257/49262	C077S453**	Sodium	195U mg/Kg	A
49257/49262	C077S401	Sodium	94U mg/Kg	A
49257/49262	C077S388	Sodium	71.3U mg/Kg	A
49257/49262	C077S389	Sodium	120U mg/Kg	A
49257/49262	C077S390	Sodium	106U mg/Kg	A
49257/49262	C077S382	Sodium	113U mg/Kg	A
49257/49262	C077S383	Sodium	102U mg/Kg	A
49257/49262	C077S400	Sodium	147U mg/Kg	A
49257/49262	C077G112	Cobalt	2.2U ug/L	A
49257/49262	C077G116	Cobalt	4.6U ug/L	A
49257/49262	C077G128	Cobalt	4.7U ug/L	A
49257/49262	C077G113	Cobalt	2.5U ug/L	A
49257/49262	C077G114	Cobalt	4.2U ug/L	A

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14443

TPH as Gasoline

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 6, 2005

LDC Report Date: December 23, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Gasoline

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49257/49262

Sample Identification

C077S451	C077G114
C077S452	
C077S453**	
C077S401	
C077S402	
C077S388	
C077S389	
C077S390	
C077S382	
C077S383	
C077S384	
C077S400	
C077G122	
C077G112	
C077R007	
C077G115**	
C077G116	
C077G128	
C077G129	
C077G113	

**Indicates sample underwent Level IV review

Introduction

This data review covers 12 soil samples and 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Gasoline.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent Level IV review. Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/16/05 (1215H25)	TPH as gasoline	15.19	C077S451 C077S452 C077S453**	J (all detects) UJ (all non-detects)	A

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as gasoline contaminants were found in the method blanks.

Sample C077R007 was identified as a rinsate. No total petroleum hydrocarbons as gasoline contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49257/49262	*TPH as gasoline*	No MS/MSD associated with these samples.	MS/MSD required.	None	P

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

Samples C077G128 and C077G129 were identified as field duplicates. No total petroleum hydrocarbons as gasoline were detected in any of the samples.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Data Qualification Summary - SDG 49257/49262

SDG	Sample	Compound	Flag	A or P	Reason
49257/ 49262	C077S451 C077S452 C077S453**	TPH as gasoline	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49257/ 49262	C077S451 C077S452 C077S453** C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400 C077G122 C077G112 C077R007 C077G115** C077G116 C077G128 C077G129 C077G113 C077G114	TPH as gasoline	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Laboratory Blank Data Qualification Summary - SDG 49257/49262

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Field Blank Data Qualification Summary - SDG 49257/49262

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14443

TPH as Extractables

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 6, 2005

LDC Report Date: December 23, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49257/49262

Sample Identification

C077S451	C077G114
C077S452	C077G117
C077S453**	C077S390DL
C077S401	C077S384DL
C077S402	
C077S388	
C077S389	
C077S390	
C077S382	
C077S383	
C077S384	
C077S400	
C077G122	
C077G112	
C077R007	
C077G115**	
C077G116	
C077G128	
C077G129	
C077G113	

**Indicates sample underwent Level IV review

Introduction

This data review covers 14 soil samples and 10 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Extractables.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent Level IV review. Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

The percent relative standard deviations (%RSD) of calibration factors for selected compounds were less than or equal to 20.0% .

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Compound	%D	Affected Compound	Associated Samples	Flag	A or P
12/16/05 (1215016)	TPH as diesel	17	TPH as diesel	C077G122 C077G112 C077R007 C077G115** C077G116 051209A1-BLK	J (all detects) UJ (all non-detects)	A
12/16/05 (1215017)	TPH as motor oil	20	TPH as motor oil	C077G122 C077G112 C077R007 C077G115** C077G116 051209A1-BLK	J (all detects) UJ (all non-detects)	A
12/17/05 (1215034)	TPH as motor oil	24	TPH as motor oil	C077G128 C077G129 C077G113 C077G114 C077G117	J (all detects) UJ (all non-detects)	A

Date	Compound	%D	Affected Compound	Associated Samples	Flag	A or P
12/18/05 (1215105)	TPH as JP5	18	TPH as JP5	C077S451 C077S452 C077S453** C077S401 C077S402 C077S388 C077S389 C077S390 C077S383 051212A-BLK	J (all detects) UJ (all non-detects)	A

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample C077R007 was identified as a rinsate. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
051209A-BLK	Octacosane	160 (28-142)	TPH as extractables	J (all detects)	P
C077G122	Octacosane	178 (28-142)	TPH as extractables	J (all detects)	P
C077G112	Octacosane	180 (28-142)	TPH as extractables	J (all detects)	P
C077R007	Octacosane	143 (28-142)	TPH as extractables	J (all detects)	P
C077G115**	Octacosane	156 (28-142)	TPH as extractables	J (all detects)	P
C077G116	Octacosane	167 (28-142)	TPH as extractables	J (all detects)	P
C077G128	Octacosane	165 (28-142)	TPH as extractables	J (all detects)	P
C077G129	Octacosane	158 (28-142)	TPH as extractables	J (all detects)	P

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077G113	Octacosane	166 (28-142)	TPH as extractables	J (all detects)	P
C077G114	Octacosane	157 (28-142)	TPH as extractables	J (all detects)	P
C077G117	Octacosane	149 (28-142)	TPH as extractables	J (all detects)	P
C077S402	Octacosane ortho-Terphenyl	211 (47-140) 170 (58-128)	TPH as extractables	J (all detects)	P
C077S390	Octacosane ortho-Terphenyl	206 (47-140) 232 (58-128)	TPH as extractables	J (all detects)	P
C077S384	Octacosane ortho-Terphenyl	263 (47-140) 400 (58-128)	TPH as extractables	J (all detects)	P

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49257/49262	TPH as extractables	No MS/MSD associated with these samples.	MS/MSD required.	None	P

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077S390 C077S384	TPH as diesel TPH as motor oil	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects)	A

Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
C077S390 C077S384	TPH as diesel TPH as motor oil	R	A

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

Samples C077G128 and C077G129 were identified as field duplicates. No total petroleum hydrocarbons as extractables were detected in any of the samples.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 49257/49262

SDG	Sample	Compound	Flag	A or P	Reason
49257/ 49262	C077G122 C077G112 C077R007 C077G115** C077G116	TPH as diesel TPH as motor oil	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49257/ 49262	C077G128 C077G129 C077G113 C077G114 C077G117	TPH as motor oil	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49257/ 49262	C077S451 C077S452 C077S453** C077S401 C077S402 C077S388 C077S389 C077S390 C077S383	TPH as JP5	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49257/ 49262	C077G122 C077G112 C077R007 C077G115** C077G116 C077G128 C077G129 C077G113 C077G114 C077G117 C077S402 C077S390 C077S384	TPH as extractables	J (all detects)	P	Surrogate recovery (%R)

SDG	Sample	Compound	Flag	A or P	Reason
49257/ 49262	C077S451 C077S452 C077S453** C077S401 C077S402 C077S388 C077S389 C077S390 C077S382 C077S383 C077S384 C077S400 C077G122 C077G112 C077R007 C077G115** C077G116 C077G128 C077G129 C077G113 C077G114 C077G117 C077S390DL C077S384DL	TPH as extractables	None	P	Matrix spike/Matrix spike duplicates
49257/ 49262	C077S390 C077S384	TPH as diesel TPH as motor oil	J (all detects) J (all detects)	A	Compound quantitation and CRQLs
49257/ 49262	C077S390 C077S384	TPH as diesel TPH as motor oil	R	A	Overall assessment of data

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 49257/49262

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 49257/49262

No Sample Data Qualified in this SDG

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Bechtel Environmental
1230 Columbia Street, Suite 400
San Diego, CA 92101
Attn: Ms. Toni Kuzmack

January 3, 2006

Project Name : NAS Alameda Point
Project # : CTO 077

On December 28, 2005 the following data packages were received by Laboratory Data Consultants, Inc. from Bechtel Environmental. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 14449:

SDG #	Fraction
49265/49267, 49277/49278	Volatiles, Semivolatiles, Polynuclear Aromatic Hydrocarbons, Chlorinated Pesticides & PCBs, Metals, TPH as Gasoline, TPH as Extractables

The above SDGs were reviewed using Level III and Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- NFESC Special Publication SP-2056-ENV, Navy Installation Restoration Chemical Data Quality Manual, Naval Facilities Engineering Command, September 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998

The data validators did utilize their professional judgement when evaluating the data to achieve the most complete and accurate assessment of the data. The data packages were reviewed according to the above stated validation procedures.

For GC/MS volatile analyses, the primary findings consisted of:

a) Air bubbles were apparent in the sample containers for sample C077TB11. Since the laboratory met the protocol requirement, this finding should be considered advisory.

b) Continuing calibration factors exceeded acceptance criteria in SDGs 49265/49267 and 49277/49278. Since the laboratory met the protocol requirement, this finding should be considered advisory.

c) Surrogate percent recoveries exceeded acceptance criteria for several samples in SDGs 49265/49267 and 49277/49278.

d) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDGs 49265/49267and 49277/49278.

e) Laboratory control sample percent recoveries exceeded acceptance criteria for several compounds in SDG 49277/49278.

f) Internal standard areas exceeded acceptance criteria for several samples in SDGs 49265/49267 and 49277/49278.

g) Methylene chloride and cis-1,2-dichloroethene were detected in the method blanks and chloroform was detected in the field blanks in SDGs 49265/49267 and 49277/49278. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For GC/MS semivolatile analyses, the primary findings consisted of:

a) Continuing calibration factors exceeded acceptance criteria in SDGs 49265/49267 and 49277/49278.

b) Surrogate percent recoveries exceeded acceptance criteria for several samples in SDG 49265/49267.

c) Matrix spike/matrix spike duplicate percent recoveries and relative percent differences exceeded acceptance criteria for several compounds in SDG 49277/49278. Since the laboratory met the protocol requirement, this finding should be considered advisory.

d) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDGs 49265/49267 and 49277/49278.

e) Laboratory control sample percent recoveries exceeded acceptance criteria for several compounds in SDGs 49265/49267 and 49277/49278.

f) Di-n-butylphthalate was detected in the field blanks. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For GC/MS PAH analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDGs 49265/49267 and 49277/49278.

b) Matrix spike/matrix spike duplicate percent recoveries exceeded acceptance criteria for several compounds in SDG 49277/49278. Since the laboratory met the protocol requirement, this finding should be considered advisory.

c) Surrogate percent recoveries exceeded acceptance criteria for several samples in SDG 49277/49278.

d) Laboratory control sample percent recoveries exceeded acceptance criteria for several compounds in SDGs 49265/49267 and 49277/49278.

e) Benzo(b)fluoranthene and benzo(k)fluoranthene coeluted for sample C077S412 in SDG 49265/49267 and for samples C077S429, C077S415 and C077S417 in SDG 49277/49278. Since the laboratory met the protocol requirement, this finding should be considered advisory.

f) Surrogate percent recoveries exceeded acceptance criteria for several samples in SDG 49277/49278.

For chlorinated pesticide and PCB analyses, the primary findings consisted of:

a) Continuing calibration factors exceeded acceptance criteria in SDG 49265/49267 and 49277/49278. Since the laboratory met the protocol requirement, this finding should be considered advisory.

b) Matrix spike analyses were not performed for all batches in SDGs 49265/49267 and 49277/49278.

For metal analyses, the primary findings consisted of:

a) Matrix spike analyses were not performed for all batches in SDG 49277/49278.

b) Duplicate analyses were not performed for all batches in SDG 49277/49278.

c) Incorrect sample container was used for mercury in for samples C077G145 and C077G143 in SDG 49277/49278. Since the laboratory met the protocol requirement, this finding should be considered advisory.

d) Matrix spike percent recoveries exceeded acceptance criteria for several compounds in SDGs 49265/49267 and 49277/49278. The associated non-detect results were qualified as unusable for barium. Since the laboratory met the protocol requirement, this finding should be considered advisory.

e) ICP serial dilution percent differences exceeded acceptance criteria for several compounds in SDG 49265/49267. Since the laboratory met the protocol requirement, this finding should be considered advisory.

f) Several metals were detected in the method and field blanks in SDGs 49265/49267 and 49277/49278. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For TPH as gasoline analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDGs 49265/49267 and 49277/49278.

b) Surrogate percent recoveries exceeded acceptance criteria for sample C077G141 in SDG 49277/49278.

For TPH as extractable analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDGs 49265/49267 and 49277/49278.

b) Surrogate percent recoveries exceeded acceptance criteria for sample C077S412 in SDG 49265/49267 and samples C077G137 and C077G141 in SDG 49277/49278.

In general, the data for all analyses appear usable with the limitations noted in the Data Validation Reports. Data validation flags were noted on the Laboratory Form 1s and included with each validation report.

Sincerely,

Richard M. Amano
President/Principal Chemist

Attachment 1

1 Week TAT

LDC #14449 (Bechtel Environmental-San Diego / Alameda Point, CTO 077)

LDC	SDG#	DATE REC'D	(2) DATE DUE	VOA (8260B)		SVOA (8270C)		PAHs (8270C -SIM)		Pest. /PCBs (SW846)		Metals (SW846)		Diss. Metals (SW846)		Hg (1630E)		TPH-G (8015)		TPH-E (8015)																	
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	49265/49267	12/28/05	01/04/06	[redacted]		5	7	5	7	8	17	0	16	9	0	-	-	[redacted]		7	12																
B	49277/49278	12/28/05	01/04/06	10	15	5	14	5	14	6	12	0	17	11	0	8	0	6	14	6	12														
B	49277/49278	12/28/05	01/04/06	2	3	2	3	2	3	2	3	0	3	2	0	1	0	2	3	2	3														
Total	B/LR			20	32	12	24	12	24	16	32	0	36	22	0	9	0	13	23	15	27	0	0	0	0	0	0	0	0	0	0	0	0	0	317

Shaded cells indicate Level IV validation (all other cells are Level III validation)

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14449

Volatiles

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 7, 2005

LDC Report Date: December 28, 2005

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49265/49267

Sample Identification

C077S413	C077S419MS
C077S412	C077S419MSD
C077S414	
C077S421	
C077S422	
C077S423	
C077S418	
C077S419	
C077S420	
C077S424	
C077S425	
C077S426	
C077G132	
C077G130	
C077G155	
C077TB10	
C077SW01	
C077G135	
C077G136	
C077R008	

Introduction

This data review covers 14 soil samples and 8 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all volatile target compounds were within *method and validation criteria.*

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/16/05	Dichlorodifluoromethane	38	C077S413 C077S412 C077S414 051216MB	J (all detects) UJ (all non-detects)	A

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051216MB	12/16/05	Methylene chloride	0.0062 ug/L	C077S413 C077S412 C077S414

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077S413	Methylene chloride	0.022 mg/Kg	0.06U mg/Kg
C077S412	Methylene chloride	0.023 mg/Kg	0.06U mg/Kg
C077S414	Methylene chloride	0.021 mg/Kg	0.06U mg/Kg

Sample C077TB10 was identified as a trip blank. No volatile contaminants were found in this blank

Sample C077SW01 was identified as a source blank. No volatile contaminants were found in this blank with the following exceptions:

Source Blank ID	Sampling Date	Compound	Concentration	Associated Samples
C077SW01	12/7/05	Chloroform	3.2 ug/L	C077S413
		Bromodichloromethane	2.2 ug/L	C077S412
		Dibromochloromethane	1.5 ug/L	C077S414
				C077S421
				C077S422
				C077S423
				C077S418
				C077S419
				C077S420
				C077S424
				C077S425
				C077S426
				C077G132
				C077G130
				C077G155
				C077G135
				C077G136
				C077S413
				C077S412
				C077S414
				C077S421
				C077S422
				C077S423
				C077S418
				C077S419
				C077S420
				C077S424
				C077S425
				C077S426
				C077G132
				C077G130
				C077G155
				C077G135
				C077G136

Sample C077R008 was identified as a rinsate. No volatile contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Compound	Concentration	Associated Samples
C077R008	12/7/05	Acetone	1.5 ug/L	C077S413
		Chloroform	2.8 ug/L	C077S412
		Bromodichloromethane	2.1 ug/L	C077S414
		Dibromochloromethane	1.5 ug/L	C077S421
				C077S422
				C077S423
				C077S418
				C077S419
				C077S420
				C077S424
				C077S425
				C077S426
				C077G132
				C077G130
				C077G155
				C077G135
				C077G136
				C077S413
				C077S412
				C077S414
				C077S421
				C077S422
				C077S423
				C077S418
				C077S419
				C077S420
				C077S424
				C077S425
				C077S426
				C077G132
				C077G130
				C077G155
				C077G135
				C077G136

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
C077S413	Chloroform	0.0041 mg/Kg	0.006U mg/Kg
C077S412	Chloroform	0.0044 mg/Kg	0.006U mg/Kg
C077S414	Chloroform	0.0039 mg/Kg	0.006U mg/Kg
C077S421	Chloroform	0.0033 mg/Kg	0.006U mg/Kg
C077S422	Chloroform	0.0048 mg/Kg	0.006U mg/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
C077S423	Chloroform	0.004 mg/Kg	0.006U mg/Kg
C077S418	Chloroform	0.0034 mg/Kg	0.005U mg/Kg
C077S419	Chloroform	0.0037 mg/Kg	0.005U mg/Kg
C077S420	Chloroform	0.0047 mg/Kg	0.007U mg/Kg
C077S424	Chloroform	0.0041 mg/Kg	0.006U mg/Kg
C077S425	Chloroform	0.0038 mg/Kg	0.005U mg/Kg

VI. *Surrogate Spikes*

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S422	Toluene-d8	121 (85-115)	All TCL compounds	J (all detects)	P
C077S423	Toluene-d8	117 (85-115)	All TCL compounds	J (all detects)	P
C077S418	Toluene-d8	119 (85-115)	All TCL compounds	J (all detects)	P
C077S419	Toluene-d8	116 (85-115)	All TCL compounds	J (all detects)	A
C077S424	Toluene-d8	119 (85-115)	All TCL compounds	J (all detects)	P
C077S426	Bromofluorobenzene	127 (85-120)	All TCL compounds	J (all detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49265/49267	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were not within QC limits. Since the samples were either diluted out or there were no associated samples, no data were qualified.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits with the following exceptions:

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S421	1,4-Dichlorobenzene-d4	105264 (136820-547278)	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S423	1,4-Dichlorobenzene-d4	110456 (136820-547278)	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P
C077S418	1,4-Dichlorobenzene-d4	116704 (136820-547278)	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S419	1,4-Dichlorobenzene-d4	87160 (136820-547278)	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P
C077S420	1,4-Dichlorobenzene-d4	119544 (136820-547278)	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S424	1,4-Dichlorobenzene-d4	119728 (136820-547278)	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P
C077S425	1,4-Dichlorobenzene-d4	114832 (136820-547278)	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S413	1,4-Dichlorobenzene-d4	144448 (158720-634880)	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P
C077S412	1,4-Dichlorobenzene-d4	137472 (158720-634880)	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S414	1,4-Dichlorobenzene-d4	149376 (158720-634880)	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Volatiles - Data Qualification Summary - SDG 49265/49267

SDG	Sample	Compound	Flag	A or P	Reason
49265/ 49267	C077S413 C077S412 C077S414	Dichlorodifluoromethane	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49265/ 49267	C077S422 C077S423 C077S418 C077S424 C077S426	All TCL compounds	J (all detects)	P	Surrogate recovery (%R)
49265/ 49267	C077S419	All TCL compounds	J (all detects)	A	Surrogate recovery (%R)
49265/ 49267	C077G132 C077G130 C077G155 C077TB10 C077SW01 C077G135 C077G136 C077R008	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49265/ 49267	C077S421 C077S423 C077S418 C077S419 C077S420 C077S424 C077S425 C077S413 C077S412 C077S414	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P	Internal standards (area)

NAS Alameda Point, CTO 077
Volatiles - Laboratory Blank Data Qualification Summary - SDG 49265/49267

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49265/49267	C077S413	Methylene chloride	0.06U mg/Kg	A
49265/49267	C077S412	Methylene chloride	0.06U mg/Kg	A
49265/49267	C077S414	Methylene chloride	0.06U mg/Kg	A

NAS Alameda Point, CTO 077
Volatiles - Field Blank Data Qualification Summary - SDG 49265/49267

SDG	Sample	Compound	Modified Final Concentration	A or P
49265/49267	C077S413	Chloroform	0.006U mg/Kg	A
49265/49267	C077S412	Chloroform	0.006U mg/Kg	A
49265/49267	C077S414	Chloroform	0.006U mg/Kg	A
49265/49267	C077S421	Chloroform	0.006U mg/Kg	A
49265/49267	C077S422	Chloroform	0.006U mg/Kg	A
49265/49267	C077S423	Chloroform	0.006U mg/Kg	A
49265/49267	C077S418	Chloroform	0.005U mg/Kg	A
49265/49267	C077S419	Chloroform	0.005U mg/Kg	A
49265/49267	C077S420	Chloroform	0.007U mg/Kg	A
49265/49267	C077S424	Chloroform	0.006U mg/Kg	A
49265/49267	C077S425	Chloroform	0.005U mg/Kg	A

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 8, 2005

LDC Report Date: December 29, 2005

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49277/49278

Sample Identification

C077S428	C077G127
C077S429	C077G133
C077S415	C077G126**
C077S416	C077R009
C077S417	C077G142**
C077S442	C077G141
C077S443	C077TB11
C077S444	C077G121
C077S409**	C077G141MS
C077S410	C077G141MSD
C077S411**	
C077S427	
C077S406**	
C077S407	
C077S408	
C077S404	
C077S403	
C077S405	
C077G137	
C077G150	

**Indicates sample underwent Level IV review

Introduction

This data review covers 18 soil samples and 12 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

All samples were received in good condition with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077TB11	All TCL compounds	Air bubbles were apparent in the sample containers.	There should be no air bubbles in the sample containers.	J (all detects) UJ (all non-detects)	A

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all volatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/16/05 (1216C01S)	Dichlorodifluoromethane	38	C077S428 C077S442 C077S443 C077S444 C077S409** C077S410 051216AMB	J (all detects) UJ (all non-detects)	A
12/16/05 (1216C21S)	Dichlorodifluoromethane Chloromethane Chloroethane Naphthalene	216 72 49 34	C077S411** C077S427 C077S406** 051216BMB	J (all detects) UJ (all non-detects)	A

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051216AMB	12/16/05	Methylene chloride	0.0062 mg/Kg	C077S428 C077S442 C077S443 C077S444 C077S409** C077S410
051215BMB	12/16/05	1,2,3-Trichlorobenzene cis-1,2-Dichloroethene Naphthalene	0.00041 mg/Kg 0.00029 mg/Kg 0.00047 mg/Kg	C077S429 C077S415 C077S416 C077S417

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077S444	Methylene chloride	0.024 mg/Kg	0.06U mg/Kg

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077S429	cis-1,2-Dichloroethene	0.00084 mg/Kg	0.010U mg/Kg
C077S415	cis-1,2-Dichloroethene	0.00037 mg/Kg	0.005U mg/Kg

Sample C077TB11 was identified as a trip blank. No volatile contaminants were found in this blank.

Sample C077R009 was identified as a rinsate. No volatile contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Compound	Concentration	Associated Samples
C077R009	12/8/05	Chloroform	2.2 ug/L	C077S428
		Bromodichloromethane	1.7 ug/L	C077S429
		Bromoform	0.93 ug/L	C077S415
		Dibromochloromethane	1.2 ug/L	C077S416
				C077S417
				C077S442
				C077S443
				C077S444
				C077S409**
				C077S410
				C077S411**
				C077S427
				C077S406**
				C077S407
				C077S408
				C077S404
				C077S403
				C077S405
				C077G137
				C077G150
				C077G127
				C077G133
				C077G126**
				C077G142**
				C077G141
				C077G121

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
C077S444	Chloroform	0.0038 mg/Kg	0.006U mg/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
C077S404	Chloroform	0.0019 mg/Kg	0.005U mg/Kg
C077S403	Chloroform	0.0019 mg/Kg	0.005U mg/Kg

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S416	Bromofluorobenzene	128 (85-120)	All TCL compounds	J (all detects)	P
C077S417	Bromofluorobenzene	121 (85-120)	All TCL compounds	J (all detects)	P
C077S407	Bromofluorobenzene	125 (85-120)	All TCL compounds	J (all detects)	P
C077S408	Bromofluorobenzene	125 (85-120)	All TCL compounds	J (all detects)	P
C077S404	Toluene-d8	129 (85-115)	All TCL compounds	J (all detects)	P
C077S403	Toluene-d8	126 (85-115)	All TCL compounds	J (all detects)	P
C077S405	Bromofluorobenzene Toluene-d8	123 (85-120) 116 (85-115)	All TCL compounds	J (all detects)	P
051217AMB	Bromofluorobenzene	121 (85-120)	All TCL compounds	J (all detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49277/49278	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051216BLCS	Chloroethane Chloromethane Dichlorodifluoromethane	157 (40-155) 172 (50-130) 302 (35-135)	C077S411** C077S427 C077S406** 051216BMB	J (all detects) J (all detects) J (all detects)	P
051217ALCS	Naphthalene	135 (40-125)	C077S407 C077S408 C077S404 C077S403 C077S405 051217AMB	J (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits with the following exceptions:

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S444	1,4-Dichlorobenzene-d4	113384 (158720-634880)	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S404	1,4-Dichlorobenzene-d4	121016 (158080-632320)	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P
C077S403	1,4-Dichlorobenzene-d4	127712 (158080-632320)	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Volatiles - Data Qualification Summary - SDG 49277/49278

SDG	Sample	Compound	Flag	A or P	Reason
49277/ 49278	C077TB11	All TCL compounds	J (all detects) UJ (all non-detects)	A	Sample condition
49277/ 49278	C077S428 C077S442 C077S443 C077S444 C077S409** C077S410	Dichlorodifluoromethane	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49277/ 49278	C077S411** C077S427 C077S406**	Dichlorodifluoromethane Chloromethane Chloroethane Naphthalene	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49277/ 49278	C077S416 C077S417 C077S407 C077S408 C077S404 C077S403 C077S405	All TCL compounds	J (all detects)	P	Surrogate spikes (%R)
49277/ 49278	C077S428 C077S429 C077S415 C077S416 C077S417 C077S442 C077S443 C077S444 C077S409** C077S410 C077S411** C077S427 C077S406** C077S407 C077S408 C077S404 C077S403 C077S405 C077G137 C077G150 C077G127 C077G133 C077G126** C077R009 C077G142** C077G141 C077TB11 C077G121	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates

SDG	Sample	Compound	Flag	A or P	Reason
49277/ 49278	C077S411** C077S427 C077S406**	Chloroethane Chloromethane Dichlorodifluoromethane	J (all detects) J (all detects) J (all detects)	P	Laboratory control samples (%R)
49277/ 49278	C077S407 C077S408 C077S404 C077S403 C077S405	Naphthalene	J (all detects)	P	Laboratory control samples (%R)
49277/ 49278	C077S444 C077S404 C077S403	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P	Internal standards (area)

NAS Alameda Point, CTO 077
Volatiles - Laboratory Blank Data Qualification Summary - SDG 49277/49278

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49277/49278	C077S444	Methylene chloride	0.06U mg/Kg	A
49277/49278	C077S429	cis-1,2-Dichloroethene	0.010U mg/Kg	A
49277/49278	C077S415	cis-1,2-Dichloroethene	0.005U mg/Kg	A

NAS Alameda Point, CTO 077
Volatiles - Field Blank Data Qualification Summary - SDG 49277/49278

SDG	Sample	Compound	Modified Final Concentration	A or P
49277/49278	C077S444	Chloroform	0.006U mg/Kg	A
49277/49278	C077S404	Chloroform	0.005U mg/Kg	A
49277/49278	C077S403	Chloroform	0.005U mg/Kg	A

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 8, 2005

LDC Report Date: December 29, 2005

Matrix: Soil/Water

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49277/49278

Sample Identification

C077S428	C077G141
C077S429	C077G121
C077S415	C077S407MS
C077S416	C077S407MSD
C077S417	
C077S409**	
C077S410	
C077S411**	
C077S427	
C077S406**	
C077S407	
C077S408	
C077S404	
C077S403	
C077S405	
C077G137	
C077G127	
C077G126**	
C077R009	
C077G142**	

**Indicates sample underwent Level IV review

Introduction

This data review covers 17 soil samples and 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C using Selected Ion Monitoring (SIM) for Polynuclear Aromatic Hydrocarbons.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

Average relative response factors (RRF) for all target compounds and system monitoring compounds

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0% .

All of the continuing calibration RRF values were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polynuclear aromatic hydrocarbon contaminants were found in the method blanks.

Sample C077R009 was identified as a rinsate. No polynuclear aromatic hydrocarbon contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S429	2-Fluorobiphenyl Terphenyl-d14	52.4 (54-125) 51.2 (57-126)	All TCL compounds	J (all detects) UJ (all non-detects)	P
C077S416	2-Fluorobiphenyl Nitrobenzene-d5 Terphenyl-d14	32.7 (54-125) 35.7 (49-121) 39.6 (57-126)	All TCL compounds	J (all detects) UJ (all non-detects)	P
C077S417	2-Fluorobiphenyl Nitrobenzene-d5 Terphenyl-d14	48.6 (54-125) 39.4 (49-121) 55.6 (57-126)	All TCL compounds	J (all detects) UJ (all non-detects)	P
C077S404	2-Fluorobiphenyl Terphenyl-d14	52.2 (54-125) 51.4 (57-126)	All TCL compounds	J (all detects) UJ (all non-detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077S410 C077S427 C077G137 C077G127 C077G126** C077R009 C077G142** C077G141 C077G121	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S407MS/MSD	2-Methylnaphthalene	134 (53-101)	144 (53-101)	-	J (all detects)	A
(C077S428	Acenaphthylene	107 (53-102)	111 (53-102)	-	J (all detects)	
C077S429	Benzo(a)anthracene	133 (56-103)	127 (56-103)	-	J (all detects)	
C077S415	Benzo(a)pyrene	114 (53-103)	118 (53-103)	-	J (all detects)	
C077S416	Benzo(b)fluoranthene	128 (49-113)	138 (49-113)	-	J (all detects)	
C077S417	Dibenz(a,h)anthracene	110 (53-105)	115 (53-105)	-	J (all detects)	
C077S409**	Fluoranthene	118 (54-106)	120 (54-106)	-	J (all detects)	
C077S411**	Fluorene	-	106 (54-104)	-	J (all detects)	
C077S406**	Indeno(1,2,3-cd)pyrene	-	112 (47-109)	-	J (all detects)	
C077S407	Naphthalene	-	102 (49-100)	-	J (all detects)	
C077S408	Phenanthrene	120 (54-105)	120 (54-105)	-	J (all detects)	
C077S404	Pyrene	114 (55-104)	117 (55-104)	-	J (all detects)	
C077S403						
C077S405)						

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051222SLCS	2-Methylnaphthalene	137 (53-101)	C077S410	J (all detects)	P
	Acenaphthylene	108 (53-102)	C077S427	J (all detects)	
	Benzo(a)anthracene	116 (56-103)	051222SMB	J (all detects)	
	Benzo(a)pyrene	105 (53-103)		J (all detects)	
	Benzo(b)fluoranthene	129 (49-113)		J (all detects)	
	Fluoranthene	108 (54-106)		J (all detects)	
	Phenanthrene	110 (54-105)		J (all detects)	
	Pyrene	109 (55-104)		J (all detects)	

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Flag	A or P
C077S429 C077S415 C077S417	Benzo(b)fluoranthene Benzo(k)fluoranthene	Due to lack of resolution between these compounds in the samples, the laboratory performed the quantitation using the total peak area.	J (all detects) J (all detects)	A

Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 49277/49278

SDG	Sample	Compound	Flag	A or P	Reason
49277/ 49278	C077S429 C077S416 C077S417 C077S404	All TCL compounds	J (all detects) UJ (all non-detects)	P	Surrogate spikes (%R)
49277/ 49278	C077S410 C077S427 C077G137 C077G127 C077G126** C077R009 C077G142** C077G141 C077G121	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49277/ 49278	C077S428 C077S429 C077S415 C077S416 C077S417 C077S409** C077S411** C077S406** C077S407 C077S408 C077S404 C077S403 C077S405	2-Methylnaphthalene Acenaphthylene Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Dibenz(a,h)anthracene Fluoranthene Fluorene Indeno(1,2,3-cd)pyrene Naphthalene Phenanthrene Pyrene	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Matrix spike/Matrix spike duplicates (%R)
49277/ 49278	C077S410 C077S427	2-Methylnaphthalene Acenaphthylene Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Fluoranthene Phenanthrene Pyrene	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P	Laboratory control samples (%R)
49277/ 49278	C077S429 C077S415 C077S417	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) J (all detects)	A	Compound quantitation and CRQLs

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 49277/49278

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary - SDG 49277/49278

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14449

Chlorinated Pesticides & PCBs

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 7, 2005

LDC Report Date: December 30, 2005

Matrix: Soil/Water

Parameters: Chlorinated Pesticides & PCBs

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49265/49267

Sample Identification

C077S413	C077SW01
C077S412	C077R008
C077S414	C077G131
C077S421	C077S114MS
C077S424	C077S114MSD
C077S425	
C077S426	
C077S119	
C077S120	
C077S117	
C077S118	
C077S115	
C077S116	
C077S113	
C077S114	
C077S111	
C077S112	
C077G132	
C077G130	
C077G155	

Introduction

This data review covers 17 soil samples and 8 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 8081A and 8082 for Chlorinated Pesticides and PCBs.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical or advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compound	Flag	A or P
12/14/05	1212094	DB-35MS	4,4'-DDT	22.5	051212A-BLK	4,4'-DDT	J (all detects) UJ (all non-detects)	A
12/14/05	1212111	DB-35MS	alpha-BHC beta-BHC gamma-BHC Endrin Endosulfan II 4,4'-DDD 4,4'-DDT	17.0 15.5 15.8 15.6 17.5 20.0 18.6	C077G132 C077G130 C077G155	alpha-BHC beta-BHC gamma-BHC Endrin Endosulfan II 4,4'-DDD 4,4'-DDT	J (all detects) UJ (all non-detects)	A
12/14/05	1212111	DB-XLB	Endrin	18.3	C077G132 C077G130 C077G155	Endrin	J (all detects) UJ (all non-detects)	A

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compound	Flag	A or P
12/15/05	1212126	DB-5MS	alpha-BHC gamma-BHC Heptachlor 4,4'-DDE Endrin 4,4'-DDD 4,4'-DDT	21.2 16.3 18.0 17.8 20.5 24.6 28.2	C077SW01 C077R008 C077G131	alpha-BHC gamma-BHC Heptachlor 4,4'-DDE Endrin 4,4'-DDD 4,4'-DDT	J (all detects) UJ (all non-detects)	A
12/15/05	1212128	DB-XLB	Aroclor-1260	17.6	C077SW01 C077R008 C077G131	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/18/05	1216044	DB-35MS	alpha-BHC Aldrin Dieldrin 4,4'-DDD 4,4'-DDT	17 17 16 20 16	C077S413 C077S412 C077S414 C077S421 C077S424 C077S425 051213C-BLK	alpha-BHC Aldrin Dieldrin 4,4'-DDD 4,4'-DDT	J (all detects) UJ (all non-detects)	A
12/18/05	1216044	DB-XLB	alpha-BHC gamma-BHC Heptachlor epoxide alpha-Chlordane 4,4'-DDE Dieldrin Endosulfan II 4,4'-DDD Endrin aldehyde 4,4'-DDT	18 17 16 16 20 17 16 18 20 18	C077S413 C077S412 C077S414 C077S421 C077S424 C077S425 051213C-BLK	alpha-BHC gamma-BHC Heptachlor epoxide alpha-Chlordane 4,4'-DDE Dieldrin Endosulfan II 4,4'-DDD Endrin aldehyde 4,4'-DDT	J (all detects) UJ (all non-detects)	A
12/18/05	1216046	DB-XLB	Aroclor-1260	19.0	C077S413 C077S412 C077S414 C077S421 C077S424 C077S425 051213C-BLK	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/18/05	1216062	DB-35MS	alpha-BHC Aldrin 4,4'-DDD	20 16 17	C077S426	alpha-BHC Aldrin 4,4'-DDD	J (all detects) UJ (all non-detects)	A
12/18/05	1216062	DB-XLB	alpha-BHC	16	C077S426	alpha-BHC	J (all detects) UJ (all non-detects)	A

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compound	Flag	A or P
12/18/05	1216064	DB-XLB	Aroclor-1260	15.2	C077S426 C077S119 C077S120 C077S117 C077S118 C077S115 C077S116 C077S113 C077S114 C077S111	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/19/05	1216078	DB-XLB	Aroclor-1260	16.9	C077S112	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/19/05	1216105	DB-XLB	Aroclor-1260	19.1	C077S114MS C077S114MSD	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A

Initial calibration verification (ICV) percent differences (%D) were less than or equal to 25.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/15/05	Toxaphene	15.2	C077S413 C077S412 C077S414 C077S421 C077S424 C077S425 C077S426 051213CBLK	J (all detects) UJ (all non-detects)	A

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide or PCB contaminants were found in the method blanks.

Sample C077R008 was identified as a rinsate. No chlorinated pesticide or PCB contaminants were found in this blank.

Sample C077SW01 was identified as a source blank. No chlorinated pesticide or PCB contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for samples C077S120 and C077S114. Since the samples were diluted out, no data were qualified.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077S413 C077S412 C077S414 C077S421 C077S424 C077S425 C077S426 C077G132 C077G130 C077G155 C077SW01 C077R008 C077G131	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. *Pesticide Cleanup Checks*

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and Reported CRQLs

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples C077G130 and C077G131 were identified as field duplicates. No chlorinated pesticides or PCBs were detected in any of the samples.

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Data Qualification Summary - SDG 49265/49267

SDG	Sample	Compound	Flag	A or P	Reason
49265/ 49267	C077G132 C077G130 C077G155	alpha-BHC beta-BHC gamma-BHC Endrin Endosulfan II 4,4'-DDD 4,4'-DDT	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49265/ 49267	C077SW01 C077R008 C077G131	alpha-BHC gamma-BHC Heptachlor 4,4'-DDE Endrin 4,4'-DDD 4,4'-DDT Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49265/ 49267	C077S413 C077S412 C077S414 C077S421 C077S424 C077S425	alpha-BHC Aldrin Dieldrin 4,4'-DDD 4,4'-DDT gamma-BHC Heptachlor epoxide alpha-Chlordane 4,4'-DDE Endosulfan II Endrin aldehyde Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49265/ 49267	C077S426	alpha-BHC Aldrin 4,4'-DDD	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49265/ 49267	C077S426 C077S119 C077S120 C077S117 C077S118 C077S115 C077S116 C077S113 C077S114 C077S111 C077S112	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)

SDG	Sample	Compound	Flag	A or P	Reason
49265/ 49267	C077S413 C077S412 C077S414 C077S421 C077S424 C077S425 C077S426	Toxaphene	J (all detects) UJ (all non-detects)	A	Continuing calibration (ICV %D)
49265/ 49267	C077S413 C077S412 C077S414 C077S421 C077S424 C077S425 C077S426 C077G132 C077G130 C077G155 C077SW01 C077R008 C077G131	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Laboratory Blank Data Qualification Summary - SDG 49265/49267

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Field Blank Data Qualification Summary - SDG 49265/49267

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 8, 2005

LDC Report Date: December 29, 2005

Matrix: Soil/Water

Parameters: Chlorinated Pesticides & PCBs

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49277/49278

Sample Identification

C077S428	C077G121
C077S429	C077G126MS
C077S415	C077G126MSD
C077S416	
C077S417	
C077S409**	
C077S410	
C077S411**	
C077S427	
C077S406**	
C077S407	
C077S408	
C077S404	
C077S403	
C077S405	
C077G137	
C077G126**	
C077R009	
C077G142**	
C077G141	

**Indicates sample underwent Level IV review.

Introduction

This data review covers 15 soil samples and 8 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 8081A and 8082 for Chlorinated Pesticides and PCBs.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical or advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

Retention time windows were evaluated and considered technically acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compounds	Flag	A or P
12/15/05	1212126	DB-35MS	alpha-BHC gamma-BHC Heptachlor 4,4'-DDE Endrin 4,4'-DDD 4,4'-DDT	21.2 16.3 18.0 17.8 20.5 24.6 28.2	051214-Blk	alpha-BHC gamma-BHC Heptachlor 4,4'-DDE Endrin 4,4'-DDD 4,4'-DDT	J (all detects) UJ (all non-detects)	A
12/15/05	1212128	DB-XLB	Aroclor-1260	17.6	051214-Blk	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compounds	Flag	A or P
12/16/05	1212161	DB-35MS	Endosulfan II 4,4'-DDD 4,4'-DDT	15.7 17.1 16.9	C077S428 C077S415 C077S416 C077S409** C077S410 C077S411** C077S427 C077S406**	Endosulfan II 4,4'-DDD 4,4'-DDT	J (all detects) UJ (all non-detects)	A
12/16/05	1212175	DB-35MS	alpha-BHC gamma-BHC Heptachlor Aldrin Heptachlor epoxide 4,4'-DDE Dieldrin Endrin Endosulfan II 4,4'-DDD 4,4'-DDT	25.0 20.1 21.7 18.0 17.7 25.2 18.5 26.1 18.0 27.3 26.2	C077S407 C077S408 C077S404 C077S403	alpha-BHC gamma-BHC Heptachlor Aldrin Heptachlor epoxide 4,4'-DDE Dieldrin Endrin Endosulfan II 4,4'-DDD 4,4'-DDT	J (all detects) UJ (all non-detects)	A
12/16/05	1212190	DB-35MS	alpha-BHC gamma-BHC Heptachlor Dieldrin	19.5 16.2 15.4 15.6	C077S405 051219A-Blk	alpha-BHC gamma-BHC Heptachlor Dieldrin	J (all detects) UJ (all non-detects)	A
12/16/05	1212190	DB-XLB	alpha-BHC	17.1	C077S405 051219A-Blk	alpha-BHC	J (all detects) UJ (all non-detects)	A
12/16/05	1215024	DB-35MS	4,4'-DDD	16	C077G137 C077G126** C077G126MS C077G126MSD 051213W-Blk	4,4'-DDD	J (all detects) UJ (all non-detects)	A
12/15/05	1215024	DB-XLB	Endosulfan II 4,4'-DDD	17 16	C077G137 C077G126** C077G126MS C077G126MSD 051213W-Blk	Endosulfan II 4,4'-DDD	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A
12/15/05	1215025	DB-35MS	Toxaphene	15.1	C077G137 C077G126** C077G126MS C077G126MSD 051213W-Blk	Toxaphene	J (all detects) UJ (all non-detects)	A
12/15/05	1215042	DB-35MS	4,4'-DDD	27	C077R009 C077G142** C077G141 C077G121	4,4'-DDD	J (all detects) UJ (all non-detects)	A

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compounds	Flag	A or P
12/15/05	1215042	DB-XLB	4,4'-DDD	27	C077R009 C077G142** C077G141 C077G121	4,4'-DDD	J (all detects) UJ (all non-detects)	A

Initial calibration verification (ICV) percent differences (%D) were less than or equal to 15.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/15/05	Toxaphene	15.2	All water samples in SDG 49277/49278	J (all detects) UJ (all non-detects)	A

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

Retention times (RT) of all compounds in the calibration standards were within QC limits for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide or PCB contaminants were found in the method blanks.

Sample C077R009 was identified as a rinsate. No chlorinated pesticide or PCB contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All soil samples in SDG 49277/49278	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and Reported CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which an Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Data Qualification Summary - SDG 49277/49278

SDG	Sample	Compound	Flag	A or P	Reason
49277/ 49278	C077S428 C077S415 C077S416 C077S409** C077S410 C077S411** C077S427 C077S406**	Endosulfan II 4,4'-DDD 4,4'-DDT	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49277/ 49278	C077S407 C077S408 C077S404 C077S403	alpha-BHC gamma-BHC Heptachlor Aldrin Heptachlor epoxide 4,4'-DDE Dieldrin Endrin Endosulfan II 4,4'-DDD 4,4'-DDT	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49277/ 49278	C077S405	alpha-BHC gamma-BHC Heptachlor Dieldrin	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49277/ 49278	C077G137 C077G126**	4,4'-DDD Endosulfan II Toxaphene	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49277/ 49278	C077R009 C077G142** C077G141 C077G121	4,4'-DDD	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49277/ 49278	C077G137 C077G126** C077R009 C077G142** C077G141 C077G121	Toxaphene	J (all detects) UJ (all non-detects)	A	Continuing calibration (ICV %D)

SDG	Sample	Compound	Flag	A or P	Reason
49277/ 49278	C077S428 C077S429 C077S415 C077S416 C077S417 C077S409** C077S410 C077S411** C077S427 C077S406** C077S407 C077S408 C077S404 C077S403 C077S405	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Laboratory Blank Data Qualification Summary - SDG 49277/49278

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Field Blank Data Qualification Summary - SDG 49277/49278

No Sample Data Qualified in this SDG

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Data Validation Reports
LDC# 14449

Metals

SDG	Sample	Analyte	Modified Final Concentration	A or P
49265/49267	C077S425	Mercury Selenium	0.034U mg/Kg 0.42U mg/Kg	A
49265/49267	C077S426	Mercury Selenium	0.051U mg/Kg 0.3U mg/Kg	A

NAS Alameda Point, CTO 077
Metals - Field Blank Data Qualification Summary - SDG 49265/49267

SDG	Sample	Analyte	Modified Final Concentration	A or P
49265/49267	C077G136	Cobalt	3.3U ug/L	A
49265/49267	C077S413	Sodium	118U mg/Kg	A
49265/49267	C077S412	Sodium	59.7U mg/Kg	A
49265/49267	C077S414	Sodium	284U mg/Kg	A
49265/49267	C077S421	Sodium	210U mg/Kg	A
49265/49267	C077S422	Sodium	153U mg/Kg	A
49265/49267	C077S423	Sodium	275U mg/Kg	A
49265/49267	C077S419	Sodium	457U mg/Kg	A
49265/49267	C077S420	Sodium	264U mg/Kg	A
49265/49267	C077S425	Sodium	182U mg/Kg	A
49265/49267	C077S426	Sodium	449U mg/Kg	A

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 7, 2005

LDC Report Date: December 28, 2005

Matrix: Soil/Water

Parameters: Metals

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49265/49267

Sample Identification

C077S413	C077S413MSD
C077S412	C077S423MS
C077S414	C077S423MSD
C077S421	C077G136MS
C077S422	C077G136MSD
C077S423	
C077S418	
C077S419	
C077S420	
C077S424	
C077S425	
C077S426	
C077G132	
C077G130	
C077G155	
C077SW01	
C077G135	
C077G136	
C077R008	
C077S413MS	

Introduction

This data review covers 16 soil samples and 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 6010B and 7000 for Metals. The metals analyzed were Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Aluminum Antimony Cobalt Potassium	30.09 ug/L 3.8 ug/L 4.59 ug/L 171.3 ug/L	C077G136 C077R008
ICB/CCB	Mercury	0.167 ug/L	All water samples in SDG 49265/49267
ICB/CCB	Sodium	874.5 ug/L	C077R008
ICB/CCB	Antimony Lead Manganese Selenium Thallium	3.693 ug/L 2.678 ug/L 1.443 ug/L 3.767 ug/L 2.353 ug/L	C077G132 C077G130 C077G155 C077SW01 C077G135
ICB/CCB	Potassium	115.8 ug/L	C077G130 C077G155 C077SW01 C077G135
ICB/CCB	Sodium	465.7 ug/L	C077SW01
PB (prep blank)	Chromium	0.149 mg/Kg	All soil samples in SDG 49265/49267

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Arsenic Chromium Mercury Selenium	2.563 ug/L 0.84 ug/L 0.161 ug/L 3.891 ug/L	All soil samples in SDG 49265/49267

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G136	Cobalt	3.3 ug/L	3.3U ug/L
C077R008	Antimony Cobalt Potassium Sodium	3.5 ug/L 4.3 ug/L 241 ug/L 1010 ug/L	3.5U ug/L 4.3U ug/L 241U ug/L 1010U ug/L
C077G132	Selenium	4.6 ug/L	4.6U ug/L
C077G130	Selenium	3.7 ug/L	3.7U ug/L
C077SW01	Manganese Potassium Sodium	1.5 ug/L 217 ug/L 974 ug/L	1.5U ug/L 217U ug/L 974U ug/L
C077G135	Selenium	4.7 ug/L	4.7U ug/L
C077S413	Mercury Selenium	0.031 mg/Kg 0.31 mg/Kg	0.031U mg/Kg 0.31U mg/Kg
C077S412	Mercury Selenium	0.023 mg/Kg 0.49 mg/Kg	0.023U mg/Kg 0.49U mg/Kg
C077S421	Mercury Selenium	0.04 mg/Kg 0.5 mg/Kg	0.04U mg/Kg 0.5U mg/Kg
C077S422	Mercury	0.037 mg/Kg	0.037U mg/Kg
C077S423	Mercury Selenium	0.11 mg/Kg 0.35 mg/Kg	0.11U mg/Kg 0.35U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S418	Selenium	0.78 mg/Kg	0.78U mg/Kg
C077S419	Mercury Selenium	0.043 mg/Kg 0.39 mg/Kg	0.043U mg/Kg 0.39U mg/Kg
C077S420	Mercury	0.073 mg/Kg	0.073U mg/Kg
C077S424	Mercury Selenium	0.072 mg/Kg 1.2 mg/Kg	0.072U mg/Kg 1.2U mg/Kg
C077S425	Mercury Selenium	0.034 mg/Kg 0.42 mg/Kg	0.034U mg/Kg 0.42U mg/Kg
C077S426	Mercury Selenium	0.051 mg/Kg 0.3 mg/Kg	0.051U mg/Kg 0.3U mg/Kg

Sample C077R008 was identified as a rinsate. No metal contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
C077R008	12/7/05	Antimony Cobalt Magnesium Potassium Sodium	3.5 ug/L 4.3 ug/L 60.7 ug/L 241 ug/L 1010 ug/L	C077S413 C077S412 C077S414 C077S421 C077S422 C077S423 C077S418 C077S419 C077S420 C077S424 C077S425 C077S426 C077G132 C077G130 C077G155 C077G135 C077G136

Sample C077SW01 was identified as a source blank. No metal contaminants were found in this blank with the following exceptions:

Source Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
C077SW01	12/7/05	Calcium Copper Magnesium Manganese Potassium Sodium	28.3 ug/L 3.3 ug/L 61.8 ug/L 1.5 ug/L 217 ug/L 974 ug/L	C077S413 C077S412 C077S414 C077S421 C077S422 C077S423 C077S418 C077S419 C077S420 C077S424 C077S425 C077S426 C077G132 C077G130 C077G155 C077G135 C077G136

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G136	Cobalt	3.3 ug/L	3.3U ug/L
C077S413	Sodium	118 mg/Kg	118U mg/Kg
C077S412	Sodium	59.7 mg/Kg	59.7U mg/Kg
C077S414	Sodium	284 mg/Kg	284U mg/Kg
C077S421	Sodium	210 mg/Kg	210U mg/Kg
C077S422	Sodium	153 mg/Kg	153U mg/Kg
C077S423	Sodium	275 mg/Kg	275U mg/Kg
C077S419	Sodium	457 mg/Kg	457U mg/Kg
C077S420	Sodium	264 mg/Kg	264U mg/Kg
C077S425	Sodium	182 mg/Kg	182U mg/Kg
C077S426	Sodium	449 mg/Kg	449U mg/Kg

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077G136MS/MSD (All water samples in SDG 49265/49267)	Aluminum	79.5 (80-120)	-	-	J (all detects) UJ (all non-detects)	A
C077S413MS/MSD (All soil samples in SDG 49265/49267)	Antimony Calcium	72.1 (80-120) 44.7 (80-120)	72.2 (80-120) 41.4 (80-120)	- -	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A
C077S413MS/MSD (All soil samples in SDG 49265/49267)	Barium	31.4 (80-120)	21.9 (80-120)	-	J (all detects) R (all non-detects)	A
C077S423MS/MSD (All soil samples in SDG 49265/49267)	Antimony Barium Manganese	66.2 (80-120) - -	64.7 (80-120) 69.9 (80-120) 76.4 (80-120)	- - -	J (all detects) UJ (all non-detects)	A

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Internal Standards

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
C077G136L	Barium Calcium Potassium Magnesium Manganese	26.3 (≤10) 24.7 (≤10) 19.2 (≤10) 27.4 (≤10) 25.8 (≤10)	All water samples in SDG 49265/49267	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
C077S413L	Cobalt	11.9 (≤10)	All soil samples in SDG 49265/49267	J (all detects)	A

XI. Sample Result Verification

Raw data were not reviewed for this SDG.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been qualified.

XIII. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Metals - Data Qualification Summary - SDG 49265/49267

SDG	Sample	Analyte	Flag	A or P	Reason
49265/ 49267	C077G132 C077G130 C077G155 C077SW01 C077G135 C077G136 C077R008	Aluminum	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49265/ 49267	C077S413 C077S412 C077S414 C077S421 C077S422 C077S423 C077S418 C077S419 C077S420 C077S424 C077S425 C077S426	Antimony Calcium Barium Manganese	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49265/ 49267	C077S413 C077S412 C077S414 C077S421 C077S422 C077S423 C077S418 C077S419 C077S420 C077S424 C077S425 C077S426	Barium	J (all detects) R (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49265/ 49267	C077G132 C077G130 C077G155 C077SW01 C077G135 C077G136 C077R008	Barium Calcium Potassium Magnesium Manganese	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	ICP serial dilution (%D)
49265/ 49267	C077S413 C077S412 C077S414 C077S421 C077S422 C077S423 C077S418 C077S419 C077S420 C077S424 C077S425 C077S426	Cobalt	J (all detects)		ICP serial dilution (%D)

NAS Alameda Point, CTO 077
Metals - Laboratory Blank Data Qualification Summary - SDG 49265/49267

SDG	Sample	Analyte	Modified Final Concentration	A or P
49265/49267	C077G136	Cobalt	3.3U ug/L	A
49265/49267	C077R008	Antimony Cobalt Potassium Sodium	3.5U ug/L 4.3U ug/L 241U ug/L 1010U ug/L	A
49265/49267	C077G132	Selenium	4.6U ug/L	A
49265/49267	C077G130	Selenium	3.7U ug/L	A
49265/49267	C077SW01	Manganese Potassium Sodium	1.5U ug/L 217U ug/L 974U ug/L	A
49265/49267	C077G135	Selenium	4.7U ug/L	A
49265/49267	C077S413	Mercury Selenium	0.031U mg/Kg 0.31U mg/Kg	A
49265/49267	C077S412	Mercury Selenium	0.023U mg/Kg 0.49U mg/Kg	A
49265/49267	C077S421	Mercury Selenium	0.04U mg/Kg 0.5U mg/Kg	A
49265/49267	C077S422	Mercury	0.037U mg/Kg	A
49265/49267	C077S423	Mercury Selenium	0.11U mg/Kg 0.35U mg/Kg	A
49265/49267	C077S418	Selenium	0.78U mg/Kg	A
49265/49267	C077S419	Mercury Selenium	0.043U mg/Kg 0.39U mg/Kg	A
49265/49267	C077S420	Mercury	0.073U mg/Kg	A
49265/49267	C077S424	Mercury Selenium	0.072U mg/Kg 1.2U mg/Kg	A

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 8, 2005

LDC Report Date: December 29, 2005

Matrix: Soil/Water

Parameters: Metals

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): *49277/49278*

Sample Identification

C077S428	C077G127
C077S429	C077G133
C077S415	C077G126**
C077S416	C077R009
C077S417	C077G142**
C077S442	C077G141
C077S443	C077G121
C077S444	C077G138
C077S409**	C077G134
C077S410	C077G145
C077S411**	C077G143
C077S427	C077SW01
C077S406**	C077S407MS
C077S407	C077S407DUP
C077S408	C077G150MS
C077S404	C077G150MSD
C077S403	C077G145MS
C077S405	C077G145MSD
C077G137	
C077G150	

**Indicates sample underwent Level IV review

Introduction

This data review covers 20 soil samples and 18 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 6010B, 7000, and EPA Method 1631E for Metals. The metals analyzed were Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P *Indicates the finding is related to a protocol/contractual deviation.*

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

All samples were received in good condition with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
C077G145 C077G143	Mercury	For this analyte, these samples arrived in Polyethylene (HDPE) bottles.	All samples must be stored in fluoropolymer or glass bottles per EPA Method 1613E.	J (all detects) UJ (all non-detects)	A

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Aluminum Antimony Chromium Cobalt	46.19 ug/L 2.265 ug/L 1.399 ug/L 1.282 ug/L	C077G137 C077G150 C077G127 C077G133 C077G126** C077R009 C077G142** C077G141 C077G121 C077G138 C077G134
ICB/CCB	Aluminum Antimony Cobalt	30.9 ug/L 3.8 ug/L 4.59 ug/L	C077G137 C077G150

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Mercury	0.133 ug/L	C077G137 C077G133 C077G126** C077R009 C077G121 C077G138 C077G134
ICB/CCB	Potassium	171.3 ug/L	C077G150
ICB/CCB	Aluminum Antimony Cobalt	21.29 ug/L 4.913 ug/L 1.451 ug/L	C077R009
ICB/CCB	Antimony Cobalt Selenium	3.976 ug/L 1.245 ug/L 4.718 ug/L	C077G127 C077G133 C077G126** C077R009 C077G142** C077G141 C077G121 C077G138 C077G134 C077G145
PB (prep blank)	Chromium	0.101 mg/Kg	All soil samples in SDG 49277/49278
ICB/CCB	Arsenic Chromium Selenium	2.563 ug/L 0.297 ug/L 3.581 ug/L	All soil samples in SDG 49277/49278

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G137	Chromium Mercury	4.6 ug/L 0.12 ug/L	4.6U ug/L 0.12U ug/L
C077G150	Chromium Cobalt	4.3 ug/L 1.7 ug/L	4.3U ug/L 1.7U ug/L
C077R009	Cobalt Mercury	1.3 ug/L 0.061 ug/L	1.3U ug/L 0.061U ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G127	Chromium Selenium	4.8 ug/L 11.7 ug/L	4.8U ug/L 11.7U ug/L
C077G133	Chromium Mercury Selenium	2.5 ug/L 0.13 ug/L 6.2 ug/L	2.5U ug/L 0.13U ug/L 6.2U ug/L
C077G126**	Chromium Mercury Selenium	1.7 ug/L 0.086 ug/L 6.6 ug/L	1.7U ug/L 0.086U ug/L 6.6U ug/L
C077G142** (5x)	Selenium	28.1 ug/L	28.1U ug/L
C077G141	Chromium Selenium	5.5 ug/L 5.5 ug/L	5.5U ug/L 5.5U ug/L
C077G121	Chromium Cobalt Mercury Selenium	2.1 ug/L 0.96 ug/L 0.062 ug/L 7.6 ug/L	2.1U ug/L 0.96U ug/L 0.062U ug/L 7.6U ug/L
C077G138	Chromium Mercury Selenium	6.2 ug/L 0.098 ug/L 8.0 ug/L	6.2U ug/L 0.098U ug/L 8.0U ug/L
C077G134	Chromium Mercury Selenium	1.9 ug/L 0.13 ug/L 7.9 ug/L	1.9U ug/L 0.13U ug/L 7.9U ug/L
C077S415	Selenium	0.35 mg/Kg	0.35U mg/Kg
C077S416	Selenium	0.38 mg/Kg	0.38U mg/Kg
C077S443	Selenium	0.42 mg/Kg	0.42U mg/Kg
C077S409**	Selenium	0.5 mg/Kg	0.5U mg/Kg
C077S410	Selenium	0.44 mg/Kg	0.44U mg/Kg
C077S427	Selenium	0.48 mg/Kg	0.48U mg/Kg
C077S406**	Selenium	0.5 mg/Kg	0.5U mg/Kg
C077S407	Selenium	0.37 mg/Kg	0.37U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S403	Arsenic	1.1 mg/Kg	1.1U mg/Kg

Sample C077R009 was identified as a rinsate. No metal contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
C077R009	12/8/05	Cobalt Magnesium	1.3 ug/L 74.9 ug/L	C077S428 C077S429 C077S415 C077S416 C077S417 C077S442 C077S443 C077S444 C077S409** C077S410 C077S411** C077S427 C077S406** C077S407 C077S408 C077S404 C077S403 C077S405 C077G137 C077G150 C077G127 C077G133 C077G126** C077G142** C077G141 C077G121 C077G138 C077G134

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
C077R009	12/8/05	Mercury	0.061 ug/L	C077S428 C077S429 C077S415 C077S416 C077S417 C077S442 C077S443 C077S444 C077S409** C077S410 C077S411** C077S427 C077S406** C077S407 C077S408 C077S404 C077S403 C077S405 C077G137 C077G133 C077G126** C077G121 C077G138 C077G134

Sample C077SW01 was identified as a source water. No metal contaminants were found in this blank with the following exceptions:

Source Water ID	Sampling Date	Analyte	Concentration	Associated Samples
C077SW01	12/8/05	Mercury	0.150 ng/L	C077G150 C077G127 C077G142** C077G141 C077G145 C077G143

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S415	Mercury	0.019 mg/Kg	0.019U mg/Kg
C077S416	Mercury	0.026 mg/Kg	0.026U mg/Kg
C077S417	Mercury	0.046 mg/Kg	0.046U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S411**	Mercury	0.04 mg/Kg	0.04U mg/Kg
C077S427	Mercury	0.021 mg/Kg	0.021U mg/Kg
C077S407	Mercury	0.019 mg/Kg	0.019U mg/Kg
C077S408	Mercury	0.024 mg/Kg	0.024U mg/Kg
C077S403	Mercury	0.037 mg/Kg	0.037U mg/Kg
C077S405	Mercury	0.02 mg/Kg	0.02U mg/Kg
C077G137	Mercury	0.12 ug/L	0.12U ug/L
C077G150	Cobalt	1.7 ug/L	1.7U ug/L
C077G133	Mercury	0.13 ug/L	0.13U ug/L
C077G126**	Mercury	0.086 ug/L	0.086U ug/L
C077G121	Cobalt Mercury	0.96 ug/L 0.062 ug/L	0.96U ug/L 0.062U ug/L
C077G138	Mercury	0.098 ug/L	0.098U ug/L
C077G134	Mercury	0.13 ug/L	0.13U ug/L

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
C077G150 C077G133 C077G126** C077R009 C077G121 C077G138 C077G134	Mercury	No MS associated with these samples.	MS required.	None	P
All soil samples in SDG 49277/49278	All ICP metals	No MS associated with these samples.	MS required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077G150MS/MSD	Aluminum	79.0 (80-120)	70.0 (80-120)	-	J (all detects)	A
(C077G150	Antimony	-	77.6 (80-120)	-	UJ (all non-detects)	
C077G127	Barium	-	71.6 (80-120)	-		
C077G133	Beryllium	-	71.7 (80-120)	-		
C077G126**	Calcium	-	56.4 (80-120)	-		
C077R009	Chromium	-	76.3 (80-120)	-		
C077G142**	Iron	-	54.0 (80-120)	-		
C077G141	Magnesium	-	55.2 (80-120)	-		
C077G121	Manganese	-	54.4 (80-120)	-		
C077G138	Nickel	-	78.4 (80-120)	-		
C077G134				-		
C077G137)						

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
C077G150 C077G133 C077G126** C077R009 C077G121 C077G138 C077G134	Mercury	No DUP analysis associated with these samples.	DUP analysis required.	None	P
All soil samples in SDG 49277/49278	All ICP metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P

Results were within QC limits.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Internal Standards

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met.

XI. Sample Result Verification

All sample result verifications were acceptable for samples on which a NFESC Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been qualified.

XIII. Field Duplicates

Samples C077G137 and C077G138 and samples C077G133 and C077G134 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/L)		RPD
	C077G137	C077G138	
Arsenic	3.9	7.4	62
Barium	159	234	38
Beryllium	2U	0.28	200
Calcium	20900	35400	52
Chromium	4.6	6.2	30

Analyte	Concentration (ug/L)		RPD
	C077G137	C077G138	
Iron	3260	4900	40
Magnesium	32400	55800	53
Manganese	215	367	52
Mercury	0.12	0.098	20
Potassium	54200	52900	2
Selenium	4.3	8.0	60
Sodium	1220000	1220000	0
Vanadium	4.2	7.0	50

Analyte	Concentration (ug/L)		RPD
	C077G133	C077G134	
Arsenic	5.6	7.1	24
Barium	141	142	1
Calcium	45100	44500	1
Chromium	2.5	1.9	27
Iron	191	196	3
Magnesium	18500	18200	2
Manganese	346	345	0
Mercury	0.13	0.13	0
Potassium	27000	27800	3
Selenium	6.2	7.9	24
Sodium	257000	265000	3
Vanadium	2.1	1.9	10

NAS Alameda Point, CTO 077
Metals - Data Qualification Summary - SDG 49277/49278

SDG	Sample	Analyte	Flag	A or P	Reason
49277/ 49278	C077G145 C077G143	Mercury	J (all detects) UJ (all non-detects)	A	Technical holding times
49277/ 49278	C077G150 C077G133 C077G126** C077R009 C077G121 C077G138 C077G134	Mercury	None	P	Matrix spike analysis
49277/ 49278	C077S428 C077S429 C077S415 C077S416 C077S417 C077S442 C077S443 C077S444 C077S409** C077S410 C077S411** C077S427 C077S406** C077S407 C077S408 C077S404 C077S403 C077S405	All ICP metals	None	P	Matrix spike analysis
49277/ 49278	C077G150 C077G127 C077G133 C077G126** C077R009 C077G142** C077G141 C077G121 C077G138 C077G134 C077G137	Aluminum Antimony Barium Beryllium Calcium Chromium Iron Magnesium Manganese Nickel	J (all detects) UJ (all non-detects)	A	Matrix spike analysis (%R)
49277/ 49278	C077G150 C077G133 C077G126** C077R009 C077G121 C077G138 C077G134	Mercury	None	P	Duplicate analysis

SDG	Sample	Analyte	Flag	A or P	Reason
49277/ 49278	C077S428 C077S429 C077S415 C077S416 C077S417 C077S442 C077S443 C077S444 C077S409** C077S410 C077S411** C077S427 C077S406** C077S407 C077S408 C077S404 C077S403 C077S405	All ICP metals	None	P	Duplicate analysis

NAS Alameda Point, CTO 077
Metals - Laboratory Blank Data Qualification Summary - SDG 49277/49278

SDG	Sample	Analyte	Modified Final Concentration	A or P
49277/ 49278	C077G137	Chromium Mercury	4.6U ug/L 0.12U ug/L	A
49277/ 49278	C077G150	Chromium Cobalt	4.3U ug/L 1.7U ug/L	A
49277/ 49278	C077R009	Cobalt Mercury	1.3U ug/L 0.061U ug/L	A
49277/ 49278	C077G127	Chromium Selenium	4.8U ug/L 11.7U ug/L	A
49277/ 49278	C077G133	Chromium Mercury Selenium	2.5U ug/L 0.13U ug/L 6.2U ug/L	A
49277/ 49278	C077G126**	Chromium Mercury Selenium	1.7U ug/L 0.086U ug/L 6.6U ug/L	A
49277/ 49278	C077G142** (5x)	Selenium	28.1U ug/L	A
49277/ 49278	C077G141	Chromium Selenium	5.5U ug/L 5.5U ug/L	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49277/ 49278	C077G121	Chromium Cobalt Mercury Selenium	2.1U ug/L 0.96U ug/L 0.062U ug/L 7.6U ug/L	A
49277/ 49278	C077G138	Chromium Mercury Selenium	6.2U ug/L 0.098U ug/L 8.0U ug/L	A
49277/ 49278	C077G134	Chromium Mercury Selenium	1.9U ug/L 0.13U ug/L 7.9U ug/L	A
49277/ 49278	C077S415	Selenium	0.35U mg/Kg	A
49277/ 49278	C077S416	Selenium	0.38U mg/Kg	A
49277/ 49278	C077S443	Selenium	0.42U mg/Kg	A
49277/ 49278	C077S409**	Selenium	0.5U mg/Kg	A
49277/ 49278	C077S410	Selenium	0.44U mg/Kg	A
49277/ 49278	C077S427	Selenium	0.48U mg/Kg	A
49277/ 49278	C077S406**	Selenium	0.5U mg/Kg	A
49277/ 49278	C077S407	Selenium	0.37U mg/Kg	A
49277/ 49278	C077S403	Arsenic	1.1U mg/Kg	A

NAS Alameda Point, CTO 077
Metals - Field Blank Data Qualification Summary - SDG 49277/49278

SDG	Sample	Analyte	Modified Final Concentration	A or P
49277/ 49278	C077S415	Mercury	0.019U mg/Kg	A
49277/ 49278	C077S416	Mercury	0.026U mg/Kg	A
49277/ 49278	C077S417	Mercury	0.046U mg/Kg	A
49277/ 49278	C077S411**	Mercury	0.04U mg/Kg	A
49277/ 49278	C077S427	Mercury	0.021U mg/Kg	A
49277/ 49278	C077S407	Mercury	0.019U mg/Kg	A
49277/ 49278	C077S408	Mercury	0.024U mg/Kg	A
49277/ 49278	C077S403	Mercury	0.037U mg/Kg	A
49277/ 49278	C077S405	Mercury	0.02U mg/Kg	A
49277/ 49278	C077G137	Mercury	0.12U ug/L	A
49277/ 49278	C077G150	Cobalt	1.7U ug/L	A
49277/ 49278	C077G133	Mercury	0.13U ug/L	A
49277/ 49278	C077G126**	Mercury	0.086U ug/L	A
49277/ 49278	C077G121	Cobalt Mercury	0.96U ug/L 0.062U ug/L	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49277/ 49278	C077G138	Mercury	0.098U ug/L	A
49277/ 49278	C077G134	Mercury	0.13U ug/L	A

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14449

TPH as Gasoline

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 7, 2005

LDC Report Date: December 28, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Gasoline

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49265/49267

Sample Identification

C077S413
C077S412
C077S414
C077S424
C077S425
C077S426
C077G132
C077G130
C077G155
C077SW01
C077R008

Introduction

This data review covers 6 soil samples and 5 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Gasoline.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation for compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as gasoline contaminants were found in the method blanks.

Sample C077R008 was identified as a rinsate. No total petroleum hydrocarbons as gasoline contaminants were found in this blank.

Sample C077SW01 was identified as a source blank. No total petroleum hydrocarbons as gasoline contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49265/49267	TPH as gasoline	No MS/MSD associated with these samples.	MS/MSD required.	None	P

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

Raw data were not reviewed for this SDG.

VI. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

VII. System Performance

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Data Qualification Summary - SDG 49265/49267

SDG	Sample	Compound	Flag	A or P	Reason
49265/ 49267	C077S413 C077S412 C077S414 C077S424 C077S425 C077S426 C077G132 C077G130 C077G155 C077SW01 C077R008	TPH as gasoline	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Laboratory Blank Data Qualification Summary - SDG 49265/49267

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Field Blank Data Qualification Summary - SDG 49265/49267

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 8, 2005

LDC Report Date: December 29, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Gasoline

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49277/49278

Sample Identification

C077S428	C077G142**
C077S429	C077G141
C077S415	C077G121
C077S416	C077S416MS
C077S417	C077S416MSD
C077S409**	
C077S410	
C077S411**	
C077S427	
C077S406**	
C077S407	
C077S408	
C077S404	
C077S403	
C077S405	
C077G137	
C077G127	
C077G133	
C077G126**	
C077R009	

**Indicates sample underwent Level IV review

Introduction

This data review covers 17 soil samples and 8 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Gasoline.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent Level IV review. Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as gasoline contaminants were found in the method blanks.

Sample C077R009 was identified as a rinsate. No total petroleum hydrocarbons as gasoline contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077G141	4-Bromofluorobenzene	62.4 (74-138)	TPH as gasoline	J (all detects) UJ (all non-detects)	P

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49277/49278	TPH as gasoline	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Data Qualification Summary - SDG 49277/49278

SDG	Sample	Compound	Flag	A or P	Reason
49277/ 49278	C077G141	TPH as gasoline	J (all detects) UJ (all non-detects)	P	Surrogate recovery (%R)
49277/ 49278	C077G137 C077G127 C077G133 C077G126** C077R009 C077G142** C077G141 C077G121	TPH as gasoline	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Laboratory Blank Data Qualification Summary - SDG 49277/49278

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Field Blank Data Qualification Summary - SDG 49277/49278

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14449

TPH as Extractables

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 7, 2005

LDC Report Date: December 28, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Level III

Laboratory: *APPL, Inc.*

Sample Delivery Group (SDG): 49265/49267

Sample Identification

C077S413
C077S412
C077S414
C077S421
C077S422
C077S423
C077S418
C077S419
C077S420
C077S424
C077S425
C077S426
C077G132
C077G130
C077G155
C077SW01
C077G135
C077G136
C077R008

Introduction

This data review covers 12 soil samples and 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Extractables.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

The percent relative standard deviations (%RSD) of calibration factors for selected compounds were less than or equal to 20.0% .

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample C077R008 was identified as a rinsate. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

Sample C077SW01 was identified as a source blank. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S412	Octacosane	146 (47-140)	TPH as extractables	J (all detects)	P

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49265/49267	TPH as extractables	No MS/MSD associated with these samples.	MS/MSD required.	None	P

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

Raw data were not reviewed for this SDG.

VI. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

VII. System Performance

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. *Field Duplicates*

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 49265/49267

SDG	Sample	Compound	Flag	A or P	Reason
49265/ 49267	C077S412	TPH as extractables	J (all detects)	P	Surrogate recovery (%R)
49265/ 49267	C077S413 C077S412 C077S414 C077S421 C077S422 C077S423 C077S418 C077S419 C077S420 C077S424 C077S425 C077S426 C077G132 C077G130 C077G155 C077SW01 C077G135 C077G136 C077R008	TPH as extractables	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 49265/49267

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 49265/49267

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 8, 2005

LDC Report Date: December 29, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49277/49278

Sample Identification

C077S428	C077G142**
C077S429	C077G141
C077S415	C077G121
C077S416	
C077S417	
C077S409**	
C077S410	
C077S411**	
C077S427	
C077S406**	
C077S407	
C077S408	
C077S404	
C077S403	
C077S405	
C077G137	
C077G127	
C077G133	
C077G126**	
C077R009	

**Indicates sample underwent Level IV review

Introduction

This data review covers 15 soil samples and 8 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Extractables.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent Level IV review. Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

The percent relative standard deviations (%RSD) of calibration factors for selected compounds were less than or equal to 20.0% .

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Compound	%D	Affected Compound	Associated Samples	Flag	A or P
12/18/05 (1215120)	TPH as motor oil	20	TPH as motor oil	051214A-BLK	J (all detects) UJ (all non-detects)	A

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample C077R009 was identified as a rinsate. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
051215A-BLK	Octacosane	149 (28-142)	TPH as extractables	J (all detects)	P
C077G137	Octacosane	149 (28-142)	TPH as extractables	J (all detects)	P
C077G141	Octacosane	148 (28-142)	TPH as extractables	J (all detects)	P

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49277/49278	TPH as extractables	No MS/MSD associated with these samples.	MS/MSD required.	None	P

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 49277/49278

SDG	Sample	Compound	Flag	A or P	Reason
49277/ 49278	C077G137 C077G141	TPH as extractables	J (all detects)	P	Surrogate recovery (%R)
49277/ 49278	C077S428 C077S429 C077S415 C077S416 C077S417 C077S409** C077S410 C077S411** C077S427 C077S406** C077S407 C077S408 C077S404 C077S403 C077S405 C077G137 C077G127 C077G133 C077G126** C077R009 C077G142** C077G141 C077G121	TPH as extractables	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 49277/49278

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 49277/49278

No Sample Data Qualified in this SDG

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Bechtel Environmental
1230 Columbia Street, Suite 400
San Diego, CA 92101
Attn: Ms. Toni Kuzmack

January 4, 2006

Project Name : NAS Alameda Point
Project # : CTO 077

On December 29, 2005 the following data packages were received by Laboratory Data Consultants, Inc. from Bechtel Environmental. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 14457:

SDG #	Fraction
49287/49289, 49301/49303	Volatiles, Semivolatiles, Polynuclear Aromatic Hydrocarbons, Chlorinated Pesticides & PCBs, Metals, TPH as Gasoline, TPH as Extractables

The above SDGs were reviewed using Level III and Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- NFESC Special Publication SP-2056-ENV, Navy Installation Restoration Chemical Data Quality Manual, Naval Facilities Engineering Command, September 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998

The data validators did utilize their professional judgement when evaluating the data to achieve the most complete and accurate assessment of the data. The data packages were reviewed according to the above stated validation procedures.

For GC/MS volatile analyses, the primary findings consisted of:

a) Air bubbles were apparent in the sample containers for sample C077TB13 in SDG 49301/49303.Since the laboratory met the protocol requirement, this finding should be considered advisory

b) Continuing calibration factors exceeded acceptance criteria in SDG 49287/49289. Since the laboratory met the protocol requirement, this finding should be considered advisory.

c) Surrogate percent recoveries exceeded acceptance criteria for sample C077S220 in SDG 49287/49289 and samples C077S301 and C077S303 in SDG 49301/49303.

d) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDGs 49287/49289 and 49301/49303.

e) Laboratory control sample percent recoveries exceeded acceptance criteria for methylene chloride in SDG 49287/49289 and naphthalene in SDG 49301/49303.

f) Internal standard areas exceeded acceptance criteria for samples C077S393 and C077S220 in SDG 49287/49289.

g) Acetone, chloroform and cis-1,2-dichloroethene were detected in the method blanks and acetone, chloroform and methylene chloride were detected in the field blanks in SDGs 49287/49289 and 49301/49303. Since the laboratory met the protocol requirement, this finding should be considered advisory.

h) BFB tune exceeded acceptance criteria for samples C077S302 and C077S303 in SDG 49301/49303.

For GC/MS semivolatile analyses, the primary findings consisted of:

a) Matrix spike/matrix spike duplicate percent recoveries and relative percent differences exceeded acceptance criteria for 2-methyl-4,6-dinitrophenol, pyridine and di-n-butylphthalate in SDG 49287/49289, aniline and pyridine in SDG 49301/49303. Since the laboratory met the protocol requirement, this finding should be considered advisory.

b) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49301/49303.

c) Laboratory control sample percent recoveries exceeded acceptance criteria for pentachlorophenol in SDG 49301/49303.

For GC/MS PAH analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDGs 49287/49289 and 49301/49303.

b) Matrix spike/matrix spike duplicate percent recoveries exceeded acceptance

criteria for several compounds in SDG 49287/49289. Since the laboratory met the protocol requirement, this finding should be considered advisory.

c) Surrogate percent recoveries exceeded acceptance criteria for samples C077S391 and C077S393 in SDG 49287/49289.

d) Laboratory control sample percent recoveries exceeded acceptance criteria for benzo(a)anthracene in SDGs 49287/49289 and 49301/49303.

e) Benzo(b)fluoranthene and benzo(k)fluoranthene coeluted for sample C077S312 in SDG 49301/49303. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For chlorinated pesticide and PCB analyses, the primary finding consisted of:

a) Continuing calibration factors exceeded acceptance criteria in SDG 49287/49289 and 49301/49303. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For metal analyses, the primary findings consisted of:

a) Matrix spike analyses were not performed for all batches in SDGs 49287/49289 and 49301/49303.

b) Duplicate analyses were not performed for all batches in SDGs 49287/49289 and 49301/49303.

c) Matrix spike percent recoveries exceeded acceptance criteria for antimony in SDG 49301/49303. Since the laboratory met the protocol requirement, this finding should be considered advisory.

d) ICP serial dilution percent differences exceeded acceptance criteria for several compounds in SDG 49287/49289 and cobalt and lead in SDG 49301/49303. Since the laboratory met the protocol requirement, this finding should be considered advisory.

e) Several metals were detected in the method and field blanks in SDGs 49287/49289 and 49301/49303. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For TPH as gasoline analyses, the primary finding consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDGs 49287/49289 and 49301/49303.

For TPH as extractable analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDGs 49287/49289 and 49301/49303.

b) Continuing calibration factors exceeded acceptance criteria in SDG 49287/49289. Since the laboratory met the protocol requirement, this finding should be considered advisory.

In general, the data for all analyses appear usable with the limitations noted in the Data Validation Reports. Data validation flags were noted on the Laboratory Form 1s and included with each validation report.

Sincerely,

Richard M. Amano
President/Principal Chemist

Attachment 1

1 Week TAT

LDC #14457 (Bechtel Environmental-San Diego / Alameda Point, CTO 077)

LDC	SDG#	DATE REC'D	(2) DATE DUE	VOA (8260B)		SVOA (8270C)		PAHs (8270C -SIM)		Pest. /PCBs (SW846)		Metals (SW846)		Pb (6010B)		Diss. Metals (SW846)		TPH-G (8015)		TPH-E (8015)																	
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	49287/49289	12/29/05	01/05/06	6	5	9	3	6	3	7	3	0	3	0	15	8	0	6	5	5	3																
B	49301/49303	12/29/05	01/05/06	3	10	2	12	2	10	4	12	0	12	0	23	2	0	3	12	2	10																
B	49301/49303	12/29/05	01/05/06	1	2	1	2	1	2	1	2	0	2	0	4	1	0	1	2	1	2																
Total	B/LR			10	17	12	17	9	15	12	17	0	17	0	42	11	0	10	19	8	15	0	0	0	0	0	0	0	0	0	0	0	0	0	231

Shaded cells indicate Level IV validation (all other cells are Level III validation)

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14457

Volatiles

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 9, 2005

LDC Report Date: January 3, 2006

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49287/49289

Sample Identification

C077S391
C077S392
C077S393
C077S220
C077S221
C077G123
C077G139
C077G124
C077G118
C077TB12
C077R010

Introduction

This data review covers 5 soil samples and 6 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all volatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs) with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/13/05	Vinyl chloride	21	C077S391 C077S392 C077S393 051213S	None	P

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/13/05	Methylene chloride	52	C077S391 C077S392 C077S393 051213S	J (all detects) UJ (all non-detects)	P

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051213SMB	12/13/05	cis-1,2-Dichloroethene	0.00028 mg/Kg	C077S391 C077S392 C077S393
051220SMB	12/20/05	Acetone	0.011 mg/Kg	C077S220 C077S221
051217WMB	12/17/05	Acetone	1.1 ug/L	All water samples in SDG 49287/49289

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077S392	cis-1,2-Dichloroethene	0.00028 mg/Kg	0.005U mg/Kg
C077S220	Acetone	0.061 mg/Kg	0.1U mg/Kg
C077S221	Acetone	0.016 mg/Kg	0.1U mg/Kg
C077TB12	Acetone	2.9 ug/L	2.9U ug/L

Sample C077TB12 was identified as a trip blank. No volatile contaminants were found in this blank with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
C077TB12	12/9/05	Methylene chloride Acetone 1,2,3-Trichloropropane	3.5 ug/L 2.9 ug/L 2.1 ug/L	C077S391 C077S392 C077S393 C077S220 C077S221 C077G123 C077G139 C077G124 C077G118 C077R010

Sample C077R010 was identified as a rinsate. No volatile contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Compound	Concentration	Associated Samples
C077R010	12/9/05	Chloroform Bromodichloromethane Dibromochloromethane	2.2 ug/L 1.8 ug/L 1.3 ug/L	C077S391 C077S392 C077S393 C077S220 C077S221 C077G123 C077G139 C077G124 C077G118

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
C077S221	Acetone	0.016 mg/Kg	0.1U mg/Kg
C077G124	Chloroform	0.19 ug/L	0.5U ug/L
C077S220	Chloroform	0.0056 mg/Kg	0.006U mg/Kg

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S220	Toluene-d8	126 (85-115)	All TCL compounds	J (all detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49287/49289	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051213SLCS	Methylene chloride	149 (55-140)	C077S391 C077S392 C077S393 051213S	J (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits with the following exceptions:

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S393	Fluorobenzene Chlorobenzene-d5 1,4-Dichlorobenzene-d4	180672 (182772-731090) 105992 (128640-514560) 32752 (58756-235024)	All TCL compounds	J (all detects) UJ (all non-detects)	P

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S220	1,4-Dichlorobenzene-d4	132928 (159488-637952)	4-Methyl-2-pentanone *1,1,2,2-Tetrachloroethane* 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) *UJ (all non-detects)*	P

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Volatiles - Data Qualification Summary - SDG 49287/49289

SDG	Sample	Compound	Flag	A or P	Reason
49287/ 49289	C077S391 C077S392 C077S393	Vinyl chloride	None	P	Continuing calibration (%D)
49287/ 49289	C077S391 C077S392 C077S393	Methylene chloride	J (all detects) UJ (all non-detects)	P	Continuing calibration (%D)
49287/ 49289	C077S220	All TCL compounds	J (all detects)	P	Surrogate recovery (%R)
49287/ 49289	C077S391 C077S392 C077S393 C077S220 C077S221 C077G123 C077G139 C077G124 C077G118 C077TB12 C077R010	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49287/ 49289	C077S391 C077S392 C077S393	Methylene chloride	J (all detects)	P	Laboratory control samples (%R)
49287/ 49289	C077S393	All TCL compounds	J (all detects) UJ (all non-detects)	P	Internal standards (area)
49287/ 49289	C077S220	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P	Internal standards (area)

NAS Alameda Point, CTO 077
Volatiles - Laboratory Blank Data Qualification Summary - SDG 49287/49289

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49287/49289	C077S392	cis-1,2-Dichloroethene	0.005U mg/Kg	A
49287/49289	C077S220	Acetone	0.1U mg/Kg	A
49287/49289	C077S221	Acetone	0.1U mg/Kg	A
49287/49289	C077TB12	Acetone	2.9U ug/L	A

NAS Alameda Point, CTO 077
Volatiles - Field Blank Data Qualification Summary - SDG 49287/49289

SDG	Sample	Compound	Modified Final Concentration	A or P
49287/49289	C077S221	Acetone	0.1U mg/Kg	A
49287/49289	C077G124	Chloroform	0.5U ug/L	A
49287/49289	C077S220	Chloroform	0.006U mg/Kg	A

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 12, 2005

LDC Report Date: December 30, 2005

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49301/49303

Sample Identification

C077S301
C077S302**
C077S303
C077S304**
C077S305
C077S306
C077S307
C077S308
C077S309
C077S310
C077S311
C077S312
C077G071**
C077G073
C077TB13
C077R011

**Indicates sample underwent Level IV review

Introduction

This data review covers 12 soil samples and 4 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

All samples were received in good condition with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077TB13	All TCL compounds	Air bubbles were apparent in the sample containers.	There should be no air bubbles in the sample containers.	J (all detects) UJ (all non-detects)	A

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals with the following exceptions:

Sample	Compound	Total Time From BFB Tuning Until Analysis	Required Analysis Time (in Hours) From BFB Tuning Until Analysis	Flag	A or P
C077S302**	All TCL compounds	12 hours 34 minutes	12 hour	None	P
C077S303	All TCL compounds	13 hours 14 minutes	12 hour	None	P

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all volatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051218WMB	12/18/05	Chloroform	0.54 ug/L	C077G071** C077G073 C077TB13
051219WMB	12/19/05	1,2,3-Trichlorobenzene Chloroform Naphthalene	0.32 ug/L 0.49 ug/L 0.36 ug/L	C077R011
051220SMB	12/20/05	Acetone	0.0066 mg/Kg	C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311
051221SMB	12/21/05	1,2,3-Trichlorobenzene	0.00033 mg/Kg	C077S312

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077G071**	Chloroform	0.47 ug/L	0.5U ug/L

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077G073	Chloroform	0.54 ug/L	0.54U ug/L
C077TB13	Chloroform	0.55 ug/L	0.55U ug/L
C077S304**	Acetone	0.022 mg/Kg	0.1U mg/Kg
C077S305	Acetone	0.007 mg/Kg	0.1U mg/Kg
C077S306	Acetone	0.011 mg/Kg	0.1U mg/Kg
C077S307	Acetone	0.021 mg/Kg	0.1U mg/Kg
C077S308	Acetone	0.006 mg/Kg	0.1U mg/Kg
C077S309	Acetone	0.0065 mg/Kg	0.1U mg/Kg
C077S310	Acetone	0.0097 mg/Kg	0.1U mg/Kg
C077S311	Acetone	0.0095 mg/Kg	0.1U mg/Kg

Sample C077TB13 was identified as a trip blank. No volatile contaminants were found in this blank with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
C077TB13	12/12/05	Methylene chloride Acetone Chloroform	3.2 ug/L 4.5 ug/L 0.55 ug/L	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312 C077G071** C077G073 C077R011

Sample C077R011 was identified as a rinsate. No volatile contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Compound	Concentration	Associated Samples
C077R011	12/12/05	Acetone Chloroform 1,2-Dichlorobenzene Bromodichloromethane Bromoform Dibromochloromethane	2.1 ug/L 2.9 ug/L 0.58 ug/L 1.9 ug/L 0.99 ug/L 1.4 ug/L	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312 C077G071** C077G073

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
C077G071**	Chloroform	0.47 ug/L	0.5U ug/L
C077G073	Chloroform	0.54 ug/L	0.54U ug/L
C077S304**	Methylene chloride Acetone	0.0061 mg/Kg 0.022 mg/Kg	0.05U mg/Kg 0.1U mg/Kg
C077S305	Acetone	0.007 mg/Kg	0.1U mg/Kg
C077S306	Acetone	0.011 mg/Kg	0.1U mg/Kg
C077S307	Acetone	0.021 mg/Kg	0.1U mg/Kg
C077S308	Methylene chloride Acetone	0.0068 mg/Kg 0.0066 mg/Kg	0.06U mg/Kg 0.1U mg/Kg
C077S309	Acetone	0.0065 mg/Kg	0.1U mg/Kg
C077S310	Acetone	0.0097 mg/Kg	0.1U mg/Kg
C077S311	Methylene chloride Acetone	0.0071 mg/Kg 0.0095 mg/Kg	0.06U mg/Kg 0.1U mg/Kg
C077S312	Methylene chloride	0.0088 mg/Kg	0.06U mg/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
C077R011	Acetone	2.1 ug/L	2.1U ug/L

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
051217S	Bromofluorobenzene	121 (85-120)	All TCL compounds	J (all detects)	P
C077S301	1,2-Dichloroethane-d4 Bromofluorobenzene	153 (52-149) 133 (85-120)	All TCL compounds	J (all detects)	P
C077S303	1,2-Dichloroethane-d4 Bromofluorobenzene	150 (52-149) 122 (85-120)	All TCL compounds	J (all detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49301/49303	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051217SLCS	Naphthalene	135 (40-125)	C077S301 C077S302** C077S303 051217SMB	J (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Volatiles - Data Qualification Summary - SDG 49301/49303

SDG	Sample	Compound	Flag	A or P	Reason
49301/ 49303	C077TB13	All TCL compounds	J (all detects) UJ (all non-detects)	A	Sample condition
49301/ 49303	C077S302** C077S303	All TCL compounds	None	P	GC/MS performance check
49301/ 49303	C077S301 C077S303	All TCL compounds	J (all detects)	P	Surrogate spikes (%R)
49301/ 49303	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312 C077G071** C077G073 C077TB13 C077R011	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49301/ 49303	C077S301 C077S302** C077S303	Naphthalene	J (all detects)	P	Laboratory control samples (%R)

NAS Alameda Point, CTO 077
Volatiles - Laboratory Blank Data Qualification Summary - SDG 49301/49303

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49301/49303	C077G071**	Chloroform	0.5U ug/L	A
49301/49303	C077G073	Chloroform	0.54U ug/L	A
49301/49303	C077TB13	Chloroform	0.55U ug/L	A
49301/49303	C077S304**	Acetone	0.1U mg/Kg	A
49301/49303	C077S305	Acetone	0.1U mg/Kg	A

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49301/49303	C077S306	Acetone	0.1U mg/Kg	A
49301/49303	C077S307	Acetone	0.1U mg/Kg	A
49301/49303	C077S308	Acetone	0.1U mg/Kg	A
49301/49303	C077S309	Acetone	0.1U mg/Kg	A
49301/49303	C077S310	Acetone	0.1U mg/Kg	A
49301/49303	C077S311	Acetone	0.1U mg/Kg	A

NAS Alameda Point, CTO 077
Volatiles - Field Blank Data Qualification Summary - SDG 49301/49303

SDG	Sample	Compound	Modified Final Concentration	A or P
49301/49303	C077G071**	Chloroform	0.5U ug/L	A
49301/49303	C077G073	Chloroform	0.54U ug/L	A
49301/49303	C077S304**	Methylene chloride Acetone	0.05U mg/Kg 0.1U mg/Kg	A
49301/49303	C077S305	Acetone	0.1U mg/Kg	A
49301/49303	C077S306	Acetone	0.1U mg/Kg	A
49301/49303	C077S307	Acetone	0.1U mg/Kg	A
49301/49303	C077S308	Methylene chloride Acetone	0.06U mg/Kg 0.1U mg/Kg	A
49301/49303	C077S309	Acetone	0.1U mg/Kg	A
49301/49303	C077S310	Acetone	0.1U mg/Kg	A
49301/49303	C077S311	Methylene chloride Acetone	0.06U mg/Kg 0.1U mg/Kg	A
49301/49303	C077S312	Methylene chloride	0.06U mg/Kg	A

SDG	Sample	Compound	Modified Final Concentration	A or P
49301/49303	C077R011	Acetone	2.1U ug/L	A

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14457

Semivolatiles

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 9, 2005

LDC Report Date: December 30, 2005

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49287/49289

Sample Identification

C077S391
C077S392
C077S393
C077G123
C077G139
C077G124
C077G118
C077G119
C077R010
C077G140
C077G123MS
C077G123MSD

Introduction

This data review covers 3 soil samples and 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals. All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/27/05	4-Chloroaniline	33	C077G123MS C077G123MSD	J (all detects) UJ (all non-detects)	A

All of the continuing calibration RRF values were greater than or equal to 0.05 .

V. Blanks

Method blanks were reviewed for each matrix as applicable. No semivolatile contaminants were found in the method blanks.

Sample C077R010 was identified as a rinsate. No semivolatile contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (*Associated* Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S407MS/MSD (All soil samples in SDG 49287/49289)	2-Methyl-4,6-dinitrophenol	29.1 (30-135)	-	-	J (all detects) UJ (all non-detects)	A
	Pyridine	9.0 (15-115)	12.4 (15-115)	31.3 (≤30)	J (all detects) UJ (all non-detects)	
C077S407MS/MSD (All soil samples in SDG 49287/49289)	Di-n-butylphthalate	125 (55-110)	-	-	J (all detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

Samples C077G118 and C077G119 were identified as field duplicates. No semivolatiles were detected in any of the samples.

NAS Alameda Point, CTO 077
Semivolatiles - Data Qualification Summary - SDG 49287/49289

SDG	Sample	Compound	Flag	A or P	Reason
49287/ 49289	C077S391 C077S392 C077S393	2-Methyl-4,6-dinitrophenol	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49287/ 49289	C077S391 C077S392 C077S393	Pyridine	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)(RPD)
49287/ 49289	C077S391 C077S392 C077S393	Di-n-butylphthalate	J (all detects)	A	Matrix spike/Matrix spike duplicates (%R)

NAS Alameda Point, CTO 077
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 49287/49289

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Semivolatiles - Field Blank Data Qualification Summary - SDG 49287/49289

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 12, 2005

LDC Report Date: December 30, 2005

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49301/49303

Sample Identification

C077S301
C077S302**
C077S303
C077S304**
C077S305
C077S306
C077S307
C077S308
C077S309
C077S310
C077S311
C077S312
C077G071**
C077G073
C077R011
C077S302MS
C077S302MSD

**Indicates sample underwent Level IV review

Introduction

This data review covers 12 soil samples and 5 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals. All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

All of the continuing calibration RRF values were greater than or equal to 0.05 .

V. Blanks

Method blanks were reviewed for each matrix as applicable. No semivolatile contaminants were found in the method blanks.

Sample C077R011 was identified as a rinsate. No semivolatile contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49301/49303	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S302MS/MSD (All soil samples in SDG 49301/49303)	Aniline	-	-	41.0 (≤30)	J (all detects) UJ (all non-detects)	A
	Pyridine	6.8 (15-115)	14.1 (15-115)	69.7 (≤30)	J (all detects) UJ (all non-detects)	

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051215SLCS	Pentachlorophenol	42.9 (50-115)	All soil samples in SDG 49301/49303	J (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Semivolatiles - Data Qualification Summary - SDG 49301/49303

SDG	Sample	Compound	Flag	A or P	Reason
49301/ 49303	C077G071** C077G073 C077R011	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49301/ 49303	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312	Aniline	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (RPD)
49301/ 49303	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312	Pyridine	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)(RPD)
49301/ 49303	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312	Pentachlorophenol	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)

NAS Alameda Point, CTO 077
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 49301/49303

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Semivolatiles - Field Blank Data Qualification Summary - SDG 49301/49303

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14457

Metals

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 9, 2005

LDC Report Date: December 29, 2005

Matrix: Soil/Water

Parameters: Metals

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49287/49289

Sample Identification

C077S391	C077G124
C077S392	C077G118
C077S393	C077R010
C077S193	C077G125
C077S194	C077R010MS
C077S195	C077R010DUP
C077S196	
C077S197	
C077S198	
C077S222	
C077S220	
C077S221	
C077S199	
C077S200	
C077S223	
C077S201	
C077S202	
C077S224	
C077G123	
C077G139	

Introduction

This data review covers 18 soil samples and 8 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 6010B and 7000 for Metals. The metals analyzed were Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Arsenic Chromium Selenium	2.277 ug/L 0.297 ug/L 3.581 ug/L	C077S391 C077S392 C077S393
ICB/CCB	Antimony Arsenic Cobalt Mercury Selenium	3.976 ug/L 2.955 ug/L 2.043 ug/L 0.133 ug/L 4.718 ug/L	All water samples in SDG 49287/49289
ICB/CCB	Potassium	114.2 ug/L	C077G123 C077G139 C077R010
ICB/CCB	Sodium	515.5 ug/L	C077R010

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G123	Arsenic Cobalt Mercury Selenium	11.7 ug/L 1.1 ug/L 0.084 ug/L 3.7 ug/L	11.7U ug/L 1.1U ug/L 0.084U ug/L 3.7U ug/L
C077G139	Cobalt Selenium	0.65 ug/L 8.6 ug/L	0.65U ug/L 8.6U ug/L
C077G124	Arsenic Mercury Selenium	8.4 ug/L 0.068 ug/L 7.5 ug/L	8.4U ug/L 0.068U ug/L 7.5U ug/L
C077G118	Antimony Arsenic Mercury Selenium	2.9 ug/L 2.7 ug/L 0.096 ug/L 6.7 ug/L	2.9U ug/L 2.7U ug/L 0.096U ug/L 6.7U ug/L
C077R010	Cobalt Mercury Potassium Sodium	2.0 ug/L 0.063 ug/L 235 ug/L 1120 ug/L	2.0U ug/L 0.063U ug/L 235U ug/L 1120U ug/L
C077G125	Arsenic Mercury Selenium	8.1 ug/L 0.12 ug/L 5.3 ug/L	8.1U ug/L 0.12U ug/L 5.3U ug/L

Sample C077R010 was identified as a rinsate. No metal contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
C077R010	12/9/05	Cadmium Calcium Cobalt Magnesium Mercury Potassium Sodium	1.2 ug/L 38.2 ug/L 2.0 ug/L 80.6 ug/L 0.063 ug/L 235 ug/L 1120 ug/L	C077S391 C077S392 C077S393 C077G123 C077G139 C077G124 C077G118 C077G125

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G123	Cobalt Mercury	1.1 ug/L 0.084 ug/L	1.1U ug/L 0.084U ug/L
C077G139	Cobalt	0.65 ug/L	0.65U ug/L
C077G124	Mercury	0.068 ug/L	0.068U ug/L
C077G118	Mercury	0.096 ug/L	0.096U ug/L
C077G125	Mercury	0.12 ug/L	0.12U ug/L
C077S391	Cadmium	0.16 mg/Kg	0.16U mg/Kg
C077S392	Mercury Sodium	0.028 mg/Kg 118 mg/Kg	0.028U mg/Kg 118U mg/Kg

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All water samples in SDG 49287/49289	All ICP metals	No MS associated with these samples.	MS required.	None	P
C077S391 C077S392 C077S393	All ICP metals	No MS associated with these samples.	MS required.	None	P
All water samples in SDG 49287/49289	All ICP metals	No MS associated with these samples.	MS required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All water samples in SDG 49287/49289	All ICP metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P
C077S391 C077S392 C077S393	All ICP metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P
C077S193 C077S194 C077S195 C077S196 C077S197 C077S198 C077S222 C077S220 C077S221 C077S199 C077S200 C077S223 C077S201 C077S202 C077S224	Lead	No DUP analysis associated with these samples.	DUP analysis required.	None	P

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Internal Standards

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
C077G125L	Barium Calcium Magnesium Manganese	15.0 (≤10) 11.1 (≤10) 12.5 (≤10) 10.2 (≤10)	All water samples in SDG 49287/49289	J (all detects) J (all detects) J (all detects) J (all detects)	A

XI. Sample Result Verification

Raw data were not reviewed for this SDG.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been qualified.

XIII. Field Duplicates

Samples C077G124 and C077G125 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD
	C077G124	C077G125	
Arsenic	8.4	8.1	4
Barium	286	245	15
Beryllium	2U	0.28	200
Calcium	35400	31900	10
Chromium	4.9	4.5	9
Iron	1940	1050	60
Magnesium	59700	50100	17
Manganese	523	421	22
Mercury	0.068	0.12	55
Potassium	47600	49800	5
Selenium	7.5	5.3	34

Compound	Concentration (ug/L)		RPD
	C077G124	C077G125	
Sodium	1110000	1090000	2
Vanadium	4.5	3.8	17

NAS Alameda Point, CTO 077
Metals - Data Qualification Summary - SDG 49287/49289

SDG	Sample	Analyte	Flag	A or P	Reason
49287/ 49289	C077G123 C077G139 C077G124 C077G118 C077R010 C077G125 C077S391 C077S392 C077S393	All ICP metals	None	P	Matrix spike analysis
49287/ 49289	C077S193 C077S194 C077S195 C077S196 C077S197 C077S198 C077S222 C077S220 C077S221 C077S199 C077S200 C077S223 C077S201 C077S202 C077S224	Lead	None	P	Matrix spike analysis
49287/ 49289	C077G123 C077G139 C077G124 C077G118 C077R010 C077G125 C077S391 C077S392 C077S393	All ICP metals	None	P	Duplicate analysis
49287/ 49289	C077S193 C077S194 C077S195 C077S196 C077S197 C077S198 C077S222 C077S220 C077S221 C077S199 C077S200 C077S223 C077S201 C077S202 C077S224	Lead	None	P	Duplicate analysis

SDG	Sample	Analyte	Flag	A or P	Reason
49287/ 49289	C077G123 C077G139 C077G124 C077G118 C077R010 C077G125	Barium Calcium Magnesium Manganese	J (all detects) J (all detects) J (all detects) J (all detects)	A	ICP serial dilution (%D)

NAS Alameda Point, CTO 077
Metals - Laboratory Blank Data Qualification Summary - SDG 49287/49289

SDG	Sample	Analyte	Modified Final Concentration	A or P
49287/ 49289	C077G123	Arsenic Cobalt Mercury Selenium	11.7U ug/L 1.1U ug/L 0.084U ug/L 3.7U ug/L	A
49287/ 49289	C077G139	Cobalt Selenium	0.65U ug/L 8.6U ug/L	A
49287/ 49289	C077G124	Arsenic Mercury Selenium	8.4U ug/L 0.068U ug/L 7.5U ug/L	A
49287/ 49289	C077G118	Antimony Arsenic Mercury Selenium	2.9U ug/L 2.7U ug/L 0.096U ug/L 6.7U ug/L	A
49287/ 49289	C077R010	Cobalt Mercury Potassium Sodium	2.0U ug/L 0.063U ug/L 235U ug/L 1120U ug/L	A
49287/ 49289	C077G125	Arsenic Mercury Selenium	8.1U ug/L 0.12U ug/L 5.3U ug/L	A

NAS Alameda Point, CTO 077
Metals - Field Blank Data Qualification Summary - SDG 49287/49289

SDG	Sample	Analyte	Modified Final Concentration	A or P
49287/ 49289	C077G123	Cobalt Mercury	1.1U ug/L 0.084U ug/L	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49287/ 49289	C077G139	Cobalt	0.65U ug/L	A
49287/ 49289	C077G124	Mercury	0.068U ug/L	A
49287/ 49289	C077G118	Mercury	0.096U ug/L	A
49287/ 49289	C077G125	Mercury	0.12U ug/L	A
49287/ 49289	C077S391	Cadmium	0.16U mg/Kg	A
49287/ 49289	C077S392	Mercury Sodium	0.028U mg/Kg 118U mg/Kg	A

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 12, 2005

LDC Report Date: January 3, 2006

Matrix: Soil/Water

Parameters: Metals

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49301/49303

Sample Identification

C077S301	C077S226	C077G073
C077S302**	C077S191	C077R011
C077S303	C077S192	C077S312MS
C077S304**	C077S219	C077S312MSD
C077S305	C077S217	
C077S306	C077S218	
C077S307	C077S232	
C077S308	C077S203	
C077S309	C077S204	
C077S310	C077S225	
C077S311	C077S213	
C077S312	C077S214	
C077S211	C077S230	
C077S212**	C077S215	
C077S229**	C077S216	
C077S207**	C077S231	
C077S208**	C077S209	
C077S227	C077S210	
C077S205	C077S228	
C077S206	C077G071**	

**Indicates sample underwent Level IV review

Introduction

This data review covers 41 soil samples and 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 6010B and 7000 for Metals. The metals analyzed were Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Magnesium	6.263 mg/Kg	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312
ICB/CCB	Arsenic Chromium Selenium	2.277 ug/L 0.806 ug/L 3.581 ug/L	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Lead	3.263 ug/L	C077S206 C077S226 C077S191 C077S192 C077S219 C077S217 C077S218 C077S232 C077S203 C077S204 C077S225 C077S213 C077S214 C077S230 C077S215 C077S216 C077S231 C077S209 C077S210 C077S228
PB (prep blank)	Cobalt Potassium Selenium	2.6 ug/L 100 ug/L 3.2 ug/L	All water samples in SDG 49301/49303
PB (prep blank)	Sodium	636 ug/L	C077R011
ICB/CCB	Antimony Arsenic Cobalt Mercury Potassium Selenium	3.596 ug/L 2.955 ug/L 2.043 ug/L 0.167 ug/L 114.2 ug/L 4.718 ug/L	All water samples in SDG 49301/49303
ICB/CCB	Sodium	496.6 ug/L	C077R011

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S302**	Selenium	0.31 mg/Kg	0.31U mg/Kg
C077S305	Selenium	0.48 mg/Kg	0.48U mg/Kg
C077S307	Selenium	0.44 mg/Kg	0.44U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S191	Lead	0.7 mg/Kg	0.7U mg/Kg
C077S215	Lead	1.6 mg/Kg	1.6U mg/Kg
C077S216	Lead	1.6 mg/Kg	1.6U mg/Kg
C077G071**	Arsenic Cobalt Selenium	3.0 ug/L 2.3 ug/L 8.1 ug/L	3.0U ug/L 2.3U ug/L 8.1U ug/L
C077G073	Arsenic Cobalt Selenium	2.8 ug/L 1.9 ug/L 5.5 ug/L	2.8U ug/L 1.9U ug/L 5.5U ug/L
C077R011	Cobalt Selenium Sodium	3.0 ug/L 4.0 ug/L 342 ug/L	3.0U ug/L 4.0U ug/L 342U ug/L

Sample C077R011 was identified as a rinsate. No metal contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
C077R011	12/12/05	Antimony Calcium Cobalt Magnesium Selenium Sodium Zinc	5.2 ug/L 103 ug/L 3.0 ug/L 112 ug/L 4.0 ug/L 342 ug/L 6.4 ug/L	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312 C077G071** C077G073

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G071**	Cobalt Selenium Zinc	2.3 ug/L 8.1 ug/L 9.9 ug/L	2.3U ug/L 8.1U ug/L 9.9U ug/L
C077G073	Cobalt Selenium Zinc	1.9 ug/L 5.5 ug/L 5.2 ug/L	1.9U ug/L 5.5U ug/L 5.2U ug/L
C077S302**	Selenium Sodium	0.31 mg/Kg 87.4 mg/Kg	0.31U mg/Kg 87.4U mg/Kg
C077S303	Sodium	71.9 mg/Kg	71.9U mg/Kg
C077S304**	Sodium	48.7 mg/Kg	48.7U mg/Kg
C077S305	Selenium Sodium	0.48 mg/Kg 48.9 mg/Kg	0.48U mg/Kg 48.9U mg/Kg
C077S306	Sodium	92.3 mg/Kg	92.3U mg/Kg
C077S307	Selenium	0.44 mg/Kg	0.44U mg/Kg
C077S308	Sodium	96.5 mg/Kg	96.5U mg/Kg
C077S309	Sodium	155 mg/Kg	155U mg/Kg
C077S310	Sodium	109 mg/Kg	109U mg/Kg
C077S311	Sodium	47.2 mg/Kg	47.2U mg/Kg
C077S312	Sodium	72.2 mg/Kg	72.2U mg/Kg

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
C077G071** C077G073 C077R011	All TAL metals	No MS associated with these samples.	MS required.	None	P
C077S205 C077S206 C077S226 C077S191 C077S192 C077S219 C077S217 C077S218 C077S232 C077S203 C077S204 C077S225 C077S213 C077S214 C077S230 C077S215 C077S216 C077S231 C077S209 C077S210 C077S228	Lead	No MS associated with these samples.	MS required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S312MS/MSD (C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312)	Antimony	68.2 (80-120)	72.0 (80-120)	-	J (all detects) UJ (all non-detects)	A

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
C077G071** C077G073 C077R011	All TAL metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P
C077S205 C077S206 C077S226 C077S191 C077S192 C077S219 C077S217 C077S218 C077S232 C077S203 C077S204 C077S225 C077S213 C077S214 C077S230 C077S215 C077S216 C077S231 C077S209 C077S210 C077S228	Lead	No DUP analysis associated with these samples.	DUP analysis required.	None	P

Results were within QC limits.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Internal Standards

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
C077S312L	Cobalt	10.6 (≤10)	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312	J (all detects)	A
C077S232L	Lead	13.7 (≤10)	C077S205 C077S206 C077S226 C077S191 C077S192 C077S219 C077S217 C077S218 C077S232 C077S203 C077S204 C077S225 C077S213 C077S214 C077S230 C077S215 C077S216 C077S231	J (all detects)	A

XI. Sample Result Verification

All sample result verifications were acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been qualified.

XIII. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Metals - Data Qualification Summary - SDG 49301/49303

SDG	Sample	Analyte	Flag	A or P	Reason
49301/ 49303	C077G071** C077G073 C077R011	All TAL metals	None	P	Matrix spike analysis
49301/ 49303	C077S205 C077S206 C077S226 C077S191 C077S192 C077S219 C077S217 C077S218 C077S232 C077S203 C077S204 C077S225 C077S213 C077S214 C077S230 C077S215 C077S216 C077S231 C077S209 C077S210 C077S228	Lead	None	P	Matrix spike analysis
49301/ 49303	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312	Antimony	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49301/ 49303	C077G071** C077G073 C077R011	All TAL metals	None	P	Duplicate analysis

SDG	Sample	Analyte	Flag	A or P	Reason
49301/ 49303	C077S205 C077S206 C077S226 C077S191 C077S192 C077S219 C077S217 C077S218 C077S232 C077S203 C077S204 C077S225 C077S213 C077S214 C077S230 C077S215 C077S216 C077S231 C077S209 C077S210 C077S228	Lead	None	P	Duplicate analysis
49301/ 49303	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312	Cobalt	J (all detects)	A	ICP serial dilution (%D)
49301/ 49303	C077S205 C077S206 C077S226 C077S191 C077S192 C077S219 C077S217 C077S218 C077S232 C077S203 C077S204 C077S225 C077S213 C077S214 C077S230 C077S215 C077S216 C077S231	Lead	J (all detects)	A	ICP serial dilution (%D)

NAS Alameda Point, CTO 077
Metals - Laboratory Blank Data Qualification Summary - SDG 49301/49303

SDG	Sample	Analyte	Modified Final Concentration	A or P
49301/49303	C077S302**	Selenium	0.31U mg/Kg	A
49301/49303	C077S305	Selenium	0.48U mg/Kg	A
49301/49303	C077S307	Selenium	0.44U mg/Kg	A
49301/49303	C077S191	Lead	0.7U mg/Kg	A
49301/49303	C077S215	Lead	1.6U mg/Kg	A
49301/49303	C077S216	Lead	1.6U mg/Kg	A
49301/49303	C077G071**	Arsenic Cobalt Selenium	3.0U ug/L 2.3U ug/L 8.1U ug/L	A
49301/49303	C077G073	Arsenic Cobalt Selenium	2.8U ug/L 1.9U ug/L 5.5U ug/L	A
49301/49303	C077R011	Cobalt Selenium Sodium	3.0U ug/L 4.0U ug/L 342U ug/L	A

NAS Alameda Point, CTO 077
Metals - Field Blank Data Qualification Summary - SDG 49301/49303

SDG	Sample	Analyte	Modified Final Concentration	A or P
49301/49303	C077G071**	Cobalt Selenium Zinc	2.3U ug/L 8.1U ug/L 9.9U ug/L	A
49301/49303	C077G073	Cobalt Selenium Zinc	1.9U ug/L 5.5U ug/L 5.2U ug/L	A
49301/49303	C077S302**	Selenium Sodium	0.31U mg/Kg 87.4U mg/Kg	A
49301/49303	C077S303	Sodium	71.9U mg/Kg	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49301/49303	C077S304**	Sodium	48.7U mg/Kg	A
49301/49303	C077S305	Selenium Sodium	0.48U mg/Kg 48.9U mg/Kg	A
49301/49303	C077S306	Sodium	92.3U mg/Kg	A
49301/49303	C077S307	Selenium	0.44U mg/Kg	A
49301/49303	C077S308	Sodium	96.5U mg/Kg	A
49301/49303	C077S309	Sodium	155U mg/Kg	A
49301/49303	C077S310	Sodium	109U mg/Kg	A
49301/49303	C077S311	Sodium	47.2U mg/Kg	A
49301/49303	C077S312	Sodium	72.2U mg/Kg	A

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14457

TPH as Gasoline

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 9, 2005

LDC Report Date: December 29, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Gasoline

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49287/49289

Sample Identification

C077S391
C077S392
C077S393
C077G123
C077G139
C077G124
C077G118
C077G119
C077R010
C077S391MS
C077S391MSD

Introduction

This data review covers 5 soil samples and 6 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Gasoline.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as gasoline contaminants were found in the method blanks.

Sample C077R010 was identified as a rinsate. No total petroleum hydrocarbons as gasoline contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49287/49289	TPH as gasoline	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

Raw data were not reviewed for this SDG.

VI. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

VII. System Performance

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Data Qualification Summary - SDG 49287/49289

SDG	Sample	Compound	Flag	A or P	Reason
49287/ 49289	C077G123 C077G139 C077G124 C077G118 C077G119 C077R010	TPH as gasoline	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Laboratory Blank Data Qualification Summary - SDG 49287/49289

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Field Blank Data Qualification Summary - SDG 49287/49289

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 12, 2005

LDC Report Date: January 3, 2006

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Gasoline

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49301/49303

Sample Identification

C077S301
C077S302**
C077S303
C077S304**
C077S305
C077S306
C077S307
C077S308
C077S309
C077S310
C077S311
C077S312
C077G071**
C077G072
C077G073
C077R011
C077S305MS
C077S305MSD

**Indicates sample underwent Level IV review

Introduction

This data review covers 14 soil samples and 4 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Gasoline.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent Level IV review. Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as gasoline contaminants were found in the method blanks.

Sample C077R011 was identified as a rinsate. No total petroleum hydrocarbons as gasoline contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077S301 C077S302** C077S303 C077S304** C077S306 C077G071** C077G072 C077G073 C077R011	TPH as gasoline	No MS/MSD associated with these samples.	*MS/MSD required.*	*None*	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

Samples C077G071** and C077G072 were identified as field duplicates. No total petroleum hydrocarbons as gasoline were detected in any of the samples.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Data Qualification Summary - SDG 49301/49303

SDG	Sample	Compound	Flag	A or P	Reason
49301/ 49303	C077S301 C077S302** C077S303 C077S304** C077S306 C077G071** C077G072 C077G073 C077R011	TPH as gasoline	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Laboratory Blank Data Qualification Summary - SDG 49301/49303

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Field Blank Data Qualification Summary - SDG 49301/49303

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14457

TPH as Extractables

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 9, 2005

LDC Report Date: December 29, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49287/49289

Sample Identification

C077S391
C077S392
C077S393
C077G123
C077G139
C077G124
C077G118
C077R010

Introduction

This data review covers 3 soil samples and 5 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Extractables.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Compound	%D	Affected Compound	Associated Samples	Flag	A or P
12/22/05	TPH as JP5	17	TPH as JP5	All soil samples in SDG 49287/49289	J (all detects) UJ (all non-detects)	A

The percent difference (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample C077R010 was identified as a rinsate. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
051215A-Blk	Octacosane	149 (28-142)	TPH as extractables	J (all detects)	P

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49287/49289	TPH as extractables	No MS/MSD associated with these samples.	MS/MSD required.	None	P

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

Raw data were not reviewed for this SDG.

VI. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

VII. System Performance

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 49287/49289

SDG	Sample	Compound	Flag	A or P	Reason
49287/ 49289	C077S391 C077S392 C077S393	TPH as JP5	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49287/ 49289	C077S391 C077S392 C077S393 C077G123 C077G139 C077G124 C077G118 C077R010	TPH as extractables	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 49287/49289

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 49287/49289

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 12, 2005

LDC Report Date: January 3, 2006

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49301/49303

Sample Identification

C077S301
C077S302**
C077S303
C077S304**
C077S305
C077S306
C077S307
C077S308
C077S309
C077S310
C077S311
C077S312
C077G071**
C077G073
C077R011

**Indicates sample underwent Level IV review

Introduction

This data review covers 12 soil samples and 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Extractables.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent Level IV review. Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample C077R011 was identified as a rinsate. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
051215A-Blk	Octacosane	149 (28-142)	TPH as extractables	J (all detects)	P

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49301/49303	TPH as extractables	No MS/MSD associated with these samples.	MS/MSD required.	None	P

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 49301/49303

SDG	Sample	Compound	Flag	A or P	Reason
49301/ 49303	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312 C077G071** C077G073 C077R011	TPH as extractables	None	P	Matrix spike/Matrix spike *duplicates*

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 49301/49303

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 49301/49303

No Sample Data Qualified in this SDG

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Bechtel Environmental
1230 Columbia Street, Suite 400
San Diego, CA 92101
Attn: Ms. Toni Kuzmack

January 5, 2006

Project Name : NAS Alameda Point
Project # : CTO 077

On December 30, 2005 the following data packages were received by Laboratory Data Consultants, Inc. from Bechtel Environmental. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 14461:

SDG #	Fraction
49310/49311	Volatiles, Semivolatiles, Polynuclear Aromatic Hydrocarbons, Chlorinated Pesticides & PCBs, Metals, Hexavalent Chromium, TPH as Gasoline, TPH as Extractables

The above SDGs were reviewed using Level III and Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- NFESC Special Publication SP-2056-ENV, Navy Installation Restoration Chemical Data Quality Manual, Naval Facilities Engineering Command, September 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998

The data validators did utilize their professional judgement when evaluating the data to achieve the most complete and accurate assessment of the data. The data packages were reviewed according to the above stated validation procedures.

For GC/MS volatile analyses, the primary findings consisted of:

a) Continuing calibration factors exceeded acceptance criteria in SDG

49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

b) Surrogate percent recoveries exceeded acceptance criteria for several samples in SDG 49310/49311.

c) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49310/49311.

d) Matrix spike/matrix spike duplicate percent recoveries and relative percent differences exceeded acceptance criteria for several compounds in SDG 49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

e) Laboratory control sample percent recoveries exceeded acceptance criteria for styrene in SDG 49310/49311.

f) Internal standard areas exceeded acceptance criteria for sample C077S545 in SDG 49310/49311.

g) *Chloroform and cis-1,2-dichloroethene were detected in the method* blanks and acetone, chloroform and bromoform were detected in the field blanks in SDG 49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For GC/MS semivolatile analyses, the primary finding consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49310/49311.

For GC/MS PAH analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49310/49311.

b) Matrix spike/matrix spike duplicate percent recoveries and relative percent differences exceeded acceptance criteria for several compounds in SDG 49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

c) Laboratory control sample percent recoveries exceeded acceptance criteria for several compounds in SDG 49310/49311.

d) Benzo(b)fluoranthene and benzo(k)fluoranthene coeluted for several samples in SDG 49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For chlorinated pesticide and PCB analyses, the primary findings consisted of:

a) Continuing calibration factors exceeded acceptance criteria in SDG 49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

b) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49310/49311.

For metal analyses, the primary findings consisted of:

a) Matrix spike analyses were not performed for all batches in SDG 49310/49311.

b) Duplicate analyses were not performed for all batches in SDG 49310/49311.

c) Matrix spike percent recoveries and relative percent differences exceeded acceptance criteria for several metals in SDG 49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

d) ICP serial dilution percent differences exceeded acceptance criteria for cobalt and barium in SDG 49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

e) Several metals were detected in the method and field blanks in SDG 49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For TPH as gasoline analyses, the primary finding consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49310/49311.

For TPH as extractable analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49310/49311.

b) Matrix spike percent recoveries exceeded acceptance criteria for TPH as motor oil in SDG 49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

c) Laboratory control sample percent recoveries exceeded acceptance criteria for TPH as motor oil in SDG 49310/49311.

d) Surrogate percent recoveries exceeded acceptance criteria for samples C077S285 and C077S286 in SDG 49310/49311.

For hexavalent chromium analyses, the primary findings consisted of:

a) Matrix spike analyses were not performed for all batches in SDG 49310/49311.
b) Duplicate analyses were not performed for all batches in SDG 49310/49311.

In general, the data for all analyses appear usable with the limitations noted in the Data Validation Reports. Data validation flags were noted on the Laboratory Form 1s and included with each validation report.

Sincerely,

Richard M. Amano
President/Principal Chemist

Attachment 1

1 Week TAT

LDC #14461 (Bechtel Environmental-San Diego / Alameda Point, CTO 077)

LDC	SDG#	DATE REC'D	(2) DATE DUE	VOA (8260B)		SVOA (8270C)		PAHs (8270C -SIM)		Pest. /PCBs (SW846)		Metals (SW846)		Diss. Metals (SW846)		TPH-G (8015)		TPH-E (8015)		Cr(VI) (7196A)																	
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	49310/49311	12/30/05	01/06/06	12	40	3	11	2	23	2	11	0	35	5	0	0	5	4	26	6	8														
A	49310/49311	12/30/05	01/06/06	1	4	0	1	0	2	0	1	0	4	1	0	0	1	1	3	1	1														
Total	B/LR			13	44	3	12	2	25	2	12	0	39	6	0	0	6	5	29	7	9	0	0	0	0	0	0	0	0	0	0	0	0	0	214

Shaded cells indicate Level IV validation (all other cells are Level III validation)

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14461

Volatiles

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 13, 2005

LDC Report Date: January 4, 2006

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49310/49311

Sample Identification

C077S177	C077S282	C077G053
C077S178	C077S283	C077G063
C077S179	C077S321**	C077G062**
C077S180**	C077S322	C077G061
C077S181	C077S323	C077G091
C077S182	C077S324	C077G092
C077S174	C077S325	C077G093
C077S175	C077S326	C077TB14
C077S171	C077S344	C077G241
C077S172	C077S345	C077TB15
C077S173	C077S346	C077R012
C077S621	C077S341	C077S174MS
C077S622	C077S342	C077S174MSD
C077S287	C077S343	C077S283MS
C077S288	C077S541	C077S283MSD
C077S289**	C077S542**	C077G091MS
C077S284	C077S543	C077G091MSD
C077S285	C077S544	
C077S286	C077S545	
C077S281	C077S546	

**Indicates sample underwent Level IV review

Introduction

This data review covers 44 soil samples and 13 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all volatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/17/05	1,2-Dibromo-3-chloropropane	29	C077S621 C077S622 C077S287 C077S288 C077S289** C077S284 C077S285 051217B1-BLK	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051219A-BLK	12/19/05	1,2,3-Trichlorobenzene Chloroform Naphthalene	0.32 ug/L 0.49 ug/L 0.36 ug/L	C077G053 C077G063 C077G062**
051219B-BLK	12/20/05	Chloroform	0.43 ug/L	C077G061 C077G091 C077G092 C077G093 C077TB14 C077G241 C077TB15 C077R012
051217B1-BLK	12/18/05	cis-1,2-Dichloroethene	0.00025 mg/Kg	C077S621 C077S622 C077S287 C077S288 C077S289** C077S284 C077S285
051218A-BLK	12/18/05	Chloroform	0.0025 mg/Kg	C077S283
051221A-BLK	12/21/05	1,2,3-Trichlorobenzene	0.00033 mg/Kg	C077S286 C077S281 C077S282 C077S321** C077S322 C077S323 C077S324 C077S342 C077S545

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051217A1-BLK	12/17/05	cis-1,2-Dichloroethene	0.00039 mg/Kg	C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S171 C077S172 C077S173

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077G053	Chloroform	0.44 ug/L	0.5U ug/L
C077G063	Chloroform	0.48 ug/L	0.5U ug/L
C077G062**	Chloroform	0.47 ug/L	0.5U ug/L
C077G091	Chloroform	0.48 ug/L	0.5U ug/L
C077G092	Chloroform	0.48 ug/L	0.5U ug/L
C077G093	Chloroform	0.41 ug/L	0.5U ug/L
C077TB14	Chloroform	0.43 ug/L	0.5U ug/L
C077G241	Chloroform	0.46 ug/L	0.5U ug/L
C077TB15	Chloroform	0.50 ug/L	0.5U ug/L
C077S287	cis-1,2-Dichloroethene	0.00027 mg/Kg	0.005U mg/Kg
C077S283	Chloroform	0.0029 mg/Kg	0.006U mg/Kg
C077S178	cis-1,2-Dichloroethene	0.00029 mg/Kg	0.006U mg/Kg
C077S181	cis-1,2-Dichloroethene	0.00025 mg/Kg	0.005U mg/Kg

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077S621	cis-1,2-Dichloroethene	0.0004 mg/Kg	0.005U mg/Kg

Samples C077TB14 and C077TB15 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
C077TB14	12/13/05	Chloroform	0.43 ug/L	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S171 C077S172 C077S173 C077S621 C077S622 C077S287 C077S288 C077S289** C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321** C077S322 C077S323 C077S324 C077S325 C077S326 C077S344 C077S345 C077S346 C077S341 C077S342 C077S343 C077S541 C077S542** C077S543 C077S544 C077S545 C077S546 C077G053 C077G063 C077G062** C077G061 C077G091 C077G092 C077G093 C077G241 C077R012

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
C077TB15	12/13/05	Chloroform	0.50 ug/L	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S171 C077S172 C077S173 C077S621 C077S622 C077S287 C077S288 C077S289** C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321** C077S322 C077S323 C077S324 C077S325 C077S326 C077S344 C077S345 C077S346 C077S341 C077S342 C077S343 C077S541 C077S542** C077S543 C077S544 C077S545 C077S546 C077G053 C077G063 C077G062** C077G061 C077G091 C077G092 C077G093 C077G241 C077R012

Sample C077R012 was identified as a rinsate. No volatile contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Compound	Concentration	Associated Samples
C077R012	12/13/05	Acetone	1.2 ug/L	C077S177
		Bromodichloromethane	2.5 ug/L	C077S178
		Bromoform	1.0 ug/L	C077S179
		Chloroform	3.6 ug/L	C077S180**
		Dibromochloromethane	1.7 ug/L	C077S181
				C077S182
				C077S174
				C077S175
				C077S171
				C077S172
				C077S173
				C077S621
				C077S622
				C077S287
				C077S288
				C077S289**
				C077S284
				C077S285
				C077S286
				C077S281
				C077S282
				C077S283
				C077S321**
				C077S322
				C077S323
				C077S324
				C077S325
				C077S326
				C077S344
				C077S345
				C077S346
				C077S341
				C077S342
				C077S343
				C077S541
				C077S542**
				C077S543
				C077S544
				C077S545
				C077S546
				C077G053
				C077G063
				C077G062**
				C077G061
				C077G091
				C077G092
				C077G093
				C077G241
				C077R012

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
C077G053	Chloroform	0.44 ug/L	0.5U ug/L
C077G063	Chloroform	0.48 ug/L	0.5U ug/L
C077G062**	Chloroform	0.47 ug/L	0.5U ug/L
C077G091	Chloroform	0.48 ug/L	0.5U ug/L
C077G092	Chloroform	0.48 ug/L	0.5U ug/L
C077G093	Chloroform	0.41 ug/L	0.5U ug/L
C077G241	Chloroform	0.46 ug/L	0.5U ug/L
C077S177	Acetone	0.0074 mg/Kg	0.1U mg/Kg
C077S160**	Bromoform	0.0024 mg/Kg	0.006U mg/Kg
C077S171	Acetone	0.0092 mg/Kg	0.1U mg/Kg
C077S621	Acetone	0.0055 mg/Kg	0.1U mg/Kg
C077S622	Acetone Chloroform	0.0048 mg/Kg 0.0027 mg/Kg	0.1U mg/Kg 0.005U mg/Kg
C077S287	Acetone Chloroform	0.0031 mg/Kg 0.003 mg/Kg	0.1U mg/Kg 0.005U mg/Kg
C077S288	Acetone Chloroform	0.0053 mg/Kg 0.0035 mg/Kg	0.1U mg/Kg 0.006U mg/Kg
C077S289**	Chloroform	0.0027 mg/Kg	0.006U mg/Kg
C077S284	Chloroform	0.0033 mg/Kg	0.006U mg/Kg
C077S285	Chloroform	0.0027 mg/Kg	0.005U mg/Kg
C077S283	Chloroform	0.0029 mg/Kg	0.006U mg/Kg
C077S324	Chloroform	0.0019 mg/Kg	0.005U mg/Kg

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S325	Bromofluorobenzene	130 (85-120)	All TCL compounds	J (all detects)	P
C077S345	Bromofluorobenzene	124 (85-120)	All TCL compounds	J (all detects)	P
C077S341	1,2-Dichloroethane-d4	150 (52-149)	All TCL compounds	J (all detects)	P
C077S342	Bromofluorobenzene	159 (85-120)	All TCL compounds	J (all detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S171 C077S172 C077S173 C077S621 C077S622 C077S287 C077S288 C077S289** C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321** C077S322 C077S323 C077S324 C077S325 C077S326 C077S344 C077S345 C077S346 C077S341 C077S342 C077S343 C077S541 C077S542** C077S543 C077S545	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S283MS/MSD (C077S177 C077S544 C077S546)	1,1,1-Trichloroethane	66.4 (70-135)	-	-	J (all detects) UJ (all non-detects)	A
	1,1-Dichloroethene	63.6 (65-135)	26.0 (65-135)	83.9 (≤30)		
	1,2-Dichloroethane	-	44.4 (70-135)	55.1 (≤30)		
	Benzene	63.4 (75-125)	30.2 (75-125)	70.9 (≤30)		
	Chlorobenzene	62.0 (75-125)	22.2 (75-125)	94.5 (≤30)		
	Ethylbenzene	54.4 (75-125)	17.4 (75-125)	103.1 (≤30)		
	m,p-Xylenes	56.6 (80-125)	15.8 (80-125)	112.7 (≤30)		
	o-Xylene	60.6 (75-125)	19.8 (75-125)	101.5 (≤30)		
	Trichloroethene	66.8 (75-125)	20.0 (75-125)	107.8 (≤30)		
	Tetrachloroethene	50.4 (65-140)	13.2 (65-140)	117.0 (≤30)		
	Toluene	65.4 (70-125)	21.8 (70-125)	99.1 (≤30)		
	trans-1,2-Dichloroethene	62.6 (65-135)	23.0 (65-135)	92.5 (≤30)		

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S174MS/MSD (C077S177 C077S544 C077S546)	Ethylbenzene m,p-Xylenes o-Xylene Tetrachloroethene	65.6 (75-125) 64.6 (80-125) 74.2 (75-125) 54.2 (65-140)	- 75.5 (80-125) - -	- - - -	J (all detects) UJ (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051217BLCS	Styrene	56.6 (75-125)	C077S325 C077S326 C077S344 C077S345 C077S346 C077S341 C077S343 C077S541 C077S542** C077S543 051217B-BLK	J (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits with the following exceptions:

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S545	1,4-Dichlorobenzene-d4	185268 (45296-181184)	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

Samples C077G092 and C077G093 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD
	C077G092	C077G093	
Carbon disulfide	1.5	0.67	76
Chloroform	0.48	0.41	16
cis-1,2-Dichloroethene	0.63	0.64	2
Trichloroethene	0.59	0.66	11
Toluene	0.27	0.25	8

NAS Alameda Point, CTO 077
Volatiles - Data Qualification Summary - SDG 49310/49311

SDG	Sample	Compound	Flag	A or P	Reason
49310/ 49311	C077S621 C077S622 C077S287 C077S288 C077S289** C077S284 C077S285	1,2-Dibromo-3-chloropropane	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49310/ 49311	C077S325 C077S345 C077S341 C077S342	All TCL compounds	J (all detects)	P	Surrogate spikes (%R)
49310/ 49311	C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S171 C077S172 C077S173 C077S621 C077S622 C077S287 C077S288 C077S289** C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321** C077S322 C077S323 C077S324 C077S325 C077S326 C077S344 C077S345 C077S346 C077S341 C077S342 C077S343 C077S541 C077S542** C077S543 C077S545	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49310/ 49311	C077S177 C077S544 C077S546	1,1,1-Trichloroethane	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)

SDG	Sample	Compound	Flag	A or P	Reason
49310/ 49311	C077S177 C077S544 C077S546	1,1-Dichloroethene 1,2-Dichloroethane Benzene Chlorobenzene Ethylbenzene m,p-Xylenes o-Xylene Trichloroethene Tetrachloroethene Toluene trans-1,2-Dichloroethene	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)(RPD)
49310/ 49311	C077S325 C077S326 C077S344 C077S345 C077S346 C077S341 C077S343 C077S541 C077S542** C077S543	Styrene	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)
49310/ 49311	C077S545	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P	Internal standards (area)

NAS Alameda Point, CTO 077
Volatiles - Laboratory Blank Data Qualification Summary - SDG 49310/49311

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49310/49311	C077G053	Chloroform	0.5U ug/L	A
49310/49311	C077G063	Chloroform	0.5U ug/L	A

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49310/49311	C077G062**	Chloroform	0.5U ug/L	A
49310/49311	C077G091	Chloroform	0.5U ug/L	A
49310/49311	C077G092	Chloroform	0.5U ug/L	A
49310/49311	C077G093	Chloroform	0.5U ug/L	A
49310/49311	C077TB14	Chloroform	0.5U ug/L	A
49310/49311	C077G241	Chloroform	0.5U ug/L	A
49310/49311	C077TB15	Chloroform	0.5U ug/L	A
49310/49311	C077S287	cis-1,2-Dichloroethene	0.005U mg/Kg	A
49310/49311	C077S283	Chloroform	0.006U mg/Kg	A
49310/49311	C077S178	cis-1,2-Dichloroethene	0.006U mg/Kg	A
49310/49311	C077S181	cis-1,2-Dichloroethene	0.005U mg/Kg	A
49310/49311	C077S621	cis-1,2-Dichloroethene	0.005U mg/Kg	A

NAS Alameda Point, CTO 077
Volatiles - Field Blank Data Qualification Summary - SDG 49310/49311

SDG	Sample	Compound	Modified Final Concentration	A or P
49310/49311	C077G053	Chloroform	0.5U ug/L	A
49310/49311	C077G063	Chloroform	0.5U ug/L	A
49310/49311	C077G062**	Chloroform	0.5U ug/L	A
49310/49311	C077G091	Chloroform	0.5U ug/L	A
49310/49311	C077G092	Chloroform	0.5U ug/L	A
49310/49311	C077G093	Chloroform	0.5U ug/L	A

SDG	Sample	Compound	Modified Final Concentration	A or P
49310/49311	C077G241	Chloroform	0.5U ug/L	A
49310/49311	C077S177	Acetone	0.1U mg/Kg	A
49310/49311	C077S180**	Bromoform	0.006U mg/Kg	A
49310/49311	C077S171	Acetone	0.1U mg/Kg	A
49310/49311	C077S621	Acetone	0.1U mg/Kg	A
49310/49311	C077S622	Acetone Chloroform	0.1U mg/Kg 0.005U mg/Kg	A
49310/49311	C077S287	Acetone Chloroform	0.1U mg/Kg 0.005U mg/Kg	A
49310/49311	C077S288	Acetone Chloroform	0.1U mg/Kg 0.006U mg/Kg	A
49310/49311	C077S289**	Chloroform	0.006U mg/Kg	A
49310/49311	C077S284	Chloroform	0.006U mg/Kg	A
49310/49311	C077S285	Chloroform	0.005U mg/Kg	A
49310/49311	C077S283	Chloroform	0.006U mg/Kg	A
49310/49311	C077S324	Chloroform	0.005U mg/Kg	A

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14461

Semivolatiles

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 13, 2005

LDC Report Date: January 3, 2006

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49310/49311

Sample Identification

C077S177
C077S178
C077S179
C077S180**
C077S181
C077S182
C077S174
C077S175
C077S176
C077S171
C077S172
C077S173
C077G053
C077R012
C077G054

**Indicates sample underwent Level IV review

Introduction

This data review covers 12 soil samples and 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No semivolatile contaminants were found in the method blanks.

Sample C077R012 was identified as a rinsate. No semivolatile contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49310/49311	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

Samples C077G053 and C077G054 were identified as field duplicates. No semivolatiles were detected in any of the samples.

NAS Alameda Point, CTO 077
Semivolatiles - Data Qualification Summary - SDG 49310/49311

SDG	Sample	Compound	Flag	A or P	Reason
49310/ 49311	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176 C077S171 C077S172 C077S173 C077G053 C077R012 C077G054	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 49310/49311

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Semivolatiles - Field Blank Data Qualification Summary - SDG 49310/49311

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14461

Polynuclear Aromatic Hydrocarbons

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 13, 2005

LDC Report Date: January 4, 2006

Matrix: Soil/Water

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49310/49311

Sample Identification

C077S177	C077S269
C077S178	C077G053
C077S179	C077R012
C077S180**	C077S176MS
C077S181	C077S176MSD
C077S182	C077S267MS
C077S174	C077S267MSD
C077S175	
C077S176	
C077S261**	
C077S262	
C077S263	
C077S171	
C077S172	
C077S173	
C077S264	
C077S265	
C077S266	
C077S267	
C077S268	

**Indicates sample underwent Level IV review

Introduction

This data review covers 25 soil samples and 2 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C using Selected Ion Monitoring (SIM) for Polynuclear Aromatic Hydrocarbons.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

Average relative response factors (RRF) for all target compounds and system monitoring compounds

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0% .

All of the continuing calibration RRF values were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polynuclear aromatic hydrocarbon contaminants were found in the method blanks.

Sample C077R012 was identified as a rinsate. No polynuclear aromatic hydrocarbon contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49310/49311	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S176MS/MSD (C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176)	Benzo(a)anthracene Benzo(a)pyrene Pyrene	106 (56-103) 104 (53-103) 107 (55-104)	- - -	- - -	J (all detects) J (all detects) J (all detects)	A
C077S267MS/MSD (C077S261** C077S262 C077S263 C077S171 C077S172 C077S173 C077S264 C077S265 C077S266 C077S267 C077S268 C077S269)	2-Methylnaphthalene Acenaphthene Acenaphthylene Anthracene Benzo(a)anthracene Chrysene Dibenz(a,h)anthracene Fluoranthene Fluorene Indeno(1,2,3-cd)pyrene Phenanthrene	104 (53-101) - 104 (53-102) - 120 (56-103) 126 (55-104) - - - - 110 (54-105)	102 (53-101) 107 (52-104) 114 (53-102) 108 (54-102) 154 (56-103) 151 (55-104) 123 (53-105) 128 (54-106) 112 (54-104) 168 (47-109) 129 (54-105)	- - - - - - - - - - -	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
C077S267MS/MSD (C077S261** C077S262 C077S263 C077S171 C077S172 C077S173 C077S264 C077S265 C077S266 C077S267 C077S268 C077S269)	Benzo(b)fluoranthene Benzo(k)fluoranthene Pyrene	- 121 (52-112) -	- - -	45.3 (≤30) 35.5 (≤30) 35.0 (≤30)	J (all detects) UJ (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051216B-LCS	Acenaphthylene Benzo(a)pyrene Benzo(b)fluoranthene Dibenz(a,h)anthracene Fluoranthene Fluorene Indeno(1,2,3-cd)pyrene Phenanthrene Pyrene	105 (53-102) 121 (53-103) 114 (49-113) 118 (53-105) 113 (54-106) 109 (54-104) 110 (47-109) 111 (54-105) 106 (55-104)	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176 051216B-BLK	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P
051216A-LCS	2-Methylnaphthalene Benzo(a)anthracene Benzo(b)fluoranthene Naphthalene	107 (53-101) 112 (56-103) 115 (49-113) 102 (49-100)	C077S261** C077S262 C077S263 C077S171 C077S172 C077S173 C077S264 C077S265 C077S266 C077S267 C077S268 C077S269 051216A-BLK	J (all detects) J (all detects) J (all detects) J (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Flag	A or P
C077S174 C077S176 C077S261** C077S262 C077S263 C077S269	Benzo(b)fluoranthene Benzo(k)fluoranthene	Due to lack of resolution between these compounds in the samples, the laboratory performed the quantitation using the total peak area.	J (all detects) J (all detects)	A

Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 49310/49311

SDG	Sample	Compound	Flag	A or P	Reason
49310/ 49311	C077G053 C077R012	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49310/ 49311	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176	Benzo(a)anthracene Benzo(a)pyrene Pyrene	J (all detects) J (all detects) J (all detects)	A	Matrix spike/Matrix spike duplicates (%R)
49310/ 49311	C077S261** C077S262 C077S263 C077S171 C077S172 C077S173 C077S264 C077S265 C077S266 C077S267 C077S268 C077S269	2-Methylnaphthalene Acenaphthene Acenaphthylene Anthracene Benzo(a)anthracene Chrysene Dibenz(a,h)anthracene Fluoranthene Fluorene Indeno(1,2,3-cd)pyrene Phenanthrene	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Matrix spike/Matrix spike duplicates (%R)
49310/ 49311	C077S261** C077S262 C077S263 C077S171 C077S172 C077S173 C077S264 C077S265 C077S266 C077S267 C077S268 C077S269	Benzo(k)fluoranthene	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)(RPD)
49310/ 49311	C077S261** C077S262 C077S263 C077S171 C077S172 C077S173 C077S264 C077S265 C077S266 C077S267 C077S268 C077S269	Pyrene Benzo(b)fluoranthene	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (RPD)

SDG	Sample	Compound	Flag	A or P	Reason
49310/ 49311	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176	Acenaphthylene Benzo(a)pyrene Benzo(b)fluoranthene Dibenz(a,h)anthracene Fluoranthene Fluorene Indeno(1,2,3-cd)pyrene Phenanthrene Pyrene	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P	Laboratory control samples (%R)
49310/ 49311	C077S261** C077S262 C077S263 C077S171 C077S172 C077S173 C077S264 C077S265 C077S266 C077S267 C077S268 C077S269	2-Methylnaphthalene Benzo(a)anthracene Benzo(b)fluoranthene Naphthalene	J (all detects) J (all detects) J (all detects) J (all detects)	P	Laboratory control samples (%R)
49310/ 49311	C077S174 C077S176 C077S261** C077S262 C077S263 C077S269	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) J (all detects)	A	Compound quantitation and CRQLs

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 49310/49311

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary - SDG 49310/49311

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14461

Chlorinated Pesticides & PCBs

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 13, 2005

LDC Report Date: January 3, 2006

Matrix: Soil/Water

Parameters: Chlorinated Pesticides & PCBs

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49310/49311

Sample Identification

C077S177
C077S178
C077S179
C077S180**
C077S181
C077S182
C077S174
C077S175
C077S176
C077S171
C077S172
C077S173
C077G053
C077R012

**Indicates sample underwent Level IV review.

Introduction

This data review covers 12 soil samples and 2 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 8081A and 8082 for Chlorinated Pesticides and PCBs.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical or advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration *and continuing calibration sections.*

III. Initial Calibration

Initial calibration of single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

Retention time windows were evaluated and considered technically acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compounds	Flag	A or P
12/21/05	1220074	DB-XLB	Aroclor-1260	17.6	C077S172 C077S173	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/19/05	1216105	DB-XLB	Aroclor-1260	19.1	051214A-BLK	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/19/05	1216106	DB-XLB	Toxaphene	68.0	051214A-BLK	Toxaphene	J (all detects) UJ (all non-detects)	A

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compounds	Flag	A or P
12/19/05	1216126	DB-XLB	Toxaphene	106.7	C077G053 C077R012	Toxaphene	J (all detects) UJ (all non-detects)	A

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

Retention times (RT) of all compounds in the calibration standards were within QC limits for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide or PCB contaminants were found in the method blanks.

Sample C077R012 was identified as a rinsate. No chlorinated pesticide or PCB contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for sample C077S179. Since the sample was diluted out, no data were qualified.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49310/49311	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and Reported CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which an Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Data Qualification Summary - SDG 49310/49311

SDG	Sample	Compound	Flag	A or P	Reason
49310/ 49311	C077S172 C077S173	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49310/ 49311	C077G053 C077R012	Toxaphene	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49310/ 49311	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176 C077S171 C077S172 C077S173 C077G053 C077R012	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Laboratory Blank Data Qualification Summary - SDG 49310/49311

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Field Blank Data Qualification Summary - SDG 49310/49311

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14457

Polynuclear Aromatic Hydrocarbons

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 9, 2005

LDC Report Date: December 30, 2005

Matrix: Soil/Water

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49287/49289

Sample Identification

C077S391
C077S392
C077S393
C077G123
C077G139
C077G124
C077G118
C077R010
C077G125

Introduction

This data review covers 3 soil samples and 6 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C using Selected Ion Monitoring (SIM) for Polynuclear Aromatic Hydrocarbons.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

Average relative response factors (RRF) for all target compounds and system monitoring compounds

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0% .

All of the continuing calibration RRF values were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polynuclear aromatic hydrocarbon contaminants were found in the method blanks.

Sample C077R010 was identified as a rinsate. No polynuclear aromatic hydrocarbon contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S391	2-Fluorobiphenyl Terphenyl-d14	49.0 (54-125) 54.8 (57-126)	All TCL compounds	J (all detects) UJ (all non-detects)	P
C077S393	2-Fluorobiphenyl Nitrobenzene-d5 Terphenyl-d14	35.2 (54-125) 46.9 (49-121) 52.7 (57-126)	All TCL compounds	J (all detects) UJ (all non-detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49287/49289	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S407MS/MSD (All soil samples in SDG 49287/49289)	2-Methylnaphthalene	134 (53-101)	144 (53-101)	-	J (all detects)	A
	Acenaphthylene	107 (53-102)	111 (53-102)	-	J (all detects)	
	Benzo(a)anthracene	133 (56-103)	127 (56-103)	-	J (all detects)	
	Benzo(a)pyrene	114 (53-103)	118 (53-103)	-	J (all detects)	
	Benzo(b)fluoranthene	128 (49-113)	138 (49-113)	-	J (all detects)	
	Dibenz(a,h)anthracene	110 (53-105)	115 (53-105)	-	J (all detects)	
	Fluoranthene	118 (54-106)	120 (54-106)	-	J (all detects)	
	Fluorene	-	106 (54-104)	-	J (all detects)	
	Indeno(1,2,3-cd)pyrene	-	112 (47-109)	-	J (all detects)	
	Naphthalene	-	102 (49-100)	-	J (all detects)	
	Phenanthrene	120 (54-105)	120 (54-105)	-	J (all detects)	
	Pyrene	114 (55-104)	117 (55-104)	-	J (all detects)	

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051216WLCS	Benzo(a)anthracene	108 (49-105)	All water samples in SDG 49287/49289	J (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

Samples C077G124 and C077G125 were identified as field duplicates. No polynuclear aromatic hydrocarbons were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD
	C077G124	C077G125	
Pyrene	0.2U	0.11	200

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 49287/49289

SDG	Sample	Compound	Flag	A or P	Reason
49287/ 49289	C077S391 C077S393	All TCL compounds	J (all detects) UJ (all non-detects)	P	Surrogate recovery (%R)
49287/ 49289	C077G123 C077G139 C077G124 C077G118 C077R010 C077G125	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49287/ 49289	C077S391 C077S392 C077S393	2-Methylnaphthalene Acenaphthylene Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Dibenz(a,h)anthracene Fluoranthene Fluorene Indeno(1,2,3-cd)pyrene Naphthalene Phenanthrene Pyrene	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Matrix spike/Matrix spike duplicates (%R)
49287/ 49289	C077G123 C077G139 C077G124 C077G118 C077R010 C077G125	Benzo(a)anthracene	J (all detects)	P	Laboratory control samples (%R)

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 49287/49289

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary - SDG 49287/49289

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 12, 2005

LDC Report Date: *December 30, 2005*

Matrix: Soil/Water

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49301/49303

Sample Identification

C077S301
C077S302**
C077S303
C077S304**
C077S305
C077S306
C077S307
C077S308
C077S309
C077S310
C077S311
C077S312
C077G071**
C077G073
C077R011

**Indicates sample underwent Level IV review

Introduction

This data review covers 12 soil samples and 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C using Selected Ion Monitoring (SIM) for Polynuclear Aromatic Hydrocarbons.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

Average relative response factors (RRF) for all target compounds and system monitoring compounds

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0% .

All of the continuing calibration RRF values were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polynuclear aromatic hydrocarbon contaminants were found in the method blanks.

Sample C077R011 was identified as a rinsate. No polynuclear aromatic hydrocarbon contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49301/49303	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051216WLCS	*Benzo(a)anthracene*	108 (49-105)	All water samples in SDG 49301/49303	J (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Flag	A or P
C077S312	Benzo(b)fluoranthene *Benzo(k)fluoranthene*	Due to lack of resolution between these compounds *in the samples, the laboratory performed the* quantitation using the total peak area.	J (all detects) J (all detects)	A

Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. *Field Duplicates*

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 49301/49303

SDG	Sample	Compound	Flag	A or P	Reason
49301/ 49303	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312 C077G071** C077G073 C077R011	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49301/ 49303	C077G071** C077G073 C077R011	Benzo(a)anthracene	J (all detects)	P	Laboratory control samples (%R)
49301/ 49303	C077S312	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) J (all detects)	A	Compound quantitation and CRQLs

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 49301/49303

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary - SDG 49301/49303

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14457

Chlorinated Pesticides & PCBs

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 9, 2005

LDC Report Date: December 30, 2005

Matrix: Soil/Water

Parameters: Chlorinated Pesticides & PCBs

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49287/49289

Sample Identification

C077S391
C077S392
C077S393
C077G123
C077G139
C077G124
C077G118
C077R010
C077S393MS
C077S393MSD

Introduction

This data review covers 5 soil samples and 5 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 8081A and 8082 for Chlorinated Pesticides and PCBs.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical or advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compounds	Flag	A or P
12/20/05	1220027	DB-35MS	4,4'-DDD	17	C077S393	4,4'-DDD	J (all detects) UJ (all non-detects)	A
12/20/05	1220029	DB-35MS	Aroclor-1260	15.8	C077S393	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/20/05	1220029	DB-XLB	Aroclor-1016 Aroclor-1260	15.8 21.3	C077S393	All PCB compounds	J (all detects) UJ (all non-detects)	A
12/21/05	1220149	DB-35MS	4,4'-DDD	20	051215A-BLK	4,4'-DDD	J (all detects) UJ (all non-detects)	A
12/21/05	1220049	DB-XLB	4,4'-DDD	18	051215A-BLK	4,4'-DDD	J (all detects) UJ (all non-detects)	A

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compounds	Flag	A or P
12/21/05	1220051	DB-35MS	Aroclor-1260	15.5	051215A-BLK	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/21/05	1220051	DB-XLB	Aroclor-1260	18.9	051215A-BLK	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/19/05	1216105	DB-XLB	Aroclor-1260	19.1	051214A-BLK	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/19/05	1216106	DB-XLB	Toxaphene	68.0	051214A-BLK	Toxaphene	J (all detects) UJ (all non-detects)	A
12/19/05	1216126	DB-XLB	Toxaphene	106.7	All water samples in SDG 49287/492879	Toxaphene	J (all detects) UJ (all non-detects)	A

Initial calibration verification (ICV) percent differences (%D) were less than or equal to 15.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/16/05	Endosulfan II	19	All samples in SDG 49287/49289	J (all detects) UJ (all non-detects)	A
12/15/05	Toxaphene	15.2	All water samples in SDG 49287/49289	J (all detects) UJ (all non-detects)	A

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide or PCB contaminants were found in the method blanks.

Sample C077R010 was identified as a rinsate. No chlorinated pesticide or PCB contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and Reported CRQLs

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Data Qualification Summary - SDG 49287/49289

SDG	Sample	Compound	Flag	A or P	Reason
49287/ 49289	C077S393	All PCB compounds	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49287/ 49289	C077G123 C077G139 C077G124 C077G118 C077R010	Toxaphene	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49287/ 49289	C077S391 C077S392 C077S393 C077G123 C077G139 C077G124 C077G118 C077R010	Endosulfan II	J (all detects) UJ (all non-detects)	A	Continuing calibration (ICV %D)
49287/ 49289	C077G123 C077G139 C077G124 C077G118 C077R010	Toxaphene	J (all detects) UJ (all non-detects)	A	Continuing calibration (ICV %D)

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Laboratory Blank Data Qualification Summary - SDG 49287/49289

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Field Blank Data Qualification Summary - SDG 49287/49289

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 12, 2005

LDC Report Date: January 3, 2006

Matrix: Soil/Water

Parameters: Chlorinated Pesticides & PCBs

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49301/49303

Sample Identification

C077S301
C077S302**
C077S303
C077S304**
C077S305
C077S306
C077S307
C077S308
C077S309
C077S310
C077S311
C077S312
C077G071**
C077G073
C077R011
C077S312MS
C077S312MSD
C077G073MS
C077G073MSD

**Indicates sample underwent Level IV review.

Introduction

This data review covers 14 soil samples and 5 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 8081A and 8082 for Chlorinated Pesticides and PCBs.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical or advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

Retention time windows were evaluated and considered technically acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compounds	Flag	A or P
12/20/05	1220027	DB-35MS	4,4'-DDD	17	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309	4,4'-DDD	J (all detects) UJ (all non-detects)	A

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compounds	Flag	A or P
12/20/05	1220029	DB-35MS	Aroclor-1260	15.8	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/20/05	1220029	DB-XLB	Aroclor-1016 Aroclor-1260	15.8 21.3	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309	All PCB compounds	J (all detects) UJ (all non-detects)	A
12/20/05	1220042	DB-35MS	alpha-BHC gamma-BHC 4,4'-DDD	19 17 20	C077S310 C077S311 C077S312	alpha-BHC gamma-BHC 4,4'-DDD	J (all detects) UJ (all non-detects)	A
12/20/05	1220042	DB-XLB	alpha-BHC	17	C077S310 C077S311 C077S312	alpha-BHC	J (all detects) UJ (all non-detects)	A
12/21/05	1220149	DB-35MS	4,4'-DDD	20	051215A-Blk	4,4'-DDD	J (all detects) UJ (all non-detects)	A
12/21/05	1220049	DB-XLB	4,4'-DDD	18	051215A-Blk	4,4'-DDD	J (all detects) UJ (all non-detects)	A
12/21/05	1220051	DB-35MS	Aroclor-1260	15.2	051215A-Blk	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/21/05	1220051	DB-XLB	Aroclor-1260	18.9	051215A-Blk	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/19/05	1216105	DB-XLB	Aroclor-1260	19.1	C077G073MS C077G073MSD 051214A-Blk	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/19/05	1216106	DB-XLB	Toxaphene	68.0	C077G073MS C077G073MSD 051214A-Blk	Toxaphene	J (all detects) UJ (all non-detects)	A

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compounds	Flag	A or P
12/19/05	1216126	DB-XLB	Toxaphene	106.7	C077G071** C077G073 C077R011	Toxaphene	J (all detects) UJ (all non-detects)	A

Initial calibration verification (ICV) percent differences (%D) were less than or equal to 15.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/16/05	Endosulfan II	19	All samples in SDG 49301/49303	J (all detects) UJ (all non-detects)	A
12/15/05	Toxaphene	15.2	All water samples in SDG 49301/49303	J (all detects) UJ (all non-detects)	A

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

Retention times (RT) of all compounds in the calibration standards were within QC limits for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide or PCB contaminants were found in the method blanks.

Sample C077R011 was identified as a rinsate. No chlorinated pesticide or PCB contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for sample C077S308 . Since the sample was diluted out, no data were qualified.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and Reported CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which an Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Data Qualification Summary - SDG 49301/49303

SDG	Sample	Compound	Flag	A or P	Reason
49301/ 49303	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309	All PCB compounds	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49301/ 49303	C077S310 C077S311 C077S312	alpha-BHC gamma-BHC 4,4'-DDD	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49301/ 49303	C077G071** C077G073 C077R011	Toxaphene	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49301/ 49303	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312 C077G071** C077G073 C077R011	Endosulfan II	J (all detects) UJ (all non-detects)	A	Continuing calibration (ICV %D)
49301/ 49303	C077G071** C077G073 C077R011	Toxaphene	J (all detects) UJ (all non-detects)	A	Continuing calibration (ICV %D)

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Laboratory Blank Data Qualification Summary - SDG 49301/49303

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Field Blank Data Qualification Summary - SDG 49301/49303

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14457

Metals

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 9, 2005

LDC Report Date: December 29, 2005

Matrix: Soil/Water

Parameters: Metals

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49287/49289

Sample Identification

C077S391	C077G124
C077S392	C077G118
C077S393	C077R010
C077S193	C077G125
C077S194	C077R010MS
C077S195	C077R010DUP
C077S196	
C077S197	
C077S198	
C077S222	
C077S220	
C077S221	
C077S199	
C077S200	
C077S223	
C077S201	
C077S202	
C077S224	
C077G123	
C077G139	

Introduction

This data review covers 18 soil samples and 8 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 6010B and 7000 for Metals. The metals analyzed were Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Arsenic Chromium Selenium	2.277 ug/L 0.297 ug/L 3.581 ug/L	C077S391 C077S392 C077S393
ICB/CCB	Antimony Arsenic Cobalt Mercury Selenium	3.976 ug/L 2.955 ug/L 2.043 ug/L 0.133 ug/L 4.718 ug/L	All water samples in SDG 49287/49289
ICB/CCB	Potassium	114.2 ug/L	C077G123 C077G139 C077R010
ICB/CCB	Sodium	515.5 ug/L	C077R010

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G123	Arsenic Cobalt Mercury Selenium	11.7 ug/L 1.1 ug/L 0.084 ug/L 3.7 ug/L	11.7U ug/L 1.1U ug/L 0.084U ug/L 3.7U ug/L
C077G139	Cobalt Selenium	0.65 ug/L 8.6 ug/L	0.65U ug/L 8.6U ug/L
C077G124	Arsenic Mercury Selenium	8.4 ug/L 0.068 ug/L 7.5 ug/L	8.4U ug/L 0.068U ug/L 7.5U ug/L
C077G118	Antimony Arsenic Mercury Selenium	2.9 ug/L 2.7 ug/L 0.096 ug/L 6.7 ug/L	2.9U ug/L 2.7U ug/L 0.096U ug/L 6.7U ug/L
C077R010	Cobalt Mercury Potassium Sodium	2.0 ug/L 0.063 ug/L 235 ug/L 1120 ug/L	2.0U ug/L 0.063U ug/L 235U ug/L 1120U ug/L
C077G125	Arsenic Mercury Selenium	8.1 ug/L 0.12 ug/L 5.3 ug/L	8.1U ug/L 0.12U ug/L 5.3U ug/L

Sample C077R010 was identified as a rinsate. No metal contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
C077R010	12/9/05	Cadmium Calcium Cobalt Magnesium Mercury Potassium Sodium	1.2 ug/L 38.2 ug/L 2.0 ug/L 80.6 ug/L 0.063 ug/L 235 ug/L 1120 ug/L	C077S391 C077S392 C077S393 C077G123 C077G139 C077G124 C077G118 C077G125

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G123	Cobalt Mercury	1.1 ug/L 0.084 ug/L	1.1U ug/L 0.084U ug/L
C077G139	Cobalt	0.65 ug/L	0.65U ug/L
C077G124	Mercury	0.068 ug/L	0.068U ug/L
C077G118	Mercury	0.096 ug/L	0.096U ug/L
C077G125	Mercury	0.12 ug/L	0.12U ug/L
C077S391	Cadmium	0.16 mg/Kg	0.16U mg/Kg
C077S392	Mercury Sodium	0.028 mg/Kg 118 mg/Kg	0.028U mg/Kg 118U mg/Kg

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All water samples in SDG 49287/49289	All ICP metals	No MS associated with these samples.	MS required.	None	P
C077S391 C077S392 C077S393	All ICP metals	No MS associated with these samples.	MS required.	None	P
All water samples in SDG 49287/49289	All ICP metals	No MS associated with these samples.	MS required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All water samples in SDG 49287/49289	All ICP metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P
C077S391 C077S392 C077S393	All ICP metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P
C077S193 C077S194 C077S195 C077S196 C077S197 C077S198 C077S222 C077S220 C077S221 C077S199 C077S200 C077S223 C077S201 C077S202 C077S224	Lead	No DUP analysis associated with these samples.	DUP analysis required.	None	P

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Internal Standards

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
C077G125L	Barium Calcium Magnesium Manganese	15.0 (≤10) 11.1 (≤10) 12.5 (≤10) 10.2 (≤10)	All water samples in SDG 49287/49289	J (all detects) J (all detects) J (all detects) J (all detects)	A

XI. Sample Result Verification

Raw data were not reviewed for this SDG.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been qualified.

XIII. Field Duplicates

Samples C077G124 and C077G125 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD
	C077G124	C077G125	
Arsenic	8.4	8.1	4
Barium	286	245	15
Beryllium	2U	0.28	200
Calcium	35400	31900	10
Chromium	4.9	4.5	9
Iron	1940	1050	60
Magnesium	59700	50100	17
Manganese	523	421	22
Mercury	0.068	0.12	55
Potassium	47600	49800	5
Selenium	7.5	5.3	34

Compound	Concentration (ug/L)		RPD
	C077G124	C077G125	
Sodium	1110000	1090000	2
Vanadium	4.5	3.8	17

NAS Alameda Point, CTO 077
Metals - Data Qualification Summary - SDG 49287/49289

SDG	Sample	Analyte	Flag	A or P	Reason
49287/ 49289	C077G123 C077G139 C077G124 C077G118 C077R010 C077G125 C077S391 C077S392 C077S393	All ICP metals	None	P	Matrix spike analysis
49287/ 49289	C077S193 C077S194 C077S195 C077S196 C077S197 C077S198 C077S222 C077S220 C077S221 C077S199 C077S200 C077S223 C077S201 C077S202 C077S224	Lead	None	P	Matrix spike analysis
49287/ 49289	C077G123 C077G139 C077G124 C077G118 C077R010 C077G125 C077S391 C077S392 C077S393	All ICP metals	None	P	Duplicate analysis
49287/ 49289	C077S193 C077S194 C077S195 C077S196 C077S197 C077S198 C077S222 C077S220 C077S221 C077S199 C077S200 C077S223 C077S201 C077S202 C077S224	Lead	None	P	Duplicate analysis

SDG	Sample	Analyte	Flag	A or P	Reason
49287/ 49289	C077G123 C077G139 C077G124 C077G118 C077R010 C077G125	Barium Calcium Magnesium Manganese	J (all detects) J (all detects) J (all detects) J (all detects)	A	ICP serial dilution (%D)

NAS Alameda Point, CTO 077
Metals - Laboratory Blank Data Qualification Summary - SDG 49287/49289

SDG	Sample	Analyte	Modified Final Concentration	A or P
49287/ 49289	C077G123	Arsenic Cobalt Mercury Selenium	11.7U ug/L 1.1U ug/L 0.084U ug/L 3.7U ug/L	A
49287/ 49289	C077G139	Cobalt Selenium	0.65U ug/L 8.6U ug/L	A
49287/ 49289	C077G124	Arsenic Mercury Selenium	8.4U ug/L 0.068U ug/L 7.5U ug/L	A
49287/ 49289	C077G118	Antimony Arsenic Mercury Selenium	2.9U ug/L 2.7U ug/L 0.096U ug/L 6.7U ug/L	A
49287/ 49289	C077R010	Cobalt Mercury Potassium Sodium	2.0U ug/L 0.063U ug/L 235U ug/L 1120U ug/L	A
49287/ 49289	C077G125	Arsenic Mercury Selenium	8.1U ug/L 0.12U ug/L 5.3U ug/L	A

NAS Alameda Point, CTO 077
Metals - Field Blank Data Qualification Summary - SDG 49287/49289

SDG	Sample	Analyte	Modified Final Concentration	A or P
49287/ 49289	C077G123	Cobalt Mercury	1.1U ug/L 0.084U ug/L	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49287/ 49289	C077G139	Cobalt	0.65U ug/L	A
49287/ 49289	C077G124	Mercury	0.068U ug/L	A
49287/ 49289	C077G118	Mercury	0.096U ug/L	A
49287/ 49289	C077G125	Mercury	0.12U ug/L	A
49287/ 49289	C077S391	Cadmium	0.16U mg/Kg	A
49287/ 49289	C077S392	Mercury Sodium	0.028U mg/Kg 118U mg/Kg	A

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 12, 2005

LDC Report Date: January 3, 2006

Matrix: Soil/Water

Parameters: Metals

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49301/49303

Sample Identification

C077S301	C077S226	C077G073
C077S302**	C077S191	C077R011
C077S303	C077S192	C077S312MS
C077S304**	C077S219	C077S312MSD
C077S305	C077S217	
C077S306	C077S218	
C077S307	C077S232	
C077S308	C077S203	
C077S309	C077S204	
C077S310	C077S225	
C077S311	C077S213	
C077S312	C077S214	
C077S211	C077S230	
C077S212**	C077S215	
C077S229**	C077S216	
C077S207**	C077S231	
C077S208**	C077S209	
C077S227	C077S210	
C077S205	C077S228	
C077S206	C077G071**	

**Indicates sample underwent Level IV review

Introduction

This data review covers 41 soil samples and 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 6010B and 7000 for Metals. The metals analyzed were Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Magnesium	6.263 mg/Kg	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312
ICB/CCB	Arsenic Chromium Selenium	2.277 ug/L 0.806 ug/L 3.581 ug/L	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Lead	3.263 ug/L	C077S206 C077S226 C077S191 C077S192 C077S219 C077S217 C077S218 C077S232 C077S203 C077S204 C077S225 C077S213 C077S214 C077S230 C077S215 C077S216 C077S231 C077S209 C077S210 C077S228
PB (prep blank)	Cobalt Potassium Selenium	2.6 ug/L 100 ug/L 3.2 ug/L	All water samples in SDG 49301/49303
PB (prep blank)	Sodium	636 ug/L	C077R011
ICB/CCB	Antimony Arsenic Cobalt Mercury Potassium Selenium	3.596 ug/L 2.955 ug/L 2.043 ug/L 0.167 ug/L 114.2 ug/L 4.718 ug/L	All water samples in SDG 49301/49303
ICB/CCB	Sodium	496.6 ug/L	C077R011

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S302**	Selenium	0.31 mg/Kg	0.31U mg/Kg
C077S305	Selenium	0.48 mg/Kg	0.48U mg/Kg
C077S307	Selenium	0.44 mg/Kg	0.44U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S191	Lead	0.7 mg/Kg	0.7U mg/Kg
C077S215	Lead	1.6 mg/Kg	1.6U mg/Kg
C077S216	Lead	1.6 mg/Kg	1.6U mg/Kg
C077G071**	Arsenic Cobalt Selenium	3.0 ug/L 2.3 ug/L 8.1 ug/L	3.0U ug/L 2.3U ug/L 8.1U ug/L
C077G073	Arsenic Cobalt Selenium	2.8 ug/L 1.9 ug/L 5.5 ug/L	2.8U ug/L 1.9U ug/L 5.5U ug/L
C077R011	Cobalt Selenium Sodium	3.0 ug/L 4.0 ug/L 342 ug/L	3.0U ug/L 4.0U ug/L 342U ug/L

Sample C077R011 was identified as a rinsate. No metal contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
C077R011	12/12/05	Antimony Calcium Cobalt Magnesium Selenium Sodium Zinc	5.2 ug/L 103 ug/L 3.0 ug/L 112 ug/L 4.0 ug/L 342 ug/L 6.4 ug/L	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312 C077G071** C077G073

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G071**	Cobalt Selenium Zinc	2.3 ug/L 8.1 ug/L 9.9 ug/L	2.3U ug/L 8.1U ug/L 9.9U ug/L
C077G073	Cobalt Selenium Zinc	1.9 ug/L 5.5 ug/L 5.2 ug/L	1.9U ug/L 5.5U ug/L 5.2U ug/L
C077S302**	Selenium Sodium	0.31 mg/Kg 87.4 mg/Kg	0.31U mg/Kg 87.4U mg/Kg
C077S303	Sodium	71.9 mg/Kg	71.9U mg/Kg
C077S304**	Sodium	48.7 mg/Kg	48.7U mg/Kg
C077S305	Selenium Sodium	0.48 mg/Kg 48.9 mg/Kg	0.48U mg/Kg 48.9U mg/Kg
C077S306	Sodium	92.3 mg/Kg	92.3U mg/Kg
C077S307	Selenium	0.44 mg/Kg	0.44U mg/Kg
C077S308	Sodium	96.5 mg/Kg	96.5U mg/Kg
C077S309	Sodium	155 mg/Kg	155U mg/Kg
C077S310	Sodium	109 mg/Kg	109U mg/Kg
C077S311	Sodium	47.2 mg/Kg	47.2U mg/Kg
C077S312	Sodium	72.2 mg/Kg	72.2U mg/Kg

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
C077G071** C077G073 C077R011	All TAL metals	No MS associated with these samples.	MS required.	None	P
C077S205 C077S206 C077S226 C077S191 C077S192 C077S219 C077S217 C077S218 C077S232 C077S203 C077S204 C077S225 C077S213 C077S214 C077S230 C077S215 C077S216 C077S231 C077S209 C077S210 C077S228	Lead	No MS associated with these samples.	MS required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S312MS/MSD (C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312)	Antimony	68.2 (80-120)	72.0 (80-120)	-	J (all detects) UJ (all non-detects)	A

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
C077G071** C077G073 C077R011	All TAL metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P
C077S205 C077S206 C077S226 C077S191 C077S192 C077S219 C077S217 C077S218 C077S232 C077S203 C077S204 C077S225 C077S213 C077S214 C077S230 C077S215 C077S216 C077S231 C077S209 C077S210 C077S228	Lead	No DUP analysis associated with these samples.	DUP analysis required.	None	P

Results were within QC limits.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Internal Standards

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
C077S312L	Cobalt	10.6 (≤10)	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312	J (all detects)	A
C077S232L	Lead	13.7 (≤10)	C077S205 C077S206 C077S226 C077S191 C077S192 C077S219 C077S217 C077S218 C077S232 C077S203 C077S204 C077S225 C077S213 C077S214 C077S230 C077S215 C077S216 C077S231	J (all detects)	A

XI. Sample Result Verification

All sample result verifications were acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been qualified.

XIII. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Metals - Data Qualification Summary - SDG 49301/49303

SDG	Sample	Analyte	Flag	A or P	Reason
49301/ 49303	C077G071** C077G073 C077R011	All TAL metals	None	P	Matrix spike analysis
49301/ 49303	C077S205 C077S206 C077S226 C077S191 C077S192 C077S219 C077S217 C077S218 C077S232 C077S203 C077S204 C077S225 C077S213 C077S214 C077S230 C077S215 C077S216 C077S231 C077S209 C077S210 C077S228	Lead	None	P	Matrix spike analysis
49301/ 49303	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312	Antimony	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49301/ 49303	C077G071** C077G073 C077R011	All TAL metals	None	P	Duplicate analysis

SDG	Sample	Analyte	Flag	A or P	Reason
49301/ 49303	C077S205 C077S206 C077S226 C077S191 C077S192 C077S219 C077S217 C077S218 C077S232 C077S203 C077S204 C077S225 C077S213 C077S214 C077S230 C077S215 C077S216 C077S231 C077S209 C077S210 C077S228	Lead	None	P	Duplicate analysis
49301/ 49303	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312	Cobalt	J (all detects)	A	ICP serial dilution (%D)
49301/ 49303	C077S205 C077S206 C077S226 C077S191 C077S192 C077S219 C077S217 C077S218 C077S232 C077S203 C077S204 C077S225 C077S213 C077S214 C077S230 C077S215 C077S216 C077S231	Lead	J (all detects)	A	ICP serial dilution (%D)

NAS Alameda Point, CTO 077
Metals - Laboratory Blank Data Qualification Summary - SDG 49301/49303

SDG	Sample	Analyte	Modified Final Concentration	A or P
49301/49303	C077S302**	Selenium	0.31U mg/Kg	A
49301/49303	C077S305	Selenium	0.48U mg/Kg	A
49301/49303	C077S307	Selenium	0.44U mg/Kg	A
49301/49303	C077S191	Lead	0.7U mg/Kg	A
49301/49303	C077S215	Lead	1.6U mg/Kg	A
49301/49303	C077S216	Lead	1.6U mg/Kg	A
49301/49303	C077G071**	Arsenic Cobalt Selenium	3.0U ug/L 2.3U ug/L 8.1U ug/L	A
49301/49303	C077G073	Arsenic Cobalt Selenium	2.8U ug/L 1.9U ug/L 5.5U ug/L	A
49301/49303	C077R011	Cobalt Selenium Sodium	3.0U ug/L 4.0U ug/L 342U ug/L	A

NAS Alameda Point, CTO 077
Metals - Field Blank Data Qualification Summary - SDG 49301/49303

SDG	Sample	Analyte	Modified Final Concentration	A or P
49301/49303	C077G071**	Cobalt Selenium Zinc	2.3U ug/L 8.1U ug/L 9.9U ug/L	A
49301/49303	C077G073	Cobalt Selenium Zinc	1.9U ug/L 5.5U ug/L 5.2U ug/L	A
49301/49303	C077S302**	Selenium Sodium	0.31U mg/Kg 87.4U mg/Kg	A
49301/49303	C077S303	Sodium	71.9U mg/Kg	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49301/49303	C077S304**	Sodium	48.7U mg/Kg	A
49301/49303	C077S305	Selenium Sodium	0.48U mg/Kg 48.9U mg/Kg	A
49301/49303	C077S306	Sodium	92.3U mg/Kg	A
49301/49303	C077S307	Selenium	0.44U mg/Kg	A
49301/49303	C077S308	Sodium	96.5U mg/Kg	A
49301/49303	C077S309	Sodium	155U mg/Kg	A
49301/49303	C077S310	Sodium	109U mg/Kg	A
49301/49303	C077S311	Sodium	47.2U mg/Kg	A
49301/49303	C077S312	Sodium	72.2U mg/Kg	A

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14457

TPH as Gasoline

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 9, 2005

LDC Report Date: December 29, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Gasoline

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49287/49289

Sample Identification

C077S391
C077S392
C077S393
C077G123
C077G139
C077G124
C077G118
C077G119
C077R010
C077S391MS
C077S391MSD

Introduction

This data review covers 5 soil samples and 6 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Gasoline.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as gasoline contaminants were found in the method blanks.

Sample C077R010 was identified as a rinsate. No total petroleum hydrocarbons as gasoline contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49287/49289	TPH as gasoline	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

Raw data were not reviewed for this SDG.

VI. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

VII. System Performance

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Data Qualification Summary - SDG 49287/49289

SDG	Sample	Compound	Flag	A or P	Reason
49287/ 49289	C077G123 C077G139 C077G124 C077G118 C077G119 C077R010	TPH as gasoline	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Laboratory Blank Data Qualification Summary - SDG 49287/49289

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Field Blank Data Qualification Summary - SDG 49287/49289

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 12, 2005

LDC Report Date: January 3, 2006

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Gasoline

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49301/49303

Sample Identification

C077S301
C077S302**
C077S303
C077S304**
C077S305
C077S306
C077S307
C077S308
C077S309
C077S310
C077S311
C077S312
C077G071**
C077G072
C077G073
C077R011
C077S305MS
C077S305MSD

**Indicates sample underwent Level IV review

Introduction

This data review covers 14 soil samples and 4 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Gasoline.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent Level IV review. Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as gasoline contaminants were found in the method blanks.

Sample C077R011 was identified as a rinsate. No total petroleum hydrocarbons as gasoline contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077S301 C077S302** C077S303 C077S304** C077S306 C077G071** C077G072 C077G073 C077R011	TPH as gasoline	*No MS/MSD associated with these samples.*	*MS/MSD required.*	*None*	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

Samples C077G071** and C077G072 were identified as field duplicates. No total petroleum hydrocarbons as gasoline were detected in any of the samples.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Data Qualification Summary - SDG 49301/49303

SDG	Sample	Compound	Flag	A or P	Reason
49301/ 49303	C077S301 C077S302** C077S303 C077S304** C077S306 C077G071** C077G072 C077G073 C077R011	TPH as gasoline	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Laboratory Blank Data Qualification Summary - SDG 49301/49303

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Field Blank Data Qualification Summary - SDG 49301/49303

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14457

TPH as Extractables

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 9, 2005

LDC Report Date: December 29, 2005

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49287/49289

Sample Identification

C077S391
C077S392
C077S393
C077G123
C077G139
C077G124
C077G118
C077R010

Introduction

This data review covers 3 soil samples and 5 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Extractables.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Compound	%D	Affected Compound	Associated Samples	Flag	A or P
12/22/05	TPH as JP5	17	TPH as JP5	All soil samples in SDG 49287/49289	J (all detects) UJ (all non-detects)	A

The percent difference (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample C077R010 was identified as a rinsate. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
051215A-Blk	Octacosane	149 (28-142)	TPH as extractables	J (all detects)	P

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49287/49289	TPH as extractables	No MS/MSD associated with these samples.	MS/MSD required.	None	P

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

Raw data were not reviewed for this SDG.

VI. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

VII. System Performance

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 49287/49289

SDG	Sample	Compound	Flag	A or P	Reason
49287/ 49289	C077S391 C077S392 C077S393	TPH as JP5	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49287/ 49289	C077S391 C077S392 C077S393 C077G123 C077G139 C077G124 C077G118 C077R010	TPH as extractables	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 49287/49289

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 49287/49289

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 12, 2005

LDC Report Date: January 3, 2006

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49301/49303

Sample Identification

C077S301
C077S302**
C077S303
C077S304**
C077S305
C077S306
C077S307
C077S308
C077S309
C077S310
C077S311
C077S312
C077G071**
C077G073
C077R011

**Indicates sample underwent Level IV review

Introduction

This data review covers 12 soil samples and 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Extractables.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent Level IV review. Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 15.0% for all compounds.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample C077R011 was identified as a rinsate. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
051215A-Blk	Octacosane	149 (28-142)	TPH as extractables	J (all detects)	P

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49301/49303	TPH as extractables	No MS/MSD associated with these samples.	MS/MSD required.	None	P

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 49301/49303

SDG	Sample	Compound	Flag	A or P	Reason
49301/ 49303	C077S301 C077S302** C077S303 C077S304** C077S305 C077S306 C077S307 C077S308 C077S309 C077S310 C077S311 C077S312 C077G071** C077G073 C077R011	TPH as extractables	None	P	Matrix spike/Matrix spike *duplicates*

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 49301/49303

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 49301/49303

No Sample Data Qualified in this SDG

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Bechtel Environmental
1230 Columbia Street, Suite 400
San Diego, CA 92101
Attn: Ms. Toni Kuzmack

January 5, 2006

Project Name : NAS Alameda Point
Project # : CTO 077

On December 30, 2005 the following data packages were received by Laboratory Data Consultants, Inc. from Bechtel Environmental. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 14461:

SDG #	Fraction
49310/49311	Volatiles, Semivolatiles, Polynuclear Aromatic Hydrocarbons, Chlorinated Pesticides & PCBs, Metals, Hexavalent Chromium, TPH as Gasoline, TPH as Extractables

The above SDGs were reviewed using Level III and Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- NFESC Special Publication SP-2056-ENV, Navy Installation Restoration Chemical Data Quality Manual, Naval Facilities Engineering Command, September 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998

The data validators did utilize their professional judgement when evaluating the data to achieve the most complete and accurate assessment of the data. The data packages were reviewed according to the above stated validation procedures.

For GC/MS volatile analyses, the primary findings consisted of:

a) Continuing calibration factors exceeded acceptance criteria in SDG

49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

b) Surrogate percent recoveries exceeded acceptance criteria for several samples in SDG 49310/49311.

c) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49310/49311.

d) Matrix spike/matrix spike duplicate percent recoveries and relative percent differences exceeded acceptance criteria for several compounds in SDG 49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

e) Laboratory control sample percent recoveries exceeded acceptance criteria for styrene in SDG 49310/49311.

f) Internal standard areas exceeded acceptance criteria for sample C077S545 in SDG 49310/49311.

g) *Chloroform and cis-1,2-dichloroethene were detected in the method* blanks and acetone, chloroform and bromoform were detected in the field blanks in SDG 49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For GC/MS semivolatile analyses, the primary finding consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49310/49311.

For GC/MS PAH analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49310/49311.

b) Matrix spike/matrix spike duplicate percent recoveries and relative percent differences exceeded acceptance criteria for several compounds in SDG 49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

c) Laboratory control sample percent recoveries exceeded acceptance criteria for several compounds in SDG 49310/49311.

d) Benzo(b)fluoranthene and benzo(k)fluoranthene coeluted for several samples in SDG 49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For chlorinated pesticide and PCB analyses, the primary findings consisted of:

a) Continuing calibration factors exceeded acceptance criteria in SDG 49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

b) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49310/49311.

For metal analyses, the primary findings consisted of:

a) Matrix spike analyses were not performed for all batches in SDG 49310/49311.

b) Duplicate analyses were not performed for all batches in SDG 49310/49311.

c) Matrix spike percent recoveries and relative percent differences exceeded acceptance criteria for several metals in SDG 49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

d) ICP serial dilution percent differences exceeded acceptance criteria for cobalt and barium in SDG 49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

e) Several metals were detected in the method and field blanks in SDG 49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For TPH as gasoline analyses, the primary finding consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49310/49311.

For TPH as extractable analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49310/49311.

b) Matrix spike percent recoveries exceeded acceptance criteria for TPH as motor oil in SDG 49310/49311. Since the laboratory met the protocol requirement, this finding should be considered advisory.

c) Laboratory control sample percent recoveries exceeded acceptance criteria for TPH as motor oil in SDG 49310/49311.

d) Surrogate percent recoveries exceeded acceptance criteria for samples C077S285 and C077S286 in SDG 49310/49311.

For hexavalent chromium analyses, the primary findings consisted of:

a) Matrix spike analyses were not performed for all batches in SDG 49310/49311.
b) Duplicate analyses were not performed for all batches in SDG 49310/49311.

In general, the data for all analyses appear usable with the limitations noted in the Data Validation Reports. Data validation flags were noted on the Laboratory Form 1s and included with each validation report.

Sincerely,

Richard M. Amano
President/Principal Chemist

Attachment 1

1 Week TAT

LDC #14461 (Bechtel Environmental-San Diego / Alameda Point, CTO 077)

LDC	SDG#	DATE REC'D	(2) DATE DUE	VOA (8260B)		SVOA (8270C)		PAHs (8270C -SIM)		Pest. /PCBs (SW846)		Metals (SW846)		Diss. Metals (SW846)		TPH-G (8015)		TPH-E (8015)		Cr(VI) (7196A)																			
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	49310/49311	12/30/05	01/06/06	12	40	3	11	2	23	2	11	0	35	5	0	0	5	4	26	6	8																		
A	49310/49311	12/30/05	01/06/06	1	4	0	1	0	2	0	1	0	4	1	0	0	1	1	3	1	1																		
Total	B/LR			13	44	3	12	2	25	2	12	0	39	6	0	0	6	5	29	7	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	214

Shaded cells indicate Level IV validation (all other cells are Level III validation)

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14461

Volatiles

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 13, 2005

LDC Report Date: January 4, 2006

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49310/49311

Sample Identification

C077S177	C077S282	C077G053
C077S178	C077S283	C077G063
C077S179	C077S321**	C077G062**
C077S180**	C077S322	C077G061
C077S181	C077S323	C077G091
C077S182	C077S324	C077G092
C077S174	C077S325	C077G093
C077S175	C077S326	C077TB14
C077S171	C077S344	C077G241
C077S172	C077S345	C077TB15
C077S173	C077S346	C077R012
C077S621	C077S341	C077S174MS
C077S622	C077S342	C077S174MSD
C077S287	C077S343	C077S283MS
C077S288	C077S541	C077S283MSD
C077S289**	C077S542**	C077G091MS
C077S284	C077S543	C077G091MSD
C077S285	C077S544	
C077S286	C077S545	
C077S281	C077S546	

**Indicates sample underwent Level IV review

Introduction

This data review covers 44 soil samples and 13 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all volatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/17/05	1,2-Dibromo-3-chloropropane	29	C077S621 C077S622 C077S287 C077S288 C077S289** C077S284 C077S285 051217B1-BLK	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051219A-BLK	12/19/05	1,2,3-Trichlorobenzene Chloroform Naphthalene	0.32 ug/L 0.49 ug/L 0.36 ug/L	C077G053 C077G063 C077G062**
051219B-BLK	12/20/05	Chloroform	0.43 ug/L	C077G061 C077G091 C077G092 C077G093 C077TB14 C077G241 C077TB15 C077R012
051217B1-BLK	12/18/05	cis-1,2-Dichloroethene	0.00025 mg/Kg	C077S621 C077S622 C077S287 C077S288 C077S289** C077S284 C077S285
051218A-BLK	12/18/05	Chloroform	0.0025 mg/Kg	C077S283
051221A-BLK	12/21/05	1,2,3-Trichlorobenzene	0.00033 mg/Kg	C077S286 C077S281 C077S282 C077S321** C077S322 C077S323 C077S324 C077S342 C077S545

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051217A1-BLK	12/17/05	cis-1,2-Dichloroethene	0.00039 mg/Kg	C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S171 C077S172 C077S173

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077G053	Chloroform	0.44 ug/L	0.5U ug/L
C077G063	Chloroform	0.48 ug/L	0.5U ug/L
C077G062**	Chloroform	0.47 ug/L	0.5U ug/L
C077G091	Chloroform	0.48 ug/L	0.5U ug/L
C077G092	Chloroform	0.48 ug/L	0.5U ug/L
C077G093	Chloroform	0.41 ug/L	0.5U ug/L
C077TB14	Chloroform	0.43 ug/L	0.5U ug/L
C077G241	Chloroform	0.46 ug/L	0.5U ug/L
C077TB15	Chloroform	0.50 ug/L	0.5U ug/L
C077S287	cis-1,2-Dichloroethene	0.00027 mg/Kg	0.005U mg/Kg
C077S283	Chloroform	0.0029 mg/Kg	0.006U mg/Kg
C077S178	cis-1,2-Dichloroethene	0.00029 mg/Kg	0.006U mg/Kg
C077S181	cis-1,2-Dichloroethene	0.00025 mg/Kg	0.005U mg/Kg

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077S621	cis-1,2-Dichloroethene	0.0004 mg/Kg	0.005U mg/Kg

Samples C077TB14 and C077TB15 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
C077TB14	12/13/05	Chloroform	0.43 ug/L	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S171 C077S172 C077S173 C077S621 C077S622 C077S287 C077S288 C077S289** C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321** C077S322 C077S323 C077S324 C077S325 C077S326 C077S344 C077S345 C077S346 C077S341 C077S342 C077S343 C077S541 C077S542** C077S543 C077S544 C077S545 C077S546 C077G053 C077G063 C077G062** C077G061 C077G091 C077G092 C077G093 C077G241 C077R012

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
C077TB15	12/13/05	Chloroform	0.50 ug/L	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S171 C077S172 C077S173 C077S621 C077S622 C077S287 C077S288 C077S289** C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321** C077S322 C077S323 C077S324 C077S325 C077S326 C077S344 C077S345 C077S346 C077S341 C077S342 C077S343 C077S541 C077S542** C077S543 C077S544 C077S545 C077S546 C077G053 C077G063 C077G062** C077G061 C077G091 C077G092 C077G093 C077G241 C077R012

Sample C077R012 was identified as a rinsate. No volatile contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Compound	Concentration	Associated Samples
C077R012	12/13/05	Acetone	1.2 ug/L	C077S177
		Bromodichloromethane	2.5 ug/L	C077S178
		Bromoform	1.0 ug/L	C077S179
		Chloroform	3.6 ug/L	C077S180**
		Dibromochloromethane	1.7 ug/L	C077S181
				C077S182
				C077S174
				C077S175
				C077S171
				C077S172
				C077S173
				C077S621
				C077S622
				C077S287
				C077S288
				C077S289**
				C077S284
				C077S285
				C077S286
				C077S281
				C077S282
				C077S283
				C077S321**
				C077S322
				C077S323
				C077S324
				C077S325
				C077S326
				C077S344
				C077S345
				C077S346
				C077S341
				C077S342
				C077S343
				C077S541
				C077S542**
				C077S543
				C077S544
				C077S545
				C077S546
				C077G053
				C077G063
				C077G062**
				C077G061
				C077G091
				C077G092
				C077G093
				C077G241
				C077R012

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
C077G053	Chloroform	0.44 ug/L	0.5U ug/L
C077G063	Chloroform	0.48 ug/L	0.5U ug/L
C077G062**	Chloroform	0.47 ug/L	0.5U ug/L
C077G091	Chloroform	0.48 ug/L	0.5U ug/L
C077G092	Chloroform	0.48 ug/L	0.5U ug/L
C077G093	Chloroform	0.41 ug/L	0.5U ug/L
C077G241	Chloroform	0.46 ug/L	0.5U ug/L
C077S177	Acetone	0.0074 mg/Kg	0.1U mg/Kg
C077S180**	Bromoform	0.0024 mg/Kg	0.006U mg/Kg
C077S171	Acetone	0.0092 mg/Kg	0.1U mg/Kg
C077S621	Acetone	0.0055 mg/Kg	0.1U mg/Kg
C077S622	Acetone Chloroform	0.0048 mg/Kg 0.0027 mg/Kg	0.1U mg/Kg 0.005U mg/Kg
C077S287	Acetone Chloroform	0.0031 mg/Kg 0.003 mg/Kg	0.1U mg/Kg 0.005U mg/Kg
C077S288	Acetone Chloroform	0.0053 mg/Kg 0.0035 mg/Kg	0.1U mg/Kg 0.006U mg/Kg
C077S289**	Chloroform	0.0027 mg/Kg	0.006U mg/Kg
C077S284	Chloroform	0.0033 mg/Kg	0.006U mg/Kg
C077S285	Chloroform	0.0027 mg/Kg	0.005U mg/Kg
C077S283	Chloroform	0.0029 mg/Kg	0.006U mg/Kg
C077S324	Chloroform	0.0019 mg/Kg	0.005U mg/Kg

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S325	Bromofluorobenzene	130 (85-120)	All TCL compounds	J (all detects)	P
C077S345	Bromofluorobenzene	124 (85-120)	All TCL compounds	J (all detects)	P
C077S341	1,2-Dichloroethane-d4	150 (52-149)	All TCL compounds	J (all detects)	P
C077S342	Bromofluorobenzene	159 (85-120)	All TCL compounds	J (all detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S171 C077S172 C077S173 C077S621 C077S622 C077S287 C077S288 C077S289** C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321** C077S322 C077S323 C077S324 C077S325 C077S326 C077S344 C077S345 C077S346 C077S341 C077S342 C077S343 C077S541 C077S542** C077S543 C077S545	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S283MS/MSD (C077S177 C077S544 C077S546)	1,1,1-Trichloroethane	66.4 (70-135)	-	-	J (all detects) UJ (all non-detects)	A
	1,1-Dichloroethene	63.6 (65-135)	26.0 (65-135)	83.9 (≤30)		
	1,2-Dichloroethane	-	44.4 (70-135)	55.1 (≤30)		
	Benzene	63.4 (75-125)	30.2 (75-125)	70.9 (≤30)		
	Chlorobenzene	62.0 (75-125)	22.2 (75-125)	94.5 (≤30)		
	Ethylbenzene	54.4 (75-125)	17.4 (75-125)	103.1 (≤30)		
	m,p-Xylenes	56.6 (80-125)	15.8 (80-125)	112.7 (≤30)		
	o-Xylene	60.6 (75-125)	19.8 (75-125)	101.5 (≤30)		
	Trichloroethene	66.8 (75-125)	20.0 (75-125)	107.8 (≤30)		
	Tetrachloroethene	50.4 (65-140)	13.2 (65-140)	117.0 (≤30)		
	Toluene	65.4 (70-125)	21.8 (70-125)	99.1 (≤30)		
	trans-1,2-Dichloroethene	62.6 (65-135)	23.0 (65-135)	92.5 (≤30)		

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S174MS/MSD (C077S177 C077S544 C077S546)	Ethylbenzene m,p-Xylenes o-Xylene Tetrachloroethene	65.6 (75-125) 64.6 (80-125) 74.2 (75-125) 54.2 (65-140)	- 75.5 (80-125) - -	- - - -	J (all detects) UJ (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051217BLCS	Styrene	56.6 (75-125)	C077S325 C077S326 C077S344 C077S345 C077S346 C077S341 C077S343 C077S541 C077S542** C077S543 051217B-BLK	J (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits with the following exceptions:

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
C077S545	1,4-Dichlorobenzene-d4	185268 (45296-181184)	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

Samples C077G092 and C077G093 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD
	C077G092	C077G093	
Carbon disulfide	1.5	0.67	76
Chloroform	0.48	0.41	16
cis-1,2-Dichloroethene	0.63	0.64	2
Trichloroethene	0.59	0.66	11
Toluene	0.27	0.25	8

NAS Alameda Point, CTO 077
Volatiles - Data Qualification Summary - SDG 49310/49311

SDG	Sample	Compound	Flag	A or P	Reason
49310/ 49311	C077S621 C077S622 C077S287 C077S288 C077S289** C077S284 C077S285	1,2-Dibromo-3-chloropropane	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49310/ 49311	C077S325 C077S345 C077S341 C077S342	All TCL compounds	J (all detects)	P	Surrogate spikes (%R)
49310/ 49311	C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S171 C077S172 C077S173 C077S621 C077S622 C077S287 C077S288 C077S289** C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321** C077S322 C077S323 C077S324 C077S325 C077S326 C077S344 C077S345 C077S346 C077S341 C077S342 C077S343 C077S541 C077S542** C077S543 C077S545	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49310/ 49311	C077S177 C077S544 C077S546	1,1,1-Trichloroethane	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)

SDG	Sample	Compound	Flag	A or P	Reason
49310/ 49311	C077S177 C077S544 C077S546	1,1-Dichloroethene 1,2-Dichloroethane Benzene Chlorobenzene Ethylbenzene m,p-Xylenes o-Xylene Trichloroethene Tetrachloroethene Toluene trans-1,2-Dichloroethene	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)(RPD)
49310/ 49311	C077S325 C077S326 C077S344 C077S345 C077S346 C077S341 C077S343 C077S541 C077S542** C077S543	Styrene	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)
49310/ 49311	C077S545	4-Methyl-2-pentanone 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	P	Internal standards (area)

NAS Alameda Point, CTO 077
Volatiles - Laboratory Blank Data Qualification Summary - SDG 49310/49311

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49310/49311	C077G053	Chloroform	0.5U ug/L	A
49310/49311	C077G063	Chloroform	0.5U ug/L	A

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49310/49311	C077G062**	Chloroform	0.5U ug/L	A
49310/49311	C077G091	Chloroform	0.5U ug/L	A
49310/49311	C077G092	Chloroform	0.5U ug/L	A
49310/49311	C077G093	Chloroform	0.5U ug/L	A
49310/49311	C077TB14	Chloroform	0.5U ug/L	A
49310/49311	C077G241	Chloroform	0.5U ug/L	A
49310/49311	C077TB15	Chloroform	0.5U ug/L	A
49310/49311	C077S287	cis-1,2-Dichloroethene	0.005U mg/Kg	A
49310/49311	C077S283	Chloroform	0.006U mg/Kg	A
49310/49311	C077S178	cis-1,2-Dichloroethene	0.006U mg/Kg	A
49310/49311	C077S181	cis-1,2-Dichloroethene	0.005U mg/Kg	A
49310/49311	C077S621	cis-1,2-Dichloroethene	0.005U mg/Kg	A

NAS Alameda Point, CTO 077
Volatiles - Field Blank Data Qualification Summary - SDG 49310/49311

SDG	Sample	Compound	Modified Final Concentration	A or P
49310/49311	C077G053	Chloroform	0.5U ug/L	A
49310/49311	C077G063	Chloroform	0.5U ug/L	A
49310/49311	C077G062**	Chloroform	0.5U ug/L	A
49310/49311	C077G091	Chloroform	0.5U ug/L	A
49310/49311	C077G092	Chloroform	0.5U ug/L	A
49310/49311	C077G093	Chloroform	0.5U ug/L	A

SDG	Sample	Compound	Modified Final Concentration	A or P
49310/49311	C077G241	Chloroform	0.5U ug/L	A
49310/49311	C077S177	Acetone	0.1U mg/Kg	A
49310/49311	C077S180**	Bromoform	0.006U mg/Kg	A
49310/49311	C077S171	Acetone	0.1U mg/Kg	A
49310/49311	C077S621	Acetone	0.1U mg/Kg	A
49310/49311	C077S622	Acetone Chloroform	0.1U mg/Kg 0.005U mg/Kg	A
49310/49311	C077S287	Acetone Chloroform	0.1U mg/Kg 0.005U mg/Kg	A
49310/49311	C077S288	Acetone Chloroform	0.1U mg/Kg 0.006U mg/Kg	A
49310/49311	C077S289**	Chloroform	0.006U mg/Kg	A
49310/49311	C077S284	Chloroform	0.006U mg/Kg	A
49310/49311	C077S285	Chloroform	0.005U mg/Kg	A
49310/49311	C077S283	Chloroform	0.006U mg/Kg	A
49310/49311	C077S324	Chloroform	0.005U mg/Kg	A

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14461

Semivolatiles

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 13, 2005

LDC Report Date: January 3, 2006

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49310/49311

Sample Identification

C077S177
C077S178
C077S179
C077S180**
C077S181
C077S182
C077S174
C077S175
C077S176
C077S171
C077S172
C077S173
C077G053
C077R012
C077G054

**Indicates sample underwent Level IV review

Introduction

This data review covers 12 soil samples and 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No semivolatile contaminants were found in the method blanks.

Sample C077R012 was identified as a rinsate. No semivolatile contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49310/49311	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

Samples C077G053 and C077G054 were identified as field duplicates. No semivolatiles were detected in any of the samples.

NAS Alameda Point, CTO 077
Semivolatiles - Data Qualification Summary - SDG 49310/49311

SDG	Sample	Compound	Flag	A or P	Reason
49310/ 49311	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176 C077S171 C077S172 C077S173 C077G053 C077R012 C077G054	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 49310/49311

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Semivolatiles - Field Blank Data Qualification Summary - SDG 49310/49311

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14461

Polynuclear Aromatic Hydrocarbons

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 13, 2005

LDC Report Date: January 4, 2006

Matrix: Soil/Water

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49310/49311

Sample Identification

C077S177	C077S269
C077S178	C077G053
C077S179	C077R012
C077S180**	C077S176MS
C077S181	C077S176MSD
C077S182	C077S267MS
C077S174	C077S267MSD
C077S175	
C077S176	
C077S261**	
C077S262	
C077S263	
C077S171	
C077S172	
C077S173	
C077S264	
C077S265	
C077S266	
C077S267	
C077S268	

**Indicates sample underwent Level IV review

Introduction

This data review covers 25 soil samples and 2 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C using Selected Ion Monitoring (SIM) for Polynuclear Aromatic Hydrocarbons.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

Average relative response factors (RRF) for all target compounds and system monitoring compounds

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0% .

All of the continuing calibration RRF values were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polynuclear aromatic hydrocarbon contaminants were found in the method blanks.

Sample C077R012 was identified as a rinsate. No polynuclear aromatic hydrocarbon contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49310/49311	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S176MS/MSD (C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176)	Benzo(a)anthracene Benzo(a)pyrene Pyrene	106 (56-103) 104 (53-103) 107 (55-104)	- - -	- - -	J (all detects) J (all detects) J (all detects)	A
C077S267MS/MSD (C077S261** C077S262 C077S263 C077S171 C077S172 C077S173 C077S264 C077S265 C077S266 C077S267 C077S268 C077S269)	2-Methylnaphthalene Acenaphthene Acenaphthylene Anthracene Benzo(a)anthracene Chrysene Dibenz(a,h)anthracene Fluoranthene Fluorene Indeno(1,2,3-cd)pyrene Phenanthrene	104 (53-101) - 104 (53-102) - 120 (56-103) 126 (55-104) - - - - 110 (54-105)	102 (53-101) 107 (52-104) 114 (53-102) 108 (54-102) 154 (56-103) 151 (55-104) 123 (53-105) 128 (54-106) 112 (54-104) 168 (47-109) 129 (54-105)	- - - - - - - - - - -	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
C077S267MS/MSD (C077S261** C077S262 C077S263 C077S171 C077S172 C077S173 C077S264 C077S265 C077S266 C077S267 C077S268 C077S269)	Benzo(b)fluoranthene Benzo(k)fluoranthene Pyrene	- 121 (52-112) -	- - -	45.3 (≤30) 35.5 (≤30) 35.0 (≤30)	J (all detects) UJ (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051216B-LCS	Acenaphthylene Benzo(a)pyrene Benzo(b)fluoranthene Dibenz(a,h)anthracene Fluoranthene Fluorene Indeno(1,2,3-cd)pyrene Phenanthrene Pyrene	105 (53-102) 121 (53-103) 114 (49-113) 118 (53-105) 113 (54-106) 109 (54-104) 110 (47-109) 111 (54-105) 106 (55-104)	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176 051216B-BLK	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P
051216A-LCS	2-Methylnaphthalene Benzo(a)anthracene Benzo(b)fluoranthene Naphthalene	107 (53-101) 112 (56-103) 115 (49-113) 102 (49-100)	C077S261** C077S262 C077S263 C077S171 C077S172 C077S173 C077S264 C077S265 C077S266 C077S267 C077S268 C077S269 051216A-BLK	J (all detects) J (all detects) J (all detects) J (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Flag	A or P
C077S174 C077S176 C077S261** C077S262 C077S263 C077S269	Benzo(b)fluoranthene Benzo(k)fluoranthene	Due to lack of resolution between these compounds in the samples, the laboratory performed the quantitation using the total peak area.	J (all detects) J (all detects)	A

Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 49310/49311

SDG	Sample	Compound	Flag	A or P	Reason
49310/ 49311	C077G053 C077R012	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49310/ 49311	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176	Benzo(a)anthracene Benzo(a)pyrene Pyrene	J (all detects) J (all detects) J (all detects)	A	Matrix spike/Matrix spike duplicates (%R)
49310/ 49311	C077S261** C077S262 C077S263 C077S171 C077S172 C077S173 C077S264 C077S265 C077S266 C077S267 C077S268 C077S269	2-Methylnaphthalene Acenaphthene Acenaphthylene Anthracene Benzo(a)anthracene Chrysene Dibenz(a,h)anthracene Fluoranthene Fluorene Indeno(1,2,3-cd)pyrene Phenanthrene	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Matrix spike/Matrix spike duplicates (%R)
49310/ 49311	C077S261** C077S262 C077S263 C077S171 C077S172 C077S173 C077S264 C077S265 C077S266 C077S267 C077S268 C077S269	Benzo(k)fluoranthene	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)(RPD)
49310/ 49311	C077S261** C077S262 C077S263 C077S171 C077S172 C077S173 C077S264 C077S265 C077S266 C077S267 C077S268 C077S269	Pyrene Benzo(b)fluoranthene	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (RPD)

SDG	Sample	Compound	Flag	A or P	Reason
49310/ 49311	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176	Acenaphthylene Benzo(a)pyrene Benzo(b)fluoranthene Dibenz(a,h)anthracene Fluoranthene Fluorene Indeno(1,2,3-cd)pyrene Phenanthrene Pyrene	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P	Laboratory control samples (%R)
49310/ 49311	C077S261** C077S262 C077S263 C077S171 C077S172 C077S173 C077S264 C077S265 C077S266 C077S267 C077S268 C077S269	2-Methylnaphthalene Benzo(a)anthracene Benzo(b)fluoranthene Naphthalene	J (all detects) J (all detects) J (all detects) J (all detects)	P	Laboratory control samples (%R)
49310/ 49311	C077S174 C077S176 C077S261** C077S262 C077S263 C077S269	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) J (all detects)	A	Compound quantitation and CRQLs

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 49310/49311

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary - SDG 49310/49311

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14461

Chlorinated Pesticides & PCBs

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 13, 2005

LDC Report Date: January 3, 2006

Matrix: Soil/Water

Parameters: Chlorinated Pesticides & PCBs

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49310/49311

Sample Identification

C077S177
C077S178
C077S179
C077S180**
C077S181
C077S182
C077S174
C077S175
C077S176
C077S171
C077S172
C077S173
C077G053
C077R012

**Indicates sample underwent Level IV review.

Introduction

This data review covers 12 soil samples and 2 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 8081A and 8082 for Chlorinated Pesticides and PCBs.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical or advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

Retention time windows were evaluated and considered technically acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compounds	Flag	A or P
12/21/05	1220074	DB-XLB	Aroclor-1260	17.6	C077S172 C077S173	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/19/05	1216105	DB-XLB	Aroclor-1260	19.1	051214A-BLK	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/19/05	1216106	DB-XLB	Toxaphene	68.0	051214A-BLK	Toxaphene	J (all detects) UJ (all non-detects)	A

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compounds	Flag	A or P
12/19/05	1216126	DB-XLB	Toxaphene	106.7	C077G053 C077R012	Toxaphene	J (all detects) UJ (all non-detects)	A

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

Retention times (RT) of all compounds in the calibration standards were within QC limits for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide or PCB contaminants were found in the method blanks.

Sample C077R012 was identified as a rinsate. No chlorinated pesticide or PCB contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for sample C077S179. Since the sample was diluted out, no data were qualified.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49310/49311	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and Reported CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which an Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Data Qualification Summary - SDG 49310/49311

SDG	Sample	Compound	Flag	A or P	Reason
49310/ 49311	C077S172 C077S173	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49310/ 49311	C077G053 C077R012	Toxaphene	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49310/ 49311	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176 C077S171 C077S172 C077S173 C077G053 C077R012	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Laboratory Blank Data Qualification Summary - SDG 49310/49311

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Field Blank Data Qualification Summary - SDG 49310/49311

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14461

Metals

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 13, 2005

LDC Report Date: January 3, 2006

Matrix: Soil/Water

Parameters: Metals

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49310/49311

Sample Identification

C077S177	C077S283	C077S172MSD
C077S178	C077S321**	C077S325MS
C077S179	C077S322	C077S325MSD
C077S180**	C077S323	C077S542MS
C077S181	C077S324	C077S542MSD
C077S182	C077S325	
C077S174	C077S326	
C077S175	C077S541	
C077S176	C077S542**	
C077S171	C077S543	
C077S172	C077S544	
C077S173	C077S545	
C077S287	C077S546	
C077S288	C077G053	
C077S289**	C077G063	
C077S284	C077G062**	
C077S285	C077G061	
C077S286	C077R012	
C077S281	C077G064	
C077S282	C077S172MS	

**Indicates sample underwent Level IV review

Introduction

This data review covers 39 soil samples and 6 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 6010B and 7000 for Metals. The metals analyzed were Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Cobalt Potassium Selenium Sodium	2.6 ug/L 100 ug/L 3.2 ug/L 636 ug/L	All water samples in SDG 49310/49311
ICB/CCB	Antimony Arsenic Cobalt Mercury Potassium Selenium	3.596 ug/L 2.955 ug/L 2.905 ug/L 0.167 ug/L 114.2 ug/L 7.396 ug/L	All water samples in SDG 49310/49311
ICB/CCB	Sodium	496.6 ug/L	C077R012
PB (prep blank)	Magnesium	8.5 mg/Kg	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176 C077S171 C077S172 C077S173 C077S287 C077S288 C077S289**

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Antimony Arsenic Chromium Lead Selenium Silver Thallium	3.693 ug/L 2.296 ug/L 0.294 ug/L 3.294 ug/L 3.767 ug/L 0.621 ug/L 2.353 ug/L	All soil samples in SDG 49310/49311
ICB/CCB	Mercury	0.159 ug/L	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176 C077S171 C077S172 C077S173 C077S287 C077S288 C077S289** C077S284 C077S285 C077S286

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G053	Selenium	9.1 ug/L	9.1U ug/L
C077G063	Arsenic Cobalt Selenium	7.3 ug/L 1.8 ug/L 10.3 ug/L	7.3U ug/L 1.8U ug/L 10.3U ug/L
C077G062**	Arsenic Cobalt Selenium	6.5 ug/L 1.9 ug/L 5.3 ug/L	6.5U ug/L 1.9U ug/L 5.3U ug/L
C077G061	Antimony Arsenic Cobalt Selenium	2.9 ug/L 3.5 ug/L 3.0 ug/L 5.3 ug/L	2.9U ug/L 3.5U ug/L 3.0U ug/L 5.3U ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077R012	Antimony Cobalt Sodium	3.2 ug/L 2.0 ug/L 697 ug/L	3.2U ug/L 2.0U ug/L 697U ug/L
C077G064	Arsenic Cobalt Selenium	6.2 ug/L 1.7 ug/L 10.4 ug/L	6.2U ug/L 1.7U ug/L 10.4U ug/L
C077S177	Mercury	0.069 mg/Kg	0.069U mg/Kg
C077S178	Antimony Mercury Selenium	0.36 mg/Kg 0.024 mg/Kg 0.48 mg/Kg	0.36U mg/Kg 0.024U mg/Kg 0.48U mg/Kg
C077S180**	Mercury Selenium Thallium	0.03 mg/Kg 1.5 mg/Kg 0.56 mg/Kg	0.03U mg/Kg 1.5U mg/Kg 0.56U mg/Kg
C077S181	Mercury Selenium Silver	0.02 mg/Kg 0.32 mg/Kg 0.043 mg/Kg	0.02U mg/Kg 0.32U mg/Kg 0.043U mg/Kg
C077S182	Selenium	0.3 mg/Kg	0.3U mg/Kg
C077S174	Mercury Selenium	0.061 mg/Kg 0.6 mg/Kg	0.061U mg/Kg 0.6U mg/Kg
C077S175	Mercury	0.024 mg/Kg	0.024U mg/Kg
C077S176	Mercury	0.025 mg/Kg	0.025U mg/Kg
C077S171	Mercury Silver	0.048 mg/Kg 0.26 mg/Kg	0.048U mg/Kg 0.26U mg/Kg
C077S172	Mercury Selenium	0.066 mg/Kg 0.55 mg/Kg	0.066U mg/Kg 0.55U mg/Kg
C077S173	Mercury Selenium	0.077 mg/Kg 0.45 mg/Kg	0.077U mg/Kg 0.45U mg/Kg
C077S287	Selenium	0.4 mg/Kg	0.4U mg/Kg
C077S288	Mercury Selenium	0.021 mg/Kg 0.72 mg/Kg	0.021U mg/Kg 0.72U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S289**	Selenium Silver	0.33 mg/Kg 0.046 mg/Kg	0.33U mg/Kg 0.046U mg/Kg
C077S285	Mercury Selenium	0.021 mg/Kg 0.34 mg/Kg	0.021U mg/Kg 0.34U mg/Kg
C077S286	Selenium Silver	0.44 mg/Kg 0.052 mg/Kg	0.44U mg/Kg 0.052U mg/Kg
C077S283	Antimony Selenium	0.45 mg/Kg 0.49 mg/Kg	0.45U mg/Kg 0.49U mg/Kg
C077S325	Selenium	0.8 mg/Kg	0.8U mg/Kg
C077S541	Selenium	0.34 mg/Kg	0.34U mg/Kg
C077S542**	Selenium	0.49 mg/Kg	0.49U mg/Kg
C077S543	Selenium	0.92 mg/Kg	0.92U mg/Kg
C077S544	Selenium	0.44 mg/Kg	0.44U mg/Kg
C077S545	Selenium	0.41 mg/Kg	0.41U mg/Kg
C077S546	Selenium	0.54 mg/Kg	0.54U mg/Kg

Sample C077R012 was identified as a rinsate. No metal contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
C077R012	12/13/05	Antimony Calcium Cobalt Magnesium Sodium	3.2 ug/L 39.1 ug/L 2.0 ug/L 56.9 ug/L 697 ug/L	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176 C077S171 C077S172 C077S173 C077S287 C077S288 C077S289** C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321** C077S322 C077S323 C077S324 C077S325 C077S326 C077S541 C077S542** C077S543 C077S544 C077S545 C077S546 C077G053 C077G063 C077G062** C077G061 C077G064

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G063	Cobalt	1.8 ug/L	1.8U ug/L
C077G062**	Cobalt	1.9 ug/L	1.9U ug/L
C077G061	Antimony Cobalt	2.9 ug/L 3.0 ug/L	2.9U ug/L 3.0U ug/L
C077G064	Cobalt	1.7 ug/L	1.7U ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S178	Antimony Sodium	0.36 mg/Kg 267 mg/Kg	0.36U mg/Kg 267U mg/Kg
C077S179	Sodium	191 mg/Kg	191U mg/Kg
C077S181	Sodium	150 mg/Kg	150U mg/Kg
C077S182	Sodium	139 mg/Kg	139U mg/Kg
C077S175	Sodium	242 mg/Kg	242U mg/Kg
C077S176	Sodium	323 mg/Kg	323U mg/Kg
C077S171	Sodium	163 mg/Kg	163U mg/Kg
C077S172	Sodium	83.4 mg/Kg	83.4U mg/Kg
C077S173	Sodium	98.8 mg/Kg	98.8U mg/Kg
C077S287	Sodium	75.8 mg/Kg	75.8U mg/Kg
C077S288	Sodium	87.8 mg/Kg	87.8U mg/Kg
C077S289**	Sodium	58.2 mg/Kg	58.2U mg/Kg
C077S285	Sodium	293 mg/Kg	293U mg/Kg
C077S286	Sodium	199 mg/Kg	199U mg/Kg
C077S281	Sodium	102 mg/Kg	102U mg/Kg
C077S282	Sodium	75.5 mg/Kg	75.5U mg/Kg
C077S283	Antimony Sodium	0.45 mg/Kg 90.1 mg/Kg	0.45U mg/Kg 90.1U mg/Kg
C077S321**	Sodium	92.3 mg/Kg	92.3U mg/Kg
C077S322	Sodium	87.8 mg/Kg	87.8U mg/Kg
C077S323	Sodium	60.7 mg/Kg	60.7U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S324	Sodium	135 mg/Kg	135U mg/Kg
C077S325	Sodium	54.2 mg/Kg	54.2U mg/Kg
C077S326	Sodium	60.1 mg/Kg	60.1U mg/Kg
C077S541	Sodium	86 mg/Kg	86U mg/Kg
C077S542**	Sodium	78.8 mg/Kg	78.8U mg/Kg
C077S543	Sodium	65.5 mg/Kg	65.5U mg/Kg
C077S544	Sodium	182 mg/Kg	182U mg/Kg
C077S545	Sodium	88 mg/Kg	88U mg/Kg
C077S546	Sodium	77.2 mg/Kg	77.2U mg/Kg

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All water samples in SDG 49310/49311	All TAL metals	No MS associated with these samples.	MS required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S172MS/MSD (C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176 C077S171 C077S172 C077S173 C077S287 C077S288 C077S289**)	Antimony Barium Manganese Potassium	60.2 (80-120) 138 (80-120) 52.0 (80-120) 75.8 (80-120)	59.6 (80-120) - - -	- 22.6 (≤20) - -	J (all detects) UJ (all non-detects)	A
C077S325MS/MSD (C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321** C077S322 C077S323 C077S324 C077S325 C077S326 C077S541 C077S542** C077S543 C077S544 C077S545 C077S546)	Antimony	64.4 (80-120)	74.6 (80-120)	-	J (all detects) UJ (all non-detects)	A
C077S542MS/MSD (C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321** C077S322 C077S323 C077S324 C077S325 C077S326 C077S541 C077S542** C077S543 C077S544 C077S545 C077S546)	Antimony	62.6 (80-120)	61.8 (80-120)	-	J (all detects) UJ (all non-detects)	A

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S542MS/MSD (C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321** C077S322 C077S323 C077S324 C077S325 C077S326 C077S541 C077S542** C077S543 C077S544 C077S545 C077S546)	Manganese	121 (80-120)	-	-	J (all detects)	A

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All water samples in SDG 49310/49311	All TAL metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P

Results were within QC limits.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Internal Standards

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
C077G064L	Barium	10.8 (≤10)	All water samples in SDG 49310/49311	J (all detects)	A
C077S172L	Cobalt	13.3 (≤10)	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176 C077S171 C077S172 C077S173 C077S287 C077S288 C077S289**	J (all detects)	A
C077S325L	Cobalt	13.0 (≤10)	C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321** C077S322 C077S323 C077S324 C077S325 C077S326 C077S541 C077S542** C077S543 C077S544 C077S545 C077S546	J (all detects)	A

XI. Sample Result Verification

All sample result verifications were acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been qualified.

XIII. Field Duplicates

Samples C077G063 and C077G064 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Analyte	Concentration (ug/L)		RPD
	C077G063	C077G064	
Arsenic	7.3	6.2	16
Barium	273	260	5
Calcium	55000	52300	5
Chromium	5.0	5.0	0
Cobalt	1.8	1.7	6
Magnesium	72300	71300	1
Manganese	1110	1060	5
Potassium	31200	30600	2
Selenium	10.3	10.4	1
Sodium	921000	900000	2
Vanadium	5.4	5.8	7

NAS Alameda Point, CTO 077
Metals - Data Qualification Summary - SDG 49310/49311

SDG	Sample	Analyte	Flag	A or P	Reason
49310/ 49311	C077G053 C077G063 C077G062** C077G061 C077R012 C077G064	All TAL metals	None	P	*Matrix spike analysis*
49310/ 49311	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176 C077S171 C077S172 C077S173 C077S287 C077S288 C077S289**	Antimony Manganese Potassium	J (all detects) UJ (all non-detects)	A	*Matrix spike/Matrix spike* duplicates (%R)
49310/ 49311	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176 C077S171 C077S172 C077S173 C077S287 C077S288 C077S289**	Barium	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)(RPD)

SDG	Sample	Analyte	Flag	A or P	Reason
49310/ 49311	C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321** C077S322 C077S323 C077S324 C077S325 C077S326 C077S541 C077S542** C077S543 C077S544 C077S545 C077S546	Antimony	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49310/ 49311	C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321** C077S322 C077S323 C077S324 C077S325 C077S326 C077S541 C077S542** C077S543 C077S544 C077S545 C077S546	Manganese	J (all detects)	A	Matrix spike/Matrix spike duplicates (%R)
49310/ 49311	C077G053 C077G063 C077G062** C077G061 C077R012 C077G064	All TAL metals	None	P	Duplicate analysis
49310/ 49311	C077G053 C077G063 C077G062** C077G061 C077R012 C077G064	Barium	J (all detects)	A	ICP serial dilution (%D)

SDG	Sample	Analyte	Flag	A or P	Reason
49310/ 49311	C077S177 C077S178 C077S179 C077S180** C077S181 C077S182 C077S174 C077S175 C077S176 C077S171 C077S172 C077S173 C077S287 C077S288 C077S289** C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321** C077S322 C077S323 C077S324 C077S325 C077S326 C077S541 C077S542** C077S543 C077S544 C077S545 C077S546	Cobalt	J (all detects)	A	ICP serial dilution (%D)

NAS Alameda Point, CTO 077
Metals - Laboratory Blank Data Qualification Summary - SDG 49310/49311

SDG	Sample	Analyte	Modified Final Concentration	A or P
49310/49311	C077G053	Selenium	9.1U ug/L	A
49310/49311	C077G063	Arsenic Cobalt Selenium	7.3U ug/L 1.8U ug/L 10.3U ug/L	A
49310/49311	C077G062**	Arsenic Cobalt Selenium	6.5U ug/L 1.9U ug/L 5.3U ug/L	A
49310/49311	C077G061	Antimony Arsenic Cobalt Selenium	2.9U ug/L 3.5U ug/L 3.0U ug/L 5.3U ug/L	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49310/49311	C077R012	Antimony Cobalt Sodium	3.2U ug/L 2.0U ug/L 697U ug/L	A
49310/49311	C077G064	Arsenic Cobalt Selenium	6.2U ug/L 1.7U ug/L 10.4U ug/L	A
49310/49311	C077S177	Mercury	0.069U mg/Kg	A
49310/49311	C077S178	Antimony Mercury Selenium	0.36U mg/Kg 0.024U mg/Kg 0.48U mg/Kg	A
49310/49311	C077S180**	Mercury Selenium Thallium	0.03U mg/Kg 1.5U mg/Kg 0.56U mg/Kg	A
49310/49311	C077S181	Mercury Selenium Silver	0.02U mg/Kg 0.32U mg/Kg 0.043U mg/Kg	A
49310/49311	C077S182	Selenium	0.3U mg/Kg	A
49310/49311	C077S174	Mercury Selenium	0.061U mg/Kg 0.6U mg/Kg	A
49310/49311	C077S175	Mercury	0.024U mg/Kg	A
49310/49311	C077S176	Mercury	0.025U mg/Kg	A
49310/49311	C077S171	Mercury Silver	0.048U mg/Kg 0.26U mg/Kg	A
49310/49311	C077S172	Mercury Selenium	0.066U mg/Kg 0.55U mg/Kg	A
49310/49311	C077S173	Mercury Selenium	0.077U mg/Kg 0.45U mg/Kg	A
49310/49311	C077S287	Selenium	0.4U mg/Kg	A
49310/49311	C077S288	Mercury Selenium	0.021U mg/Kg 0.72U mg/Kg	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49310/49311	C077S289**	Selenium Silver	0.33U mg/Kg 0.046U mg/Kg	A
49310/49311	C077S285	Mercury Selenium	0.021U mg/Kg 0.34U mg/Kg	A
49310/49311	C077S286	Selenium Silver	0.44U mg/Kg 0.052U mg/Kg	A
49310/49311	C077S283	Antimony Selenium	0.45U mg/Kg 0.49U mg/Kg	A
49310/49311	C077S325	Selenium	0.8U mg/Kg	A
49310/49311	C077S541	Selenium	0.34U mg/Kg	A
49310/49311	C077S542**	Selenium	0.49U mg/Kg	A
49310/49311	C077S543	Selenium	0.92U mg/Kg	A
49310/49311	C077S544	Selenium	0.44U mg/Kg	A
49310/49311	C077S545	Selenium	0.41U mg/Kg	A
49310/49311	C077S546	Selenium	0.54U mg/Kg	A

NAS Alameda Point, CTO 077
Metals - Field Blank Data Qualification Summary - SDG 49310/49311

SDG	Sample	Analyte	Modified Final Concentration	A or P
49310/49311	C077G063	Cobalt	1.8U ug/L	A
49310/49311	C077G062**	Cobalt	1.9U ug/L	A
49310/49311	C077G061	Antimony Cobalt	2.9U ug/L 3.0U ug/L	A
49310/49311	C077G064	Cobalt	1.7U ug/L	A
49310/49311	C077S178	Antimony Sodium	0.36U mg/Kg 267U mg/Kg	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49310/49311	C077S179	Sodium	191U mg/Kg	A
49310/49311	C077S181	Sodium	150U mg/Kg	A
49310/49311	C077S182	Sodium	139U mg/Kg	A
49310/49311	C077S175	Sodium	242U mg/Kg	A
49310/49311	C077S176	Sodium	323U mg/Kg	A
49310/49311	C077S171	Sodium	163U mg/Kg	A
49310/49311	C077S172	Sodium	83.4U mg/Kg	A
49310/49311	C077S173	Sodium	98.8U mg/Kg	A
49310/49311	C077S287	Sodium	75.8U mg/Kg	A
49310/49311	C077S288	Sodium	87.8U mg/Kg	A
49310/49311	C077S289**	Sodium	58.2U mg/Kg	A
49310/49311	C077S285	Sodium	293U mg/Kg	A
49310/49311	C077S286	Sodium	199U mg/Kg	A
49310/49311	C077S281	Sodium	102U mg/Kg	A
49310/49311	C077S282	Sodium	75.5U mg/Kg	A
49310/49311	C077S283	Antimony Sodium	0.45U mg/Kg 90.1U mg/Kg	A
49310/49311	C077S321**	Sodium	92.3U mg/Kg	A
49310/49311	C077S322	Sodium	87.8U mg/Kg	A
49310/49311	C077S323	Sodium	60.7U mg/Kg	A
49310/49311	C077S324	Sodium	135U mg/Kg	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49310/49311	C077S325	Sodium	54.2U mg/Kg	A
49310/49311	C077S326	Sodium	60.1U mg/Kg	A
49310/49311	C077S541	Sodium	86U mg/Kg	A
49310/49311	C077S542**	Sodium	78.8U mg/Kg	A
49310/49311	C077S543	Sodium	65.5U mg/Kg	A
49310/49311	C077S544	Sodium	182U mg/Kg	A
49310/49311	C077S545	Sodium	88U mg/Kg	A
49310/49311	C077S546	Sodium	77.2U mg/Kg	A

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14461

Hexavalent Chromium

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 13, 2005

LDC Report Date: January 3, 2006

Matrix: Soil/Water

Parameters: Hexavalent Chromium

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49310/49311

Sample Identification

C077S287
C077S288
C077S289**
C077S284
C077S285
C077S286
C077S281
C077S282
C077S283
C077G063
C077G062**
C077G061
C077R012
C077G064
C077G064MS
C077G064MSD

**Indicates sample underwent Level IV review

Introduction

This data review covers 9 soil samples and 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 7196A for Hexavalent Chromium.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent Level IV review. Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No hexavalent chromium contaminants were found in the method blanks.

Sample C065R012 was identified as a rinsate. No hexavalent chromium contaminants were found in this blank.

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All soil samples in SDG 49310/49311	Hexavalent chromium	No MS associated with these samples.	MS required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

V. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All soil samples in SDG 49310/49311	Hexavalent chromium	No DUP analysis associated with these samples.	DUP analysis required.	None	P

VI. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VII. Sample Result Verification

All sample result verifications were acceptable for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

IX. Field Duplicates

Samples C077G063 and C077G064 were identified as field duplicates. No hexavalent chromium was detected in any of the samples.

NAS Alameda Point, CTO 077
Hexavalent Chromium - Data Qualification Summary - SDG 49310/49311

SDG	Sample	Analyte	Flag	A or P	Reason
49310/49311	C077S287 C077S288 C077S289** C077S284 C077S285 C077S286 C077S281 C077S282 C077S283	Hexavalent chromium	None	P	Matrix spike analysis
49310/49311	C077S287 C077S288 C077S289** C077S284 C077S285 C077S286 C077S281 C077S282 C077S283	Hexavalent chromium	None	P	Duplicate analysis

NAS Alameda Point, CTO 077
Hexavalent Chromium - Laboratory Blank Data Qualification Summary - SDG 49310/49311

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Hexavalent Chromium - Field Blank Data Qualification Summary - SDG 49310/49311

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14461

TPH as Gasoline

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 13, 2005

LDC Report Date: January 3, 2006

Matrix: Soil

Parameters: Total Petroleum Hydrocarbons as Gasoline

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49310/49311

Sample Identification

C077S541
C077S542**
C077S543
C077S544
C077S545
C077S546

**Indicates sample underwent Level IV review

Introduction

This data review covers 6 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Gasoline.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent Level IV review. Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as gasoline contaminants were found in the method blanks.

No field blanks were identified in this SDG.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49310/49311	TPH as gasoline	No MS/MSD associated with these samples.	MS/MSD required.	None	P

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Data Qualification Summary - SDG 49310/49311

SDG	Sample	Compound	Flag	A or P	Reason
49310/ 49311	C077S541 C077S542** C077S543 C077S544 C077S545 C077S546	TPH as gasoline	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Laboratory Blank Data Qualification Summary - SDG 49310/49311

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Field Blank Data Qualification Summary - SDG 49310/49311

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14461

TPH as Extractables

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 13, 2005

LDC Report Date: January 3, 2006

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49310/49311

Sample Identification

C077S621	C077S544
C077S622	C077S545
C077S287	C077S546
C077S288	C077G063
C077S289**	C077G062**
C077S284	C077G061
C077S285	C077G241
C077S286	C077R012
C077S281	C077S285MS
C077S282	C077S285MSD
C077S283	C077S325MS
C077S321**	C077S325MSD
C077S322	C077S542MS
C077S323	C077S542MSD
C077S324	
C077S325	
C077S326	
C077S541	
C077S542**	
C077S543	

**Indicates sample underwent Level IV review

Introduction

This data review covers 29 soil samples and 5 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Extractables.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent Level IV review. Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

The percent relative standard deviations (%RSD) of calibration factors for selected compounds were less than or equal to 20.0% .

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample C077R012 was identified as a rinsate. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077S285	Octacosane	2230 (47-140)	TPH as extractables	J (all detects)	P
C077S286	Octacosane	953 (47-140)	TPH as extractables	J (all detects)	P

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49310/49311	TPH as extractables	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S285MS/MSD (C077S621 C077S622 C077S287 C077S288 C077S289** C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321**)	TPH as motor oil	155 (50-150)	-	-	J (all detects)	A

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051216AS-LCS	TPH as motor oil	155 (50-150)	C077S322 C077S323 C077S324 C077S325 C077S326 C077S541 C077S542** C077S543 C077S544 C077S545 C077S546 051216A-BLKS	J (all detects)	P

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 49310/49311

SDG	Sample	Compound	Flag	A or P	Reason
49310/ 49311	C077S285 C077S286	TPH as extractables	J (all detects)	P	Surrogate recovery (%R)
49310/ 49311	C077G063 C077G062** C077G061 C077G241 C077R012	TPH as extractables	None	P	Matrix spike/Matrix spike duplicates
49310/ 49311	C077S621 C077S622 C077S287 C077S288 C077S289** C077S284 C077S285 C077S286 C077S281 C077S282 C077S283 C077S321**	TPH as motor oil	J (all detects)	A	Matrix spike/Matrix spike duplicates (%R)
49310/ 49311	C077S322 C077S323 C077S324 C077S325 C077S326 C077S541 C077S542** C077S543 C077S544 C077S545 C077S546	TPH as motor oil	J (all detects)	P	Laboratory control samples (%R)

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 49310/49311

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 49310/49311

No Sample Data Qualified in this SDG

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Bechtel Environmental
1230 Columbia Street, Suite 400
San Diego, CA 92101
Attn: Ms. Toni Kuzmack

January 10, 2006

Project Name : NAS Alameda Point
Project # : CTO 077

On January 4, 2006 the following data packages were received by Laboratory Data Consultants, Inc. from Bechtel Environmental. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 14473:

SDG #	Fraction
49342/49343	Volatiles, Semivolatiles, Polynuclear Aromatic Hydrocarbons, Chlorinated Pesticides & PCBs, Metals

The above SDG were reviewed using Level III and Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- NFESC Special Publication SP-2056-ENV, Navy Installation Restoration Chemical Data Quality Manual, Naval Facilities Engineering Command, September 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998

The data validators did utilize their professional judgement when evaluating the data to achieve the most complete and accurate assessment of the data. The data packages were reviewed according to the above stated validation procedures.

For GC/MS volatile analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49342/49343.

b) Surrogate percent recoveries exceeded acceptance criteria for sample C077S021 in SDG 49342/49343.

c) Acetone was detected in the method blanks in SDG 49342/49343. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For GC/MS semivolatile analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49342/49343.

b) Matrix spike/matrix spike duplicate percent recoveries and relative percent differences exceeded acceptance criteria for several compounds in SDG 49342/49343. Since the laboratory met the protocol requirement, this finding should be considered advisory.

c) Laboratory control sample percent recoveries exceeded acceptance criteria for hexachlorobutadiene and hexachloroethane in SDG 49342/49343.

d) Di-n-butylphthalate was detected in the field blanks in SDG 49342/49343. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For GC/MS PAH analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49342/49343.

b) Matrix spike/matrix spike duplicate percent recoveries and relative percent differences exceeded acceptance criteria for several compounds in SDG 49342/49343. Since the laboratory met the protocol requirement, this finding should be considered advisory.

c) Laboratory control sample percent recoveries exceeded acceptance criteria for benzo(a)anthracene and 2-methylnaphthalene in SDG 49342/49343.

d) Benzo(b)fluoranthene and benzo(k)fluoranthene coeluted for several samples in SDG 49342/49343. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For chlorinated pesticide and PCB analyses, the primary findings consisted of:

a) Continuing calibration factors exceeded acceptance criteria in SDG 49342/49343. Since the laboratory met the protocol requirement, this finding should be considered advisory.

b) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49342/49343.

c) Matrix spike/matrix spike duplicate relative percent differences exceeded acceptance criteria for several compounds in SDG 49342/49343. Since the laboratory met the protocol requirement, this finding should be considered advisory

d) Laboratory control sample percent recoveries exceeded acceptance criteria for endosulfan sulfate and endrin aldehyde in SDG 49342/49343.

For metal analyses, the primary findings consisted of:

a) Matrix spike analyses were not performed for all batches in SDG 49342/49343.

b) Duplicate analyses were not performed for all batches in SDG 49342/49343.

c) Matrix spike percent recoveries and relative percent differences exceeded acceptance criteria for several metals in SDG 49342/49343. Since the laboratory met the protocol requirement, this finding should be considered advisory.

d) ICP serial dilution percent differences exceeded acceptance criteria for lead in SDG 49342/49343. Since the laboratory met the protocol requirement, this finding should be considered advisory.

e) Several metals were detected in the method and field blanks in SDG 49342/49343. Since the laboratory met the protocol requirement, this finding should be considered advisory.

In general, the data for all analyses appear usable with the limitations noted in the Data Validation Reports. Data validation flags were noted on the Laboratory Form 1s and included with each validation report.

Sincerely,

Richard M. Amano
President/Principal Chemist

Attachment 1

1 Week TAT

LDC #14473 (Bechtel Environmental-San Diego / Alameda Point, CTO 077)

LDC	SDG#	DATE REC'D	(2) DATE DUE	VOA (8260B)		SVOA (8270C)		PAHs (8270C -SIM)		Pest. /PCBs (SW846)		PCBs (8082)		Metals (SW846)		Lead (6010B)		Diss. Metals (SW846)																	
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	49342/49343	01/04/06	01/10/06	4	21	3	23	4	25	3	23	0	11	0	23	0	12	3	0																
A	49342/49343	01/04/06	01/10/06	0	3	0	3	0	3	0	3	0	1	0	3	0	2	0	0																
Total	B/LR			4	24	3	26	4	28	3	26	0	12	0	26	0	14	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	173

Shaded cells indicate Level IV validation (all other cells are Level III validation)

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14473

Volatiles

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 15, 2005

LDC Report Date: January 9, 2006

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49342/49343

Sample Identification

C077G011	C077SO72
C077G013	C077SO73
C077TB17	C077SO77
C077R014	C077SO78
C077SO21	C077SO79
C077SO22	C077SO80**
C077SO23	C077SO81**
C077SO24	C077SO82**
C077SO25	
C077SO26	
C077SO27	
C077SO28	
C077SO29	
C077SO30	
C077SO31	
C077SO32	
C077SO74	
C077SO75	
C077SO76	
C077SO71	

**Indicates sample underwent Level IV review.

Introduction

This data review covers 24 soil samples and 4 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all volatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051223A-BLK	12/23/05	Acetone	0.0046 mg/Kg	C077SO80** C077SO81** C077SO82**
051222A1-BLK	12/22/05	Acetone	0.0047 mg/Kg	C077SO74 C077SO75 C077SO76 C077SO71 C077SO72 C077SO73 C077SO77 C077SO78 C077SO79
051219A-BLK	12/19/05	Acetone	0.0031 mg/Kg	C077SO21 C077SO22 C077SO23 C077SO24 C077SO26 C077SO27 C077SO28 C077SO29 C077SO30 C077SO31
051220A1-BLK	12/20/05	Acetone	0.011 mg/Kg	C077SO32

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077SO80**	Acetone	0.027 mg/Kg	0.1U mg/Kg
C077SO81**	Acetone	0.042 mg/Kg	0.1U mg/Kg
C077SO82**	Acetone	0.023 mg/Kg	0.1U mg/Kg
C077SO74	Acetone	0.03 mg/Kg	0.1U mg/Kg

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077SO75	Acetone	0.016 mg/Kg	0.1U mg/Kg
C077SO76	Acetone	0.016 mg/Kg	0.2U mg/Kg
C077SO71	Acetone	0.015 mg/Kg	0.1U mg/Kg
C077SO72	Acetone	0.012 mg/Kg	0.1U mg/Kg
C077SO73	Acetone	0.015 mg/Kg	0.1U mg/Kg
C077SO77	Acetone	0.016 mg/Kg	0.1U mg/Kg
C077SO78	Acetone	0.025 mg/Kg	0.1U mg/Kg
C077SO79	Acetone	0.014 mg/Kg	0.2U mg/Kg
C077SO21	Acetone	0.019 mg/Kg	0.1U mg/Kg
C077SO22	Acetone	0.02 mg/Kg	0.1U mg/Kg
C077SO23	Acetone	0.0097 mg/Kg	0.1U mg/Kg
C077SO24	Acetone	0.012 mg/Kg	0.1U mg/Kg
C077SO26	Acetone	0.022 mg/Kg	0.1U mg/Kg
C077SO29	Acetone	0.017 mg/Kg	0.1U mg/Kg
C077SO30	Acetone	0.013 mg/Kg	0.1U mg/Kg
C077SO32	Acetone	0.0059 mg/Kg	0.1U mg/Kg
C077SO31	Acetone	0.013 mg/Kg	0.1U mg/Kg

Sample C077TB17 was identified as a trip blank. No volatile contaminants were found in this blank.

Sample C077R014 was identified as a rinsate. No volatile contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Compound	Concentration	Associated Samples
C077R014	12/15/05	Bromodichloromethane Bromoform Chloroform Dibromochloromethane	1.9 ug/L 0.23 ug/L 2.8 ug/L 1.3 ug/L	C077G011 C077G013 C077SO21 C077SO22 C077SO23 C077SO24 C077SO25 C077SO26 C077SO27 C077SO28 C077SO29 C077SO30 C077SO31 C077SO32 C077SO74 C077SO75 C077SO76 C077SO71 C077SO72 C077SO73 C077SO77 C077SO78 C077SO79 C077SO80** C077SO81** C077SO82**

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
C077SO25	Toluene-d8	83.8 (85-115)	All TCL compounds	J (all detects) UJ (all non-detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49342/49343	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Volatiles - Data Qualification Summary - SDG 49342/49343

SDG	Sample	Compound	Flag	A or P	Reason
49342/ 49343	C077G011 C077G013 C077TB17 C077R014 C077SO21 C077SO22 C077SO23 C077SO24 C077SO25 C077SO26 C077SO27 C077SO28 C077SO29 C077SO30 C077SO31 C077SO32 C077SO74 C077SO75 C077SO76 C077SO71 C077SO72 C077SO73 C077SO77 C077SO78 C077SO79 C077SO80** C077SO81** C077SO82**	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49342/ 49343	C077SO25	All TCL compounds	J (all detects) UJ (all non-detects)	P	Surrogate recovery (%R)

NAS Alameda Point, CTO 077
Volatiles - Laboratory Blank Data Qualification Summary - SDG 49342/49343

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49342/49343	C077SO80**	Acetone	0.1U mg/Kg	A
49342/49343	C077SO81**	Acetone	0.1U mg/Kg	A
49342/49343	C077SO82**	Acetone	0.1U mg/Kg	A
49342/49343	C077SO74	Acetone	0.1U mg/Kg	A
49342/49343	C077SO75	Acetone	0.1U mg/Kg	A

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49342/49343	C077SO76	Acetone	0.2U mg/Kg	A
49342/49343	C077SO71	Acetone	0.1U mg/Kg	A
49342/49343	C077SO72	Acetone	0.1U mg/Kg	A
49342/49343	C077SO73	Acetone	0.1U mg/Kg	A
49342/49343	C077SO77	Acetone	0.1U mg/Kg	A
49342/49343	C077SO78	Acetone	0.1U mg/Kg	A
49342/49343	C077SO79	Acetone	0.2U mg/Kg	A
49342/49343	C077SO21	Acetone	0.1U mg/Kg	A
49342/49343	C077SO22	Acetone	0.1U mg/Kg	A
49342/49343	C077SO23	Acetone	0.1U mg/Kg	A
49342/49343	C077SO24	Acetone	0.1U mg/Kg	A
49342/49343	C077SO28	Acetone	0.1U mg/Kg	A
49342/49343	C077SO29	Acetone	0.1U mg/Kg	A
49342/49343	C077SO30	Acetone	0.1U mg/Kg	A
49342/49343	C077SO32	Acetone	0.1U mg/Kg	A
49342/49343	C077SO31	Acetone	0.1U mg/Kg	A

NAS Alameda Point, CTO 077
Volatiles - Field Blank Data Qualification Summary - SDG 49342/49343

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14473

Semivolatiles

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 15, 2005

LDC Report Date: January 5, 2006

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Level III & IV

Laboratory: APPL, Inc.

***Sample Delivery Group* (SDG):** 49342/49343

Sample Identification

C077S021	C077S079
C077S022	C077S080**
C077S023	C077S081**
C077S024	C077S082**
C077S025	C077G011
C077S026	C077G013
C077S027	C077R014
C077S028	C077S080MS
C077S029	C077S080MSD
C077S030	
C077S031	
C077S032	
C077S074	
C077S075	
C077S076	
C077S071	
C077S072	
C077S073	
C077S077	
C077S078	

**Indicates sample underwent Level IV review

Introduction

This data review covers 26 soil samples and 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals. All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

All of the continuing calibration RRF values were greater than or equal to 0.05 .

V. Blanks

Method blanks were reviewed for each matrix as applicable. No semivolatile contaminants were found in the method blanks.

Sample C077R014 was identified as a rinsate. No semivolatile contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Compound	Concentration	Associated Samples
C077R014	12/15/05	Di-n-butylphthalate	6.8 ug/L	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078 C077S079 C077S080** C077S081** C077S082** C077G011 C077G013

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
C077G011	Di-n-butylphthalate	4.7 ug/L	10U ug/L
C077G013	Di-n-butylphthalate	12 ug/L	12U ug/L

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078 C077G011 C077G013 C077R014	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S080MS/MSD (C077S079 C077S080** C077S081** C077S082**)	3,3'-Dichlorobenzidine Aniline Butylbenzylphthalate	- 20.8 (25-135) 241 (50-125)	- - -	74.3 (≤30) - 98.7 (≤30)	J (all detects) UJ (all non-detects)	A
C077S080MS/MSD (C077S079 C077S080** C077S081** C077S082**)	Pyridine	0 (15-115)	0 (15-115)	-	J (all detects) R (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051220A-LCSW	Hexachlorobutadiene	24.4 (25-105)	C077G011 C077G013	J (all detects) UJ (all non-detects)	P
	Hexachloroethane	23.0 (30-95)	C077R014 051220A-BLKW	J (all detects) UJ (all non-detects)	

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Semivolatiles - Data Qualification Summary - SDG 49342/49343

SDG	Sample	Compound	Flag	A or P	Reason
49342/ 49343	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078 C077G011 C077G013 C077R014	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49342/ 49343	C077S079 C077S080** C077S081** C077S082**	3,3'-Dichlorobenzidine	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (RPD)
49342/ 49343	C077S079 C077S080** C077S081** C077S082**	Aniline	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49342/ 49343	C077S079 C077S080** C077S081** C077S082**	Butylbenzylphthalate	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)(RPD)
49342/ 49343	C077S079 C077S080** C077S081** C077S082**	Pyridine	J (all detects) R (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49342/ 49343	C077G011 C077G013 C077R014	Hexachlorobutadiene Hexachloroethane	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)

NAS Alameda Point, CTO 077
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 49342/49343

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Semivolatiles - Field Blank Data Qualification Summary - SDG 49342/49343

SDG	Sample	Compound	Modified Final Concentration	A or P
49342/49323	C077G011	Di-n-butylphthalate	10U ug/L	A
49342/49323	C077G013	Di-n-butylphthalate	12U ug/L	A

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14473

Polynuclear Aromatic Hydrocarbons

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 15, 2005

LDC Report Date: January 5, 2006

Matrix: Soil/Water

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49342/49343

Sample Identification

C077S021	C077S079
C077S022	C077S080**
C077S023	C077S081**
C077S024	C077S082**
C077S025	C077G011
C077S026	C077G013
C077S027	C077R014
C077S028	C077G014
C077S029	C077S023MS
C077S030	C077S023MSD
C077S031	C077S080MS
C077S032	C077S080MSD
C077S074	
C077S075	
C077S076	
C077S071	
C077S072	
C077S073	
C077S077	
C077S078	

**Indicates sample underwent Level IV review

Introduction

This data review covers 28 soil samples and 4 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C using Selected Ion Monitoring (SIM) for Polynuclear Aromatic Hydrocarbons.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

Average relative response factors (RRF) for all target compounds and system monitoring compounds

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0% .

All of the continuing calibration RRF values were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polynuclear aromatic hydrocarbon contaminants were found in the method blanks.

Sample C077R014 was identified as a rinsate. No polynuclear aromatic hydrocarbon contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49342/49343	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S023MS/MSD	Benzo(a)anthracene	135 (56-103)	106 (56-103)	-	J (all detects)	A
(C077S021	Benzo(k)fluoranthene	-	115 (52-112)	-	J (all detects)	
C077S022	Chrysene	121 (55-104)	-	-	J (all detects)	
C077S023	Fluoranthene	113 (54-106)	-	-	J (all detects)	
C077S024	Pyrene	105 (55-104)	-	-	J (all detects)	
C077S025						
C077S026						
C077S027						
C077S028						
C077S029						
C077S030						
C077S031						
C077S032						
C077S074						
C077S075						
C077S076						
C077S071						
C077S072						
C077S073						
C077S077						
C077S078)						

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S023MS/MSD (C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078)	Benzo(g,h,i)perylene Indeno(1,2,3-cd)pyrene	- -	45.9 (51-107) 40.5 (47-109)	- 32.0 (≤30)	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A
C077S080MS/MSD (C077S079 C077S080** C077S081** C077S082**)	Anthracene Benzo(g,h,i)perylene Indeno(1,2,3-cd)pyrene	38.3 (54-102) 10.5 (51-107) 8.6 (47-109)	41.4 (54-102) 31.6 (51-107) 20.1 (47-109)	- - -	J (all detects) UJ (all non-detects)	A
C077S080MS/MSD (C077S079 C077S080** C077S081** C077S082**)	2-Methylnaphthalene	105 (53-101)	-	-	J (all detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051220A-LCS	Benzo(a)anthracene 2-Methylnaphthalene	111 (56-103) 102 (53-101)	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078 051220A-BLKS	J (all detects) J (all detects)	P
051227A-LCS	Benzo(a)anthracene	108 (56-103)	C077S079 C077S080** C077S081** C077S082** 051227A-BLK	J (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Flag	A or P
C077S021 C077S024 C077S025 C077S031 C077S074 C077S078 C077S080**	Benzo(b)fluoranthene Benzo(k)fluoranthene	Sample result was reported from the column on which co-elution existed.	J (all detects) J (all detects)	A

Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

Samples C077G013 and C077G014 were identified as field duplicates. No polynuclear aromatic hydrocarbons were detected in any of the samples.

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 49342/49343

SDG	Sample	Compound	Flag	A or P	Reason
49342/ 49343	C077G011 C077G013 C077R014 C077G014	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49342/ 49343	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078	Benzo(a)anthracene Benzo(k)fluoranthene Chrysene Fluoranthene Pyrene	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Matrix spike/Matrix spike duplicates (%R)
49342/ 49343	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078	Benzo(g,h,i)perylene	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)

SDG	Sample	Compound	Flag	A or P	Reason
49342/ 49343	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078	Indeno(1,2,3-cd)pyrene	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)(RPD)
49342/ 49343	C077S079 C077S080** C077S081** C077S082**	Anthracene Benzo(g,h,i)perylene Indeno(1,2,3-cd)pyrene	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49342/ 49343	C077S079 C077S080** C077S081** C077S082**	2-Methylnaphthalene	J (all detects)	A	Matrix spike/Matrix spike duplicates (%R)
49342/ 49343	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078	Benzo(a)anthracene 2-Methylnaphthalene	J (all detects) J (all detects)	P	Laboratory control samples (%R)
49342/ 49343	C077S079 C077S080** C077S081** C077S082**	Benzo(a)anthracene	J (all detects)	P	Laboratory control samples (%R)

SDG	Sample	Compound	Flag	A or P	Reason
49342/ 49343	C077S021 C077S024 C077S025 C077S031 C077S074 C077S078 C077S080**	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) J (all detects)	A	Compound quantitation and CRQLs

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 49342/49343

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary - SDG 49342/49343

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14473

Chlorinated Pesticides & PCBs

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 15, 2005

LDC Report Date: January 9, 2006

Matrix: Soil/Water

Parameters: Chlorinated Pesticides & PCBs

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49342/49343

Sample Identification

C077S021	C077S079	C077S079MSD
C077S022	C077S080**	
C077S023	C077S081**	
C077S024	C077S082**	
C077S025	C077S091**	
C077S026	C077S092	
C077S027	C077S093	
C077S028	C077S094	
C077S029	C077S095	
C077S030	C077S096	
C077S031	C077S097	
C077S032	C077S098	
C077S074	C077S100	
C077S075	C077S99	
C077S076	C077S101	
C077S071	C077S102	
C077S072	C077G011	
C077S073	C077G013	
C077S077	C077R014	
C077S078	C077S079MS	

**Indicates sample underwent Level IV review.

Introduction

This data review covers 38 soil samples and 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 8081A and 8082 for Chlorinated Pesticides and PCBs.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical or advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

Retention time windows were evaluated and considered technically acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compounds	Flag	A or P
12/28/05	1227084	DB-XLB	Aroclor-1260	19.5	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compounds	Flag	A or P
12/29/05	1227115	DB-35MS	Aroclor-1016	15.5	C077S091 C077S092	Aroclor-1016 Aroclor-1221 Aroclor-1232	J (all detects) UJ (all non-detects)	A
12/29/05	1227115	DB-XLB	Aroclor-1016	16.8	C077S091 C077S092	Aroclor-1016 Aroclor-1221 Aroclor-1232	J (all detects) UJ (all non-detects)	A
12/29/05	1227160	DB-XLB	Aroclor-1260	17.8	C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078 051220A-BLKS 051227A-BLK	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A
12/29/05	1227182	DB-35MS	alpha-BHC gamma-BHC Heptachlor Aldrin Dieldrin	21 20 16 16 16	C077S079 C077S080 C077S081 C077S082 C077S079MS C077S079MSD	alpha-BHC gamma-BHC Heptachlor Aldrin Dieldrin	J (all detects) UJ (all non-detects)	A
12/29/05	1227182	DB-XLB	alpha-BHC gamma-BHC Endrin	19 17 23	C077S079 C077S080 C077S081 C077S082 C077S079MS C077S079MSD	alpha-BHC gamma-BHC Endrin	J (all detects) UJ (all non-detects)	A

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

Retention times (RT) of all compounds in the calibration standards were within QC limits for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide or PCB contaminants were found in the method blanks.

Sample C077R014 was identified as a rinsate. No chlorinated pesticide or PCB contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for several samples. Since these samples were diluted out, no data were qualified.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078 C077G011 C077G013 C077R014	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Affected Compound	Flag	A or P
C077S079MS/MSD (C077S079 C077S080** C077S081** C077S082**)	4,4'-DDE 4,4'-DDT 4,4'-TDE/DDD alpha-Chlordane Aldrin Endosulfan sulfate Endrin aldehyde gamma-BHC gamma-Chlordane Heptachlor	- - - - - - - - - -	- - - - - - - - - -	56.7 (≤25) 48.5 (≤25) 42.5 (≤25) 35.8 (≤25) 44.5 (≤25) 36.8 (≤25) 43.4 (≤25) 26.7 (≤25) 39.2 (≤25) 41.5 (≤25)	4,4'-DDE 4,4'-DDT 4,4'-TDE/DDD alpha-Chlordane Aldrin Endosulfan sulfate Endrin aldehyde gamma-BHC gamma-Chlordane Heptachlor	J (all detects) UJ (all non-detects)	A

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Affected Compound	Flag	A or P
C077S079MS/MSD (C077S079 C077S080** C077S081** C077S082** C077S091** C077S092 C077S093 C077S094 C077S095 C077S096 C077S097 C077S098 C077S100 C077S99 C077S101 C077S102)	Aroclor-1260	-	-	28.2 (≤25)	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051220A-LCS	Endosulfan sulfate	43.8 (60-135)	C077S021 C077S022	J (all detects) UJ (all non-detects)	P
	Endrin aldehyde	21.9 (35-145)	C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078 051220ABLKS	J (all detects) UJ (all non-detects)	

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and Reported CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which an Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Data Qualification Summary - SDG 49342/49343

SDG	Sample	Compound	Flag	A or P	Reason
49342/ 49343	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49342/ 49343	C077S091 C077S092	Aroclor-1016 Aroclor-1221 Aroclor-1232	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49342/ 49343	C077S079 C077S080 C077S081 C077S082	alpha-BHC gamma-BHC Heptachlor Aldrin Dieldrin Endrin	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49342/ 49343	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078 C077G011 C077G013 C077R014	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates

SDG	Sample	Compound	Flag	A or P	Reason
49342/ 49343	C077S079 C077S080** C077S081** C077S082**	4,4'-DDE 4,4'-DDT 4,4'-TDE/DDD alpha-Chlordane Aldrin Endosulfan sulfate Endrin aldehyde gamma-BHC gamma-Chlordane Heptachlor	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (RPD)
49342/ 49343	C077S079 C077S080** C077S081** C077S082** C077S091** C077S092 C077S093 C077S094 C077S095 C077S096 C077S097 C077S098 C077S100 C077S99 C077S101 C077S102	Aroclor-1242 Aroclor-1248 Aroclor-1254 Aroclor-1260	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (RPD)
49342/ 49343	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078	Endosulfan sulfate Endrin aldehyde	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Laboratory Blank Data Qualification Summary - SDG 49342/49343

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Field Blank Data Qualification Summary - SDG 49342/49343

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14473

Metals

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 15, 2005

LDC Report Date: January 5, 2006

Matrix: Soil/Water

Parameters: Metals

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49342/49343

Sample Identification

C077S021	C077S079	C077S031MSD
C077S022	C077S080**	C077S158MS
C077S023	C077S081**	C077S158MSD
C077S024	C077S082**	
C077S025	C077S151**	
C077S026	C077S152**	
C077S027	C077S153	
C077S028	C077S157	
C077S029	C077S158	
C077S030	C077S159	
C077S031	C077S163	
C077S032	C077S164	
C077S074	C077S165	
C077S075	C077S154	
C077S076	C077S155	
C077S071	C077S156	
C077S072	C077G011	
C077S073	C077G013	
C077S077	C077R014	
C077S078	C077S031MS	

**Indicates sample underwent Level IV review

Introduction

This data review covers 40 soil samples and 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 6010B and 7000 for Metals. The metals analyzed were Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Antimony Lead Mercury Thallium	3.693 ug/L 2.954 ug/L 0.141 ug/L 2.353 ug/L	All water samples in SDG 49342/49343
ICB/CCB	Manganese Potassium	1.443 ug/L 106.3 ug/L	C077G013 C077R014
ICB/CCB	Sodium	465.7 ug/L	C077R014
ICB/CCB	Antimony Arsenic Lead Selenium Silver Thallium	3.693 ug/L 2.296 ug/L 2.678 ug/L 3.767 ug/L 0.621 ug/L 2.353 ug/L	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075
ICB/CCB	Aluminum	53.73 ug/L	C077S023 C077S026 C077S032

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Mercury	0.129 ug/L	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076
ICB/CCB	Antimony Arsenic Sodium	2.454 ug/L 2.418 ug/L 190.3 ug/L	C077S076 C077S071 C077S072 C077S073 C077S077 C077S078 C077S079 C077S080** C077S081** C077S082**
ICB/CCB	Lead	0.938 ug/L	C077S076 C077S071 C077S072 C077S073 C077S077 C077S078 C077S079 C077S080** C077S081** C077S082** C077S151** C077S152**

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G011	Thallium	2.4 ug/L	2.4U ug/L
C077R014	Manganese Potassium Sodium	2.1 ug/L 239 ug/L 1400 ug/L	2.1U ug/L 239U ug/L 1400U ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S021	Selenium Silver	0.49 mg/Kg 0.058 mg/Kg	0.49U mg/Kg 0.058U mg/Kg
C077S022	Mercury Selenium Silver	0.08 mg/Kg 1.1 mg/Kg 0.15 mg/Kg	0.08U mg/Kg 1.1U mg/Kg 0.15U mg/Kg
C077S023	Mercury	0.028 mg/Kg	0.028U mg/Kg
C077S024	Mercury Selenium	0.037 mg/Kg 0.5 mg/Kg	0.037U mg/Kg 0.5U mg/Kg
C077S025	Mercury Selenium Silver	0.029 mg/Kg 0.51 mg/Kg 0.047 mg/Kg	0.029U mg/Kg 0.51U mg/Kg 0.047U mg/Kg
C077S026	Selenium	0.44 mg/Kg	0.44U mg/Kg
C077S027	Mercury	0.026 mg/Kg	0.026U mg/Kg
C077S028	Silver	0.041 mg/Kg	0.041U mg/Kg
C077S029	Mercury Selenium	0.035 mg/Kg 0.42 mg/Kg	0.035U mg/Kg 0.42U mg/Kg
C077S030	Selenium	0.39 mg/Kg	0.39U mg/Kg
C077S031	Selenium Silver	0.47 mg/Kg 0.043 mg/Kg	0.47U mg/Kg 0.043U mg/Kg
C077S032	Mercury	0.031 mg/Kg	0.031U mg/Kg
C077S074	Selenium	0.95 mg/Kg	0.95U mg/Kg
C077S075	Mercury Selenium	0.066 mg/Kg 0.71 mg/Kg	0.066U mg/Kg 0.71U mg/Kg

Sample C077R014 was identified as a rinsate. No metal contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
C077R014	12/15/05	Calcium Magnesium Manganese Potassium Sodium	35.8 ug/L 61.7 ug/L 2.1 ug/L 239 ug/L 1400 ug/L	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076 C077S071 C077S072 C077S073 C077S077 C077S078 C077S079 C077S080** C077S081** C077S082** C077G011 C077G013

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S021	Sodium	145 mg/Kg	145U mg/Kg
C077S022	Sodium	474 mg/Kg	474U mg/Kg
C077S024	Sodium	250 mg/Kg	250U mg/Kg
C077S025	Sodium	110 mg/Kg	110U mg/Kg
C077S026	Sodium	291 mg/Kg	291U mg/Kg
C077S027	Sodium	214 mg/Kg	214U mg/Kg
C077S028	Sodium	182 mg/Kg	182U mg/Kg
C077S029	Sodium	210 mg/Kg	210U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S030	Sodium	106 mg/Kg	106U mg/Kg
C077S031	Sodium	260 mg/Kg	260U mg/Kg
C077S032	Sodium	487 mg/Kg	487U mg/Kg
C077S074	Sodium	307 mg/Kg	307U mg/Kg
C077S075	Sodium	349 mg/Kg	349U mg/Kg
C077S071	Sodium	241 mg/Kg	241U mg/Kg
C077S072	Sodium	173 mg/Kg	173U mg/Kg
C077S073	Sodium	335 mg/Kg	335U mg/Kg
C077S077	Sodium	212 mg/Kg	212U mg/Kg
C077S078	Sodium	303 mg/Kg	303U mg/Kg
C077S080**	Sodium	191 mg/Kg	191U mg/Kg
C077S081**	Sodium	189 mg/Kg	189U mg/Kg
C077S082**	Sodium	372 mg/Kg	372U mg/Kg

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
C077S076	All TCL compounds except Mercury	No MS associated with these samples.	MS required.	None	P
C077G011 C077G013 C077R014 C077S071 C077S072 C077S073 C077S077 C077S078 C077S079 C077S080** C077S081** C077S082**	All TAL metals	No MS associated with these samples.	MS required.	None	P
C077S151** C077S152**	Lead	No MS associated with these samples.	MS required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S031MS/MSD (C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075)	Antimony Calcium Copper Iron *Magnesium* Manganese Zinc	58.6 (80-120) - - - 72.4 (80-120) - -	53.4 (80-120) 64.6 (80-120) 209 (80-120) - 56.4 (80-120) - 271 (80-120)	- - 52.0 (≤20) 62.0 (≤20) - 23.4 (≤20) 77.1 (≤20)	*J (all detects)* UJ (all non-detects)	A

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S031MS/MSD (C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076)	Mercury	66.0 (80-120)	145 (80-120)	75.2 (≤20)	J (all detects) UJ (all non-detects)	A

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
C077S076	All TCL compounds except Mercury	No DUP analysis associated with these samples.	DUP analysis required.	None	P
C077G011 C077G013 C077R014 C077S071 C077S072 C077S073 C077S077 C077S078 C077S079 C077S080** C077S081** C077S082**	All TAL metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P
C077S151** C077S152**	Lead	No DUP analysis associated with these samples.	DUP analysis required.	None	P

Results were within QC limits.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Internal Standards

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
C077S031L	Lead	16.2 (≤10)	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075	J (all detects)	A

XI. Sample Result Verification

All sample result verifications were acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been qualified.

XIII. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Metals - Data Qualification Summary - SDG 49342/49343

SDG	Sample	Analyte	Flag	A or P	Reason
49342/ 49343	C077S076	All TAL metals except Mercury	None	P	Matrix spike analysis
49342/ 49343	C077S071 C077S072 C077S073 C077S077 C077S078 C077S079 C077S080** C077S081** C077S082** C077G011 C077G013 C077R014	All TAL metals	None	P	Matrix spike analysis
49342/ 49343	C077S151** C077S152**	Lead	None	P	Matrix spike analysis
49342/ 49343	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075	Antimony Calcium Magnesium Zinc	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49342/ 49343	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075	Copper Zinc	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)(RPD)

SDG	Sample	Analyte	Flag	A or P	Reason
49342/ 49343	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075	Iron Manganese	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (RPD)
49342/ 49343	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075 C077S076	Mercury	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)(RPD)
49342/ 49343	C077S076	All TCL compounds except Mercury	None	P	Duplicate analysis
49342/ 49343	C077S071 C077S072 C077S073 C077S077 C077S078 C077S079 C077S080** C077S081** C077S082** C077G011 C077G013 C077R014	All TAL metals	None	P	Duplicate analysis
49342/ 49343	C077S151** C077S152**	Lead	None	P	Duplicate analysis

SDG	Sample	Analyte	Flag	A or P	Reason
49342/ 49343	C077S021 C077S022 C077S023 C077S024 C077S025 C077S026 C077S027 C077S028 C077S029 C077S030 C077S031 C077S032 C077S074 C077S075	Lead	J (all detects)	A	ICP serial dilution (%D)

NAS Alameda Point, CTO 077
Metals - Laboratory Blank Data Qualification Summary - SDG 49342/49343

SDG	Sample	Analyte	Modified Final Concentration	A or P
49342/49343	C077G011	Thallium	2.4U ug/L	A
49342/49343	C077R014	Manganese Potassium Sodium	2.1U ug/L 239U ug/L 1400U ug/L	A
49342/49343	C077S021	Selenium Silver	0.49U mg/Kg 0.058U mg/Kg	A
49342/49343	C077S022	Mercury Selenium Silver	0.08U mg/Kg 1.1U mg/Kg 0.15U mg/Kg	A
49342/49343	C077S023	Mercury	0.028U mg/Kg	A
49342/49343	C077S024	Mercury Selenium	0.037U mg/Kg 0.5U mg/Kg	A
49342/49343	C077S025	Mercury Selenium Silver	0.029U mg/Kg 0.51U mg/Kg 0.047U mg/Kg	A
49342/49343	C077S026	Selenium	0.44U mg/Kg	A
49342/49343	C077S027	Mercury	0.026U mg/Kg	A
49342/49343	C077S028	Silver	0.041U mg/Kg	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49342/49343	C077S029	Mercury Selenium	0.035U mg/Kg 0.42U mg/Kg	A
49342/49343	C077S030	Selenium	0.39U mg/Kg	A
49342/49343	C077S031	Selenium Silver	0.47U mg/Kg 0.043U mg/Kg	A
49342/49343	C077S032	Mercury	0.031U mg/Kg	A
49342/49343	C077S074	Selenium	0.95U mg/Kg	A
49342/49343	C077S075	Mercury Selenium	0.066U mg/Kg 0.71U mg/Kg	A

NAS Alameda Point, CTO 077
Metals - Field Blank Data Qualification Summary - SDG 49342/49343

SDG	Sample	Analyte	Modified Final Concentration	A or P
49342/49343	C077S021	Sodium	145U mg/Kg	A
49342/49343	C077S022	Sodium	474U mg/Kg	A
49342/49343	C077S024	Sodium	250U mg/Kg	A
49342/49343	C077S025	Sodium	110U mg/Kg	A
49342/49343	C077S026	Sodium	291U mg/Kg	A
49342/49343	C077S027	Sodium	214U mg/Kg	A
49342/49343	C077S028	Sodium	182U mg/Kg	A
49342/49343	C077S029	Sodium	210U mg/Kg	A
49342/49343	C077S030	Sodium	106U mg/Kg	A
49342/49343	C077S031	Sodium	260U mg/Kg	A
49342/49343	C077S032	Sodium	487U mg/Kg	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49342/49343	C077S074	Sodium	307U mg/Kg	A
49342/49343	C077S075	Sodium	349U mg/Kg	A
49342/49343	C077S071	Sodium	241U mg/Kg	A
49342/49343	C077S072	Sodium	173U mg/Kg	A
49342/49343	C077S073	Sodium	335U mg/Kg	A
49342/49343	C077S077	Sodium	212U mg/Kg	A
49342/49343	C077S078	Sodium	303U mg/Kg	A
49342/49343	C077S080**	Sodium	191U mg/Kg	A
49342/49343	C077S081**	Sodium	189U mg/Kg	A
49342/49343	C077S082**	Sodium	372U mg/Kg	A

LABORATORY DATA CONSULTANTS, INC.
7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Bechtel Environmental
1230 Columbia Street, Suite 400
San Diego, CA 92101
Attn: Ms. Toni Kuzmack

January 12, 2006

Project Name : NAS Alameda Point
Project # : CTO 077

On January 6, 2006 the following data packages were received by Laboratory Data Consultants, Inc. from Bechtel Environmental. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 14479:

SDG #	Fraction
49319/49320, 49363/49364, 47373/49374, 49394	Volatiles, Semivolatiles, Polynuclear Aromatic Hydrocarbons, Chlorinated Pesticides & PCBs, Metals, TPH as Gasoline, TPH as Extractables

The above SDG were reviewed using Level III and Level IV guidelines. The analyses were validated using the following documents, as applicable to each method:

- NFESC Special Publication SP-2056-ENV, Navy Installation Restoration Chemical Data Quality Manual, Naval Facilities Engineering Command, September 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998

The data validators did utilize their professional judgement when evaluating the data to achieve the most complete and accurate assessment of the data. The data packages were reviewed according to the above stated validation procedures.

For GC/MS volatile analyses, the primary findings consisted of:

a) Continuing calibration factors exceeded acceptance criteria in SDGs 49319/49320, 49363/49364 and 49373/49374. Since the laboratory met the protocol requirement, this finding should be considered advisory.

b) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDGs 49319/49320 and 49373/49374.

c) Matrix spike/matrix spike duplicate percent recoveries exceeded acceptance criteria for several compounds in SDG 49373/49374. Since the laboratory met the protocol requirement, this finding should be considered advisory.

d) Laboratory control sample percent recoveries exceeded acceptance criteria for 2,2-dichloropropane and acetone in SDG 49319/49320 and for 2,2-dichloropropane in SDG 49373/49374.

e) Several compounds were detected in the method and field blanks in SDGs 49319/49320, 49363/49364 and 49373/49374. Since the laboratory met the protocol requirement, this finding should be considered advisory.

f) Data was qualified as unusable in dilutions by the validators in order to yield only one complete set of data for a given sample and eliminate redundant data.

For GC/MS semivolatile analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDGs 49319/49320 and 49363/49364.

b) Laboratory control sample percent recoveries exceeded acceptance criteria for hexachlorobutadiene and hexachloroethane in SDG 49363/49364.

For GC/MS PAH analyses, the primary findings consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDGs 49319/49320 and 49363/49364.

b) Laboratory control sample percent recoveries exceeded acceptance criteria for several compounds in SDG 49319/49320.

c) Benzo(b)fluoranthene and benzo(k)fluoranthene coeluted for sample C077S253 in SDG 49319/49320. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For chlorinated pesticide and PCB analyses, the primary findings consisted of:

a) Continuing calibration factors exceeded acceptance criteria in SDGs 49319/49320 and 49363/49364. Since the laboratory met the protocol requirement, this finding should be considered advisory.

b) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDGs 49319/49320 and 49363/49364.

c) Matrix spike/matrix spike duplicate relative percent differences exceeded acceptance criteria for several compounds in SDGs 49319/49320 and 49363/49364. Since the laboratory met the protocol requirement, this finding should be considered advisory

d) Laboratory control sample percent recoveries exceeded acceptance criteria for several compounds in SDGs 49319/49320 and for endosulfan sulfate in SDG 49363/49364.

For metal analyses, the primary findings consisted of:

a) Matrix spike analyses were not performed for all batches in SDGs 49363/49364, 49394 and 49373/49374/05BR1906.

b) Duplicate analyses were not performed for all batches in SDGs 49363/49364, 49394 and 49373/49374/05BR1906.

c) Matrix spike percent recoveries and relative percent differences exceeded acceptance criteria for several metals in SDG 49319/49320/05BR1891. Since the laboratory met the protocol requirement, this finding should be considered advisory.

d) Laboratory control sample percent recoveries exceeded acceptance criteria for cadmium SDG 49319/49320/05BR1891.

e) ICP serial dilution percent differences exceeded acceptance criteria for several metals in SDGs 49319/49320/05BR1891, 49363/49364 and 49373/49374/05BR1906. Since the laboratory met the protocol requirement, this finding should be considered advisory.

f) Several metals were detected in the method and field blanks in SDGs 49319/49320/05BR1891, 49363/49364 and 49373/49374/05BR1906. Since the laboratory met the protocol requirement, this finding should be considered advisory.

For TPH as gasoline analyses, the primary finding consisted of:

a) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDG 49319/49320.

For TPH as extractable analyses, the primary findings consisted of:

a) Continuing calibration factors exceeded acceptance criteria for TPH as diesel

in SDG 49363/49364. Since the laboratory met the protocol requirement, this finding should be considered advisory.

b) Matrix spike and matrix spike duplicate analyses were not performed for all batches in SDGs 49319/49320 and 49373/49374.

c) Matrix spike/matrix spike duplicate relative percent differences exceeded acceptance criteria for TPH as motor oil in SDG 49319/49320. Since the laboratory met the protocol requirement, this finding should be considered advisory.

In general, the data for all analyses appear usable with the limitations noted in the Data Validation Reports. Data validation flags were noted on the Laboratory Form 1s and included with each validation report.

Sincerely,

Richard M. Amano
President/Principal Chemist

Attachment 1

1 Week TAT

LDC #14479 (Bechtel Environmental-San Diego / Alameda Point, CTO 077)

LDC	SDG#	DATE REC'D	(2) DATE DUE	VOA (8260B)		SVOA (8270C)		PAHs (8270C -SIM)		Pest. /PCBs (SW846)		Pest. (8081A)		Metals (SW846)		Lead (6010B)		Diss. Metals (SW846)		TPH-G (8015)		TPH-E (8015)															
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	49319/49320	01/06/06	01/13/06	9	9	1	0	1	2	2	0	0	26	0	1	-	-	13	0	2	0	10	9														
A	49319/49320	01/06/06	01/13/06	3	3	1	0	1	0	1	0	0	5	0	2	-	-	2	0	1	0	2	3														
B	49363/49364	01/06/06	01/13/06	9	10	1	0	1	0	2	0	0	14	0	2	0	3	4	0	-	-	9	14														
C	49373/49374	01/06/06	01/13/06	5	4	-	-	-	-	-	-	-	-	0	9	0	1	7	0	3	0	5	2														
D	49394	01/06/06	01/13/06	-	-	-	-	-	-	-	-	-	-	-	-	0	1	-	-	-	-	-	-														
Total	B/LR			26	26	3	0	3	2	5	0	0	45	0	14	0	5	26	0	6	0	26	28	0	0	0	0	0	0	0	0	0	0	0	0	0	215

Shaded cells indicate Level IV validation (all other cells are Level III validation)

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14479

Volatiles

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 14, 2005

LDC Report Date: January 10, 2006

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49319/49320

Sample Identification

C077S001	C077G051**
C077S002**	C077G083
C077S009	C077G002
C077S004	C077G202
C077S005	C077R013
C077S006	C077S010MS
C077S007	C077S010MSD
C077S008	C077G201MS
C077S010	C077G201MSD
C077S010DL	C077G051DL
C077S461**	C077G003DL
C077S462**	
C077S463	
C077TB17	
C077G161	
C077G201**	
C077G003**	
C077G001	
C077G081	
C077G082	

**Indicates sample underwent Level IV review

Introduction

This data review covers 15 soil samples and 16 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all volatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/23/05	Acetone	42	C077TB17 C077G001 C077G081 C077G082 051223A-BLK	J (all detects) UJ (all non-detects)	A
12/19/05	4-Methyl-2-pentanone	98	C077G161 C077G201** C077G003** 051219B1-BLK	J (all detects) UJ (all non-detects)	A
12/20/05	Acetone	62	C077G051** C077G083 C077G002 C077G202 C077R013 051220A-BLK	J (all detects) UJ (all non-detects)	A

All of the continuing calibration RRF values were within method and validation criteria with the following exceptions:

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
12/19/05	4-Methyl-2-pentanone	0.0078 (≥0.05)	C077G161 C077G201** C077G003** 051219B1-BLK	J (all detects) UJ (all non-detects)	A

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051219B1-BLK	12/20/05	Chloroform	0.43 ug/L	C077G161 C077G201** C077G003**
051220A-BLK	12/20/05	Acetone	9.7 ug/L	C077G051** C077G083 C077G002 C077G202 C077R013

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051218A1-BLK	12/18/05	Chloroform	0.0025 mg/Kg	C077S001 C077S002** C077S009 C077S004 C077S005 C077S006 C077S007 C077S008 C077S010 C077S461** C077S462** C077S463

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077G161	Chloroform	0.36 ug/L	0.5U ug/L
C077G051**	Acetone	3.6 ug/L	3.6U ug/L
C077G083	Acetone	2.6 ug/L	2.6U ug/L
C077G002	Acetone	3.6 ug/L	3.6U ug/L
C077G202	Acetone	2.0 ug/L	2.0U ug/L
C077R013	Acetone	4.4 ug/L	4.4 ug/L
C077S001	Chloroform	0.0026 mg/Kg	0.005U mg/Kg
C077S002**	Chloroform	0.0033 mg/Kg	0.006U mg/Kg
C077S009	Chloroform	0.0031 mg/Kg	0.006U mg/Kg
C077S004	Chloroform	0.0034 mg/Kg	0.006U mg/Kg
C077S005	Chloroform	0.0031 mg/Kg	0.006U mg/Kg
C077S006	Chloroform	0.0028 mg/Kg	0.006U mg/Kg

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077S007	Chloroform	0.0029 mg/Kg	0.006U mg/Kg
C077S008	Chloroform	0.0035 mg/Kg	0.006U mg/Kg
C077S010	Chloroform	0.0027 mg/Kg	0.006U mg/Kg
C077S461**	Chloroform	0.0023 mg/Kg	0.005U mg/Kg
C077S462**	Chloroform	0.0024 mg/Kg	0.006U mg/Kg
C077S463 (2X)	Chloroform	0.005 mg/Kg	0.01U mg/Kg

Sample C077TB17 was identified as a trip blank. No volatile contaminants were found in this blank.

Sample C077R013 was identified as a rinsate. No volatile contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Compound	Concentration	Associated Samples
C077R013	12/14/05	Bromodichloromethane Acetone Chloroform Bromoform Dibromochloromethane	1.9 ug/L 4.4 ug/L 2.5 ug/L 0.92 ug/L 1.3 ug/L	C077S001 C077S002** C077S009 C077S004 C077S005 C077S006 C077S007 C077S008 C077S010 C077S461** C077S462** C077S463 C077G161 C077G201** C077G003** C077G001 C077G081 C077G082 C077G051** C077G083 C077G002 C077G202

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
C077G161	Chloroform	0.36 ug/L	0.5U ug/L
C077G201**	Acetone	2.9 ug/L	2.9U ug/L
C077G003**	Acetone	3.2 ug/L	3.2U ug/L
C077G051**	Acetone	3.6 ug/L	3.6U ug/L
C077G083	Acetone Chloroform	2.6 ug/L 0.24 ug/L	2.6U ug/L 0.5U ug/L
C077G002	Acetone	3.6 ug/L	3.6U ug/L
C077G202	Acetone	2.0 ug/L	2.0U ug/L
C077S007	Acetone Chloroform	0.0039 mg/Kg 0.0029 mg/Kg	0.1U mg/Kg 0.006U mg/Kg
C077S010	Acetone Chloroform	0.0073 mg/Kg 0.0027 mg/Kg	0.1U mg/Kg 0.006U mg/Kg
C077S461**	Acetone Chloroform	0.0064 mg/Kg 0.0023 mg/Kg	0.1U mg/Kg 0.005U mg/Kg
C077S462**	Acetone Chloroform	0.0041 mg/Kg 0.0024 mg/Kg	0.1U mg/Kg 0.006U mg/Kg
C077S463	Chloroform	0.005 mg/Kg	0.01U mg/Kg
C077S008	Chloroform	0.0035 mg/Kg	0.006U mg/Kg
C077S001	Chloroform	0.0026 mg/Kg	0.005U mg/Kg
C077S002**	Chloroform	0.0033 mg/Kg	0.006U mg/Kg
C077S009	Chloroform	0.0031 mg/Kg	0.006U mg/Kg
C077S004	Chloroform	0.0034 mg/Kg	0.006U mg/Kg
C077S005	Chloroform	0.0031 mg/Kg	0.006U mg/Kg
C077S006	Chloroform	0.0028 mg/Kg	0.006U mg/Kg

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49319/49320	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were not within QC limits. Since there were no associated samples, no data were qualified.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051223A-LCS	2,2-Dichloropropane	139 (70-135)	C077TB17 C077G001 C077G081 C077G082 051223A-BLK	J (all detects)	P
051220A-LCS	2,2-Dichloropropane Acetone	142 (70-135) 196 (40-140)	C077G051** C077G083 C077G002 C077G202 C077R013 051220A-BLK	J (all detects) J (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077S010 C077G003**	Naphthalene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	A
C077G051**	2-Butanone	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	A

Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
C077G051DL	2-Butanone	R	A
C077S010 C077G003**	Naphthalene	R	A

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

Samples C077G081 and C077G082 were identified as field duplicates. No volatiles were detected in any of the samples.

NAS Alameda Point, CTO 077
Volatiles - Data Qualification Summary - SDG 49319/49320

SDG	Sample	Compound	Flag	A or P	Reason
49319/ 49320	C077TB17 C077G001 C077G081 C077G082 C077G051** C077G083 C077G002 C077G202 C077R013	Acetone	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49319/ 49320	C077G161 C077G201** C077G003**	4-Methyl-2-pentanone	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49319/ 49320	C077G161 C077G201** C077G003**	4-Methyl-2-pentanone	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF)
49319/ 49320	C077S001 C077S002** C077S009 C077S004 C077S005 C077S006 C077S007 C077S008 C077S010 C077S010DL C077S461** C077S462** C077S463 C077TB17 C077G161 C077G201** C077G003** C077G001 C077G081 C077G082 C077G051** C077G083 C077G002 C077G202 C077R013 C077G051DL C077G003DL	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49319/ 49320	C077TB17 C077G001 C077G081 C077G082	2,2-Dichloropropane	J (all detects)	P	Laboratory control samples (%R)

SDG	Sample	Compound	Flag	A or P	Reason
49319/ 49320	C077G051** C077G083 C077G002 C077G202 C077R013	2,2-Dichloropropane Acetone	J (all detects) J (all detects)	P	Laboratory control samples (%R)
49319/ 49320	C077S010 C077G003**	Naphthalene	J (all detects)	A	Compound quantitation and CRQLs
49319/ 49320	C077G051**	2-Butanone	J (all detects)	A	Compound quantitation and CRQLs
49319/ 49320	C077G051DL	2-Butanone	R	A	Overall assessment of data
49319/ 49320	C077S010 C077G003**	Naphthalene	R	A	Overall assessment of data

NAS Alameda Point, CTO 077
Volatiles - Laboratory Blank Data Qualification Summary - SDG 49319/49320

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49319/ 49320	C077G161	Chloroform	0.5U ug/L	A
49319/ 49320	C077G051**	Acetone	3.6U ug/L	A
49319/ 49320	C077G083	Acetone	2.6U ug/L	A
49319/ 49320	C077G002	Acetone	3.6U ug/L	A
49319/ 49320	C077G202	Acetone	2.0U ug/L	A
49319/ 49320	C077R013	Acetone	4.4 ug/L	A
49319/ 49320	C077S001	Chloroform	0.005U mg/Kg	A
49319/ 49320	C077S002**	Chloroform	0.006U mg/Kg	A

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49319/ 49320	C077S009	Chloroform	0.006U mg/Kg	A
49319/ 49320	C077S004	Chloroform	0.006U mg/Kg	A
49319/ 49320	C077S005	Chloroform	0.006U mg/Kg	A
49319/ 49320	C077S006	Chloroform	0.006U mg/Kg	A
49319/ 49320	C077S007	Chloroform	0.006U mg/Kg	A
49319/ 49320	C077S008	Chloroform	0.006U mg/Kg	A
49319/ 49320	C077S010	Chloroform	0.006U mg/Kg	A
49319/ 49320	C077S461**	Chloroform	0.005U mg/Kg	A
49319/ 49320	C077S462**	Chloroform	0.006U mg/Kg	A
49319/ 49320	C077S463 (2X)	Chloroform	0.01U mg/Kg	A

NAS Alameda Point, CTO 077
Volatiles - Field Blank Data Qualification Summary - SDG 49319/49320

SDG	Sample	Compound	Modified Final Concentration	A or P
49319/ 49320	C077G161	Chloroform	0.5U ug/L	A
49319/ 49320	C077G201**	Acetone	2.9U ug/L	A
49319/ 49320	C077G003**	Acetone	3.2U ug/L	A

SDG	Sample	Compound	Modified Final Concentration	A or P
49319/ 49320	C077G051**	Acetone	3.6U ug/L	A
49319/ 49320	C077G083	Acetone Chloroform	2.6U ug/L 0.5U ug/L	A
49319/ 49320	C077G002	Acetone	3.6U ug/L	A
49319/ 49320	C077G202	Acetone	2.0U ug/L	A
49319/ 49320	C077S007	Acetone Chloroform	0.1U mg/Kg 0.006U mg/Kg	A
49319/ 49320	C077S010	Acetone Chloroform	0.1U mg/Kg 0.006U mg/Kg	A
49319/ 49320	C077S461**	Acetone Chloroform	0.1U mg/Kg 0.005U mg/Kg	A
49319/ 49320	C077S462**	Acetone Chloroform	0.1U mg/Kg 0.006U mg/Kg	A
49319/ 49320	C077S463	Chloroform	0.01U mg/Kg	A
49319/ 49320	C077S008	Chloroform	0.006U mg/Kg	A
49319/ 49320	C077S001	Chloroform	0.005U mg/Kg	A
49319/ 49320	C077S002**	Chloroform	0.006U mg/Kg	A
49319/ 49320	C077S009	Chloroform	0.006U mg/Kg	A
49319/ 49320	C077S004	Chloroform	0.006U mg/Kg	A
49319/ 49320	C077S005	Chloroform	0.006U mg/Kg	A

SDG	Sample	Compound	Modified Final Concentration	A or P
49319/ 49320	C077S006	Chloroform	0.006U mg/Kg	A

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 16, 2005

LDC Report Date: January 10, 2006

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49363/49364

Sample Identification

C077S561
C077S562
C077S581
C077S582
C077S601
C077S602
C077S661
C077S662
C077G031
C077G033
C077R015
C077G211
C077G221
C077G222
C077G261
C077G231
C077TB18
C077S581MS
C077S581MSD

Introduction

This data review covers 10 soil samples and 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all volatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
12/28/05	Bromomethane	28	C077S601 C077S602 051228A-BLK	J (all detects) UJ (all non-detects)	A
12/30/05	2,2-Dichloropropane	26	C077R015 C077G211 C077G221 C077G222 C077G261 C077G231 C077TB18 051229A-BLK	J (all detects) UJ (all non-detects)	A

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051228A-BLK	12/28/05	Naphthalene	0.0012 ug/L	C077S601 C077S602
051221A1-BLK	12/21/05	Methylene chloride Acetone	0.036 ug/L 0.0056 ug/L	C077S561 C077S562 C077S581 C077S582 C077S661 C077S662

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	*Compound* TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077S601	Naphthalene	0.0034 mg/Kg	0.02U mg/Kg
C077S602	Naphthalene	0.0031 mg/Kg	0.02U mg/Kg
C077S561	Acetone	0.0073 mg/Kg	0.1U mg/Kg

Sample	*Compound* TIC (RT in minutes)	*Reported* Concentration	*Modified Final* Concentration
C077S562	Acetone	0.013 mg/Kg	0.1U mg/Kg
C077S581	Acetone	0.0049 mg/Kg	0.1U mg/Kg
C077S582	Acetone	0.0093 mg/Kg	0.1U mg/Kg
C077S661	Acetone	0.0045 mg/Kg	0.1U mg/Kg

Sample C077TB18 was identified as a trip blank. No volatile contaminants were found in this blank

Sample C077R015 was identified as a rinsate. No volatile contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Compound	Concentration	Associated Samples
C077R015	12/16/05	Bromodichloromethane Bromoform Chloroform Dibromochloromethane	2.2 ug/L 0.33 ug/L 2.8 ug/L 1.5 ug/L	C077S561 C077S562 C077S581 C077S582 C077S601 C077S602 C077S661 C077S662 C077G031 C077G033 C077G211 C077G221 C077G222 C077G261 C077G231

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

Samples C077G221 and C077G222 were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD
	C077G221	C077G222	
Carbon disulfide	0.37	0.37	0

NAS Alameda Point, CTO 077
Volatiles - Data Qualification Summary - SDG 49363/49364

SDG	Sample	Compound	Flag	A or P	Reason
49363/ 49364	C077S601 C077S602	Bromomethane	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49363/ 49364	C077R015 C077G211 C077G221 C077G222 C077G261 C077G231 C077TB18	2,2-Dichloropropane	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)

NAS Alameda Point, CTO 077
Volatiles - Laboratory Blank Data Qualification Summary - SDG 49363/49364

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49363/ 49364	C077S601	Naphthalene	0.02U mg/Kg	A
49363/ 49364	C077S602	Naphthalene	0.02U mg/Kg	A
49363/ 49364	C077S561	Acetone	0.1U mg/Kg	A
49363/ 49364	C077S562	Acetone	0.1U mg/Kg	A
49363/ 49364	C077S581	Acetone	0.1U mg/Kg	A
49363/ 49364	C077S582	Acetone	0.1U mg/Kg	A
49363/ 49364	C077S661	Acetone	0.1U mg/Kg	A

NAS Alameda Point, CTO 077
Volatiles - Field Blank Data Qualification Summary - SDG 49363/49364

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 19, 2005

LDC Report Date: January 10, 2006

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49373/49374

Sample Identification

C077S641
C077S642
C077G251
C077TB19
C077R016
C077G153
C077R017
C077S641MS
C077S641MSD

Introduction

This data review covers 4 soil samples and 5 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

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R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all volatile target compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
1/2/06	2,2-Dichloropropane	32	C077G153 C077R017 060102A-BLK	J (all detects) UJ (all non-detects)	A

All of the continuing calibration RRF values were within method and validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No volatile contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
051223A1-BLK	12/23/05	Acetone	0.0046 mg/Kg	C077S641 C077S642

Sample concentrations were compared to concentrations detected in the method blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
C077S641	Acetone	0.0082 mg/Kg	0.1U mg/Kg
C077S642	Acetone	0.019 mg/Kg	0.1U mg/Kg

Sample C077TB19 was identified as a trip blank. No volatile contaminants were found in this blank with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
C077TB19	12/19/05	Methylene chloride Acetone	5.3 ug/L 6.1 ug/L	C077S641 C077S642 C077G251 C077R016 C077G153 C077R017

Samples C077R016 and C077R017 were identified as rinsates. No volatile contaminants were found in these blanks with the following exceptions:

Rinsate ID	Sampling Date	Compound	Concentration	Associated Samples
C077R016	12/19/05	Bromodichloromethane Acetone Chloroform Dibromochloromethane	1.9 ug/L 4.2 ug/L 2.5 ug/L 1.4 ug/L	C077S641 C077S642
C077R017	12/19/05	Bromodichloromethane Acetone Chloroform Dibromochloromethane	1.6 ug/L 4.3 ug/L 1.9 ug/L 1.3 ug/L	C077G251 C077G153

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
C077R016	Acetone	4.2 ug/L	4.2U ug/L
C077R017	Acetone	4.3 ug/L	4.3U ug/L
C077S641	Acetone	0.0082 mg/Kg	0.1U mg/Kg
C077S642	Acetone	0.019 mg/Kg	0.1U mg/Kg

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49373/49374	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S641MS/MSD (All soil samples in SDG 49373/49374)	1,1,1-Trichloroethane	21.8 (70-135)	27.4 (70-135)	-	J (all detects) UJ (all non-detects)	A
	1,1-Dichloroethene	31.8 (65-135)	43.0 (65-135)	-		
	Benzene	23.0 (75-125)	30.0 (75-125)	-		
	Chlorobenzene	14.4 (75-125)	15.6 (75-125)	-		
	Ethylbenzene	11.4 (75-125)	13.6 (75-125)	-		
	m,p-Xylenes	11.8 (80-125)	14.0 (80-125)	-		
	o-Xylene	10.8 (75-125)	13.0 (75-125)	-		
	Trichloroethene	17.2 (75-125)	19.8 (75-125)	-		
	Tetrachloroethene	11.0 (65-140)	13.6 (65-140)	-		
	Toluene	16.8 (70-125)	18.4 (70-125)	-		
	trans-1,2-Dichloroethene	24.8 (65-135)	29.6 (65-135)	-		

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
060102A-LCS	2,2-Dichloropropane	62.5 (70-135)	C077G153 C077R017 060102A-BLK	J (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. *Field Duplicates*

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Volatiles - Data Qualification Summary - SDG 49373/49374

SDG	Sample	Compound	Flag	A or P	Reason
49373/ 49374	C077G153 C077R017	2,2-Dichloropropane	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49373/ 49374	C077G251 C077TB19 C077R016 C077G153 C077R017	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49373/ 49374	C077S641 C077S642	1,1,1-Trichloroethane 1,1-Dichloroethene Benzene Chlorobenzene Ethylbenzene *m,p-Xylenes* o-Xylene Trichloroethene Tetrachloroethene Toluene trans-1,2-Dichloroethene	J (all detects) *UJ (all non-detects)*	A	Matrix spike/Matrix spike *duplicates (%R)*
49373/ 49374	C077G153 C077R017	2,2-Dichloropropane	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)

NAS Alameda Point, CTO 077
Volatiles - Laboratory Blank Data Qualification Summary - SDG 49373/49374

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P
49373/ 49374	C077S641	Acetone	0.1U mg/Kg	A
49373/ 49374	C077S642	Acetone	0.1U mg/Kg	A

NAS Alameda Point, CTO 077
Volatiles - Field Blank Data Qualification Summary - SDG 49373/49374

SDG	Sample	Compound	Modified Final Concentration	A or P
49373/ 49374	C077R016	Acetone	4.2U ug/L	A

SDG	Sample	Compound	Modified Final Concentration	A or P
49373/ 49374	C077R017	Acetone	4.3U ug/L	A
49373/ 49374	C077S641	Acetone	0.1U mg/Kg	A
49373/ 49374	C077S642	Acetone	0.1U mg/Kg	A

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14479

Semivolatiles

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	NAS Alameda Point, CTO 077
Collection Date:	December 14, 2005
LDC Report Date:	January 10, 2006
Matrix:	Water
Parameters:	Semivolatiles
Validation Level:	Level III & IV
Laboratory:	APPL, Inc.
Sample Delivery Group (SDG):	49319/49320

Sample Identification

C077G051**
C077R013

**Indicates sample underwent Level IV review

Introduction

This data review covers 2 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals. All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

All of the continuing calibration RRF values were greater than or equal to 0.05 .

V. Blanks

Method blanks were reviewed for each matrix as applicable. No semivolatile contaminants were found in the method blanks.

Sample C077R013 was identified as a rinsate. No semivolatile contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49319/49320	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Semivolatiles - Data Qualification Summary - SDG 49319/49320

SDG	Sample	Compound	Flag	A or P	Reason
49319/ 49320	C077G051** C077R013	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 49319/49320

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Semivolatiles - Field Blank Data Qualification Summary - SDG 49319/49320

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 16, 2005

LDC Report Date: January 10, 2006

Matrix: Water

Parameters: Semivolatiles

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49363/49364

Sample Identification

C077G031

Introduction

This data review covers one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals. All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990 .

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

All of the continuing calibration RRF values were greater than or equal to 0.05 .

V. Blanks

Method blanks were reviewed for each matrix as applicable. No semivolatile contaminants were found in the method blanks.

No field blanks were identified in this SDG.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49363/49364	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
051220A-LCS/D (All samples in SDG 49363/49364)	Hexachlorobutadiene	24.4 (25-105)	-	-	J (all detects) UJ (all non-detects)	P
	Hexachloroethane	23.0 (30-95)	-	-	J (all detects) UJ (all non-detects)	

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Semivolatiles - Data Qualification Summary - SDG 49363/49364

SDG	Sample	Compound	Flag	A or P	Reason
49363/ 49364	C077G031	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49363/ 49364	C077G031	Hexachlorobutadiene Hexachloroethane	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)

NAS Alameda Point, CTO 077
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 49363/49364

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Semivolatiles - Field Blank Data Qualification Summary - SDG 49363/49364

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14479

Polynuclear Aromatic Hydrocarbons

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 14, 2005

LDC Report Date: January 10, 2006

Matrix: Soil/Water

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49319/49320

Sample Identification

C077S253
C077S254
C077G051**
C077R013

**Indicates sample underwent Level IV review

Introduction

This data review covers 2 soil samples and 2 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per a modification of EPA SW 846 Method 8270C using Selected Ion Monitoring (SIM) for Polynuclear Aromatic Hydrocarbons.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

Average relative response factors (RRF) for all target compounds and system monitoring compounds

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0% .

All of the continuing calibration RRF values were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polynuclear aromatic hydrocarbon contaminants were found in the method blanks.

Sample C077R013 was identified as a rinsate. No polynuclear aromatic hydrocarbon contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49319/49320	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051219A-LCS	Benzo(a)pyrene	115 (53-103)	All soil samples in SDG 49319/49320	J (all detects)	P
	Dibenz(a,h)anthracene	115 (53-105)		J (all detects)	
	Fluoranthene	108 (54-106)		J (all detects)	
	Fluorene	105 (54-104)		J (all detects)	
	Phenanthrene	106 (54-105)		J (all detects)	
	Pyrene	105 (55-104)		J (all detects)	

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Flag	A or P
C077S253	Benzo(b)fluoranthene Benzo(k)fluoranthene	Due to lack of resolution between these compounds in the samples, the laboratory performed the quantitation using the total peak area.	J (all detects) J (all detects)	A

Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 49319/49320

SDG	Sample	Compound	Flag	A or P	Reason
49319/ 49320	C077S253 C077S254 C077G051** C077R013	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49319/ 49320	C077S253 C077S254	Benzo(a)pyrene Dibenz(a,h)anthracene Fluoranthene Fluorene Phenanthrene Pyrene	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P	Laboratory control samples (%R)
49319/ 49320	C077S253	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) J (all detects)	A	Compound quantitation and CRQLs

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 49319/49320

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary - SDG 49319/49320

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 16, 2005

LDC Report Date: January 10, 2006

Matrix: Water

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49363/49364

Sample Identification

C077G031

Introduction

This data review covers one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per a modification of EPA SW 846 Method 8270C using Selected Ion Monitoring (SIM) for Polynuclear Aromatic Hydrocarbons.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

Average relative response factors (RRF) for all target compounds and system monitoring compounds

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 25.0% .

All of the continuing calibration RRF values were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polynuclear aromatic hydrocarbon contaminants were found in the method blanks.

No field blanks were identified in this SDG.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49363/49364	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

Data flags have been summarized at the end of the report if data has been qualified.

XVI. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 49363/49364

SDG	Sample	Compound	Flag	A or P	Reason
49363/ 49364	C077G031	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 49363/49364

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Polynuclear Aromatic Hydrocarbons - Field Blank Data Qualification Summary - SDG 49363/49364

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14479

Chlorinated Pesticides & PCBs

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 14, 2005

LDC Report Date: January 10, 2006

Matrix: Soil/Water

Parameters: Chlorinated Pesticides & PCBs

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49319/49320

Sample Identification

C077S041**	C077S246
C077S042**	C077S253
C077S053**	C077S254
C077S054**	C077S251
C077S055**	C077S252
C077S047	C077S249
C077S048	C077S250
C077S049	C077S247
C077S050	C077S248
C077S051**	C077G051
C077S052	C077R013
C077S043	C077G052
C077S044	C077S048MS
C077S045	C077S048MSD
C077S046	
C077S241	
C077S242	
C077S243	
C077S244	
C077S245	

**Indicates sample underwent Level IV review.

Introduction

This data review covers 31 soil samples and 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 8081A and 8082 for Chlorinated Pesticides and PCBs.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical or advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

Retention time windows were evaluated and considered technically acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Affected Compounds	Flag	A or P
12/27/05	1227003	DB-XLB	Endrin	16	C077S041** C077S042** C077S053** C077S054** C077S055** C077S047 C077S048MS C077S048MSD 051217S-BlkA	Endrin	J (all detects) UJ (all non-detects)	A

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

Retention times (RT) of all compounds in the calibration standards were within QC limits for samples on which a Level IV review was performed. Raw data were not evaluated for the samples on which a Level III review was performed.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide or PCB contaminants were found in the method blanks.

Sample C077R013 was identified as a rinsate. No chlorinated pesticide or PCB contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for several samples. Since these samples were diluted out, no data were qualified.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
C077S242 C077S243 C077S244 C077S245 C077S246 C077S253 C077S254 C077S251 C077S252 C077S249 C077S250 C077S247 C077S248 C077G051 C077R013 C077G052	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S048MS/MSD	4,4'-DDE	-	-	40.3 (≤25)	J (all detects)	A
(C077S041**	4,4'-DDT	-	-	58.8 (≤25)	UJ (all non-detects)	
C077S042**	4,4'-DDD	-	-	52.1 (≤25)		
C077S053**	alpha-BHC	-	-	38.4 (≤25)		
C077S054**	alpha-Chlordane	-	-	61.8 (≤25)		
C077S055**	Aldrin	-	-	54.5 (≤25)		
C077S047	beta-BHC	-	-	65.3 (≤25)		
C077S048	Dieldrin	-	-	73.7 (≤25)		
C077S049	Endosulfan I	-	-	62.1 (≤25)		
C077S050	Endosulfan II	-	-	83.3 (≤25)		
C077S051**	Endosulfan sulfate	-	-	97.9 (≤25)		
C077S052	Endrin	-	-	77.0 (≤25)		
C077S043	Endrin aldehyde	-	-	103.6 (≤25)		
C077S044	gamma-BHC	-	-	50.2 (≤25)		
C077S045	gamma-Chlordane	-	-	58.4 (≤25)		
C077S046	Heptachlor	-	-	51.9 (≤25)		
C077S241)	Heptachlor epoxide	-	-	66.7 (≤25)		

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051217S-LCSA	4,4'-DDE	136 (70-125)	C077S041**	J (all detects)	P
	alpha-BHC	131 (60-125)	C077S042**	J (all detects)	
	alpha-Chlordane	121 (65-125)	C077S053**	J (all detects)	
	Dieldrin	128 (65-125)	C077S054**	J (all detects)	
	gamma-BHC	128 (60-125)	C077S055**	J (all detects)	
			C077S047		
			C077S048		
			C077S049		
			C077S050		
			C077S051**		
			C077S052		
			C077S043		
			C077S044		
			C077S045		
			C077S046		
			C077S241		
			051217S-BlkA		

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

All target compound identifications were within validation criteria for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Compound Quantitation and Reported CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which an Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples C077G051 and C077G052 were identified as field duplicates. No chlorinated pesticides or PCBs were detected in any of the samples.

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Data Qualification Summary - SDG 49319/49320

SDG	Sample	Compound	Flag	A or P	Reason
49319/ 49320	C077S041** C077S042** C077S053** C077S054** C077S055** C077S047	Endrin	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49319/ 49320	C077S242 C077S243 C077S244 C077S245 C077S246 C077S253 C077S254 C077S251 C077S252 C077S249 C077S250 C077S247 C077S248 C077G051 C077R013 C077G052	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49319/ 49320	C077S041** C077S042** C077S053** C077S054** C077S055** C077S047 C077S048 C077S049 C077S050 C077S051** C077S052 C077S043 C077S044 C077S045 C077S046 C077S241	4,4'-DDE 4,4'-DDT 4,4'-DDD alpha-BHC alpha-Chlordane Aldrin beta-BHC Dieldrin Endosulfan I Endosulfan II Endosulfan sulfate Endrin Endrin aldehyde gamma-BHC gamma-Chlordane Heptachlor Heptachlor epoxide	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (RPD)

SDG	Sample	Compound	Flag	A or P	Reason
49319/ 49320	C077S041** C077S042** C077S053** C077S054** C077S055** C077S047 C077S048 C077S049 C077S050 C077S051** C077S052 C077S043 C077S044 C077S045 C077S046 C077S241	4,4'-DDE alpha-BHC alpha-Chlordane Dieldrin gamma-BHC	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P	Laboratory control samples (%R)

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Laboratory Blank Data Qualification Summary - SDG 49319/49320

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Field Blank Data Qualification Summary - SDG 49319/49320

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 16, 2005

LDC Report Date: January 10, 2006

Matrix: Soil/Water

Parameters: Chlorinated Pesticides & PCBs

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49363/49364

Sample Identification

C077S140
C077S141
C077S142
C077S137
C077S138
C077S139
C077S131
C077S132
C077S133
C077S134
C077S135
C077S136
C077G031
C077R015
C077S136MS
C077S136MSD

Introduction

This data review covers 14 soil samples and 2 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 8081A and 8082 for Chlorinated Pesticides and PCBs.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical or advisory nature.

Blank results are summarized in Section V.

Field duplicates are summarized in Section XIV.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of single and multicomponent compounds was performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for selected compounds.

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
12/29/05	1227159	DB-XLB	Endrin	27	051227S-Blk	J (all detects) UJ (all non-detects)	A
12/30/05	1227195	DB-35MS	4,4'-DDD	16	C077S141 C077S137 C077S138 C077S139 C077S131 C077S132 C077S133 C077S135 C077S142	J (all detects) UJ (all non-detects)	A

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
12/30/05	1227195	DB-XLB	Endrin	29	C077S141 C077S137 C077S138 C077S139 C077S131 C077S132 C077S133 C077S135 C077S142	J (all detects) UJ (all non-detects)	A
12/30/05	1227208	DB-35MS	alpha-BHC gamma-BHC Aldrin 4,4'-DDE 4,4'-DDD	18 17 18 16 18	C077S140 C077S134 C077S136	J (all detects) UJ (all non-detects)	A
12/30/05	1227208	DB-XLB	alpha-BHC gamma-BHC 4,4'-DDE Endrin 4,4'-DDD	17 16 17 18 18	C077S140 C077S134 C077S136	J (all detects) UJ (all non-detects)	A

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No chlorinated pesticide or PCB contaminants were found in the method blanks.

Sample C077R015 was identified as a rinsate. No chlorinated pesticide or PCB contaminants were found in this blank.

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Column	Surrogate	%R (Limits)	Compound	Flag	A or P
051227S-Blk	DB-35MS	Tetrachloro-m-xylene	126 (70-125)	All TCL compounds	J (all detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All water samples in SDG 49363/49364	All TCL compounds	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S136MS/MSD (All soil samples in SDG 49363/49364)	alpha-BHC	-	-	28.3 (≤25)	J (all detects) UJ (all non-detects)	A
	beta-BHC	-	-	32.7 (≤25)		
	Dieldrin	-	-	28.3 (≤25)		
	Endosulfan I	-	-	29.1 (≤25)		
	Endosulfan II	-	-	37.5 (≤25)		
	Endosulfan sulfate	-	-	47.3 (≤25)		
	Endrin	-	-	36.5 (≤25)		
	Endrin aldehyde	-	-	53.3 (≤25)		
	gamma-BHC	-	-	35.7 (≤25)		
	Heptachlor epoxide	-	-	32.4 (≤25)		

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
051227S-LCS	Endosulfan sulfate	58.6 (60-135)	All soil samples in SDG 49363/49364	J (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

Raw data were not reviewed for this SDG.

XII. Compound Quantitation and Reported CRQLs

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Data Qualification Summary - SDG 49363/49364

SDG	Sample	Compound	Flag	A or P	Reason
49363/ 49364	C077S141 C077S137 C077S138 C077S139 C077S131 C077S132 C077S133 C077S135 C077S142	4,4'-DDD Endrin	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49363/ 49364	C077S140 C077S134 C077S136	alpha-BHC gamma-BHC Aldrin 4,4'-DDE 4,4'-DDD Endrin	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)
49363/ 49364	C077G031 C077R015	All TCL compounds	None	P	Matrix spike/Matrix spike duplicates
49363/ 49364	C077S140 C077S141 C077S142 C077S137 C077S138 C077S139 C077S131 C077S132 C077S133 C077S134 C077S135 C077S136	alpha-BHC beta-BHC Dieldrin Endosulfan I Endosulfan II Endosulfan sulfate Endrin Endrin aldehyde gamma-BHC Heptachlor epoxide	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (RPD)
49363/ 49364	C077S140 C077S141 C077S142 C077S137 C077S138 C077S139 C077S131 C077S132 C077S133 C077S134 C077S135 C077S136	Endosulfan sulfate	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Laboratory Blank Data Qualification Summary - SDG 49363/49364

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Chlorinated Pesticides & PCBs - Field Blank Data Qualification Summary - SDG 49363/49364

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14479

Metals

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 14 through December 15, 2005

LDC Report Date: January 10, 2006

Matrix: Soil/Water

Parameters: Metals

Validation Level: Level III & IV

Laboratory: APPL, Inc./Brooks Rand LLC

Sample Delivery Group (SDG): 49319/49320/05BR1891

Sample Identification

C077S461**
C077S462**
C077S463
C077G161
C077G201**
C077G081
C077G051**
C077G202
C077R013
C077G083
C077G011
C077G012
C077G013
C077G161MS
C077G161MSD
C077G201MS
C077G201MSD
C077G081MS
C077G081MSD
C077G202MS
C077G202MSD

**Indicates sample underwent Level IV review

Introduction

This data review covers 3 soil samples and 18 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 6010B, 7000, and EPA Method 1631E for Metals. The metals analyzed were Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Samples indicated by a double asterisk on the front cover underwent a Level IV review. A Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Antimony Arsenic Lead Selenium Silver Thallium	3.693 ug/L 2.296 ug/L 2.678 ug/L 3.767 ug/L 0.621 ug/L 2.353 ug/L	All soil samples in SDG 49319/49320/05BR1891
ICB/CCB	Antimony Beryllium Mercury Selenium	3.098 ug/L 0.26 ug/L 0.186 ug/L 4.72 ug/L	C077G161 C077G081 C077G051** C077G202 C077G083
ICB/CCB	Sodium	190.3 ug/L	C077G161 C077G081 C077G202 C077G083
ICB/CCB	Aluminum Antimony Arsenic Mercury Sodium	21.58 ug/L 4.393 ug/L 2.828 ug/L 0.186 ug/L 276.3 ug/L	C077G201**
PB (prep blank)	Aluminum Sodium	21.62 ug/L 334.7 ug/L	C077R013

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Antimony Potassium Sodium	4.329 ug/L 107.7 ug/L 354.3 ug/L	C077R013

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S461**	Selenium	0.55 mg/Kg	0.55U mg/Kg
C077S462**	Antimony	0.61 mg/Kg	0.61U mg/Kg
C077S463	Silver	0.26 mg/Kg	0.26U mg/Kg
C077G161	Mercury Selenium	0.16 ug/L 7.7 ug/L	0.16U ug/L 7.7U ug/L
C077G081	Mercury	0.11 ug/L	0.11U ug/L
C077G051**	Mercury Selenium	0.14 ug/L 11.5 ug/L	0.14U ug/L 11.5U ug/L
C077G202	Mercury Selenium	0.10 ug/L 6.3 ug/L	0.10U ug/L 6.3U ug/L
C077R013	Sodium	253 ug/L	253U ug/L
C077G083	Mercury	0.047 ug/L	0.047U ug/L
C077G201**	Aluminum Arsenic Mercury	26.7 ug/L 4.6 ug/L 0.046 ug/L	26.7U ug/L 4.6U ug/L 0.046U ug/L

Sample C077R013 was identified as a rinsate. No metal contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
C077R013	12/14/05	Calcium Magnesium Sodium	39.7 ug/L 86.3 ug/L 253 ug/L	C077S461** C077S462** C077S463 C077G161 C077G201** C077G081 C077G051** C077G202 C077G083

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S461**	Sodium	102 mg/Kg	102U mg/Kg
C077G083	Magnesium	280 ug/L	280U ug/L

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077S031MS/MSD (All soil samples in SDG 49319/49320/05BR1891)	Antimony Calcium Copper Iron Magnesium Manganese Zinc Mercury	58.6 (80-120) - - - 72.4 (80-120) - - 66.0 (80-120)	53.4 (80-120) 64.6 (80-120) 209 (80-120) - 56.4 (80-120) - 271 (80-120) 145 (80-120)	- - 52.0 (≤20) 62.0 (≤20) - 23.4 (≤20) 77.1 (≤20) 75.2 (≤20)	J (all detects) UJ (all non-detects)	A

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077G161MS/MSD (C077G161 C077G081 C077G051** C077G202 C077G083)	Magnesium	126 (80-120)	-	-	J (all detects)	A

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
LCS/LCSD (C077G161 C077G081 C077G051** C077G202 C077G083)	Cadmium	122 (80-120)	-	-	J (all detects)	P

VIII. Internal Standards

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
C077S031L	Lead	16.2 (≤10)	All soil samples in SDG 49319/49320/05BR1891	J (all detects)	A

XI. Sample Result Verification

All sample result verifications were acceptable for samples on which a Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been qualified.

XIII. Field Duplicates

Samples C077G011 and C077G012 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Analyte	Concentration (ng/L)		RPD
	C077G011	C077G012	
Mercury	1.630	1.250	26

NAS Alameda Point, CTO 077
Metals - Data Qualification Summary - SDG 49319/49320/05BR1891

SDG	Sample	Analyte	Flag	A or P	Reason
49319/49320/ 05BR1891	C077S461** C077S462** C077S463	Antimony Calcium Magnesium	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)
49319/49320/ 05BR1891	C077S461** C077S462** C077S463	Copper Zinc Mercury	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R) (RPD)
49319/49320/ 05BR1891	C077S461** C077S462** C077S463	Iron Manganese	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (RPD)
49319/49320/ 05BR1891	C077G161 C077G081 C077G051** C077G202 C077G083	Magnesium	J (all detects)	A	Matrix spike/Matrix spike duplicates (%R)
49319/49320/ 05BR1891	C077G161 C077G081 C077G051** C077G202 C077G083	Cadmium	J (all detects)	P	Laboratory control samples (%R)
49319/49320/ 05BR1891	C077S461** C077S462** C077S463	Lead	J (all detects)	A	ICP serial dilution (%D)

NAS Alameda Point, CTO 077
Metals - Laboratory Blank Data Qualification Summary - SDG 49319/49320/05BR1891

SDG	Sample	Analyte	Modified Final Concentration	A or P
49319/49320/ 05BR1891	C077S461**	Selenium	0.55U mg/Kg	A
49319/49320/ 05BR1891	C077S462**	Antimony	0.61U mg/Kg	A
49319/49320/ 05BR1891	C077S463	Silver	0.26U mg/Kg	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49319/49320/ 05BR1891	C077G161	Mercury Selenium	0.16U ug/L 7.7U ug/L	A
49319/49320/ 05BR1891	C077G081	Mercury	0.11U ug/L	A
49319/49320/ 05BR1891	C077G051**	Mercury Selenium	0.14U ug/L 11.5U ug/L	A
49319/49320/ 05BR1891	C077G202	Mercury Selenium	0.10U ug/L 6.3U ug/L	A
49319/49320/ 05BR1891	C077R013	Sodium	253U ug/L	A
49319/49320/ 05BR1891	C077G083	Mercury	0.047U ug/L	A
49319/49320/ 05BR1891	C077G201**	Aluminum Arsenic Mercury	26.7U ug/L 4.6U ug/L 0.046U ug/L	A

NAS Alameda Point, CTO 077
Metals - Field Blank Data Qualification Summary - SDG 49319/49320/05BR1891

SDG	Sample	Analyte	Modified Final Concentration	A or P
49319/49320/ 05BR1891	C077S461**	Sodium	102U mg/Kg	A
49319/49320/ 05BR1891	C077G083	Magnesium	280U ug/L	A

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 16, 2005

LDC Report Date: January 9, 2006

Matrix: Soil/Water

Parameters: Metals

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49363/49364

Sample Identification

C077S160
C077S161
C077S162
C077S581
C077S582
C077G031
C077G032
C077G033
C077R015

Introduction

This data review covers 5 soil samples and 4 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 6010B and 7000 for Metals. The metals analyzed were Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Antimony Beryllium Mercury	2.454 ug/L 0.275 ug/L 0.141 ug/L	All water samples in SDG 49363/49364
ICB/CCB	Potassium Sodium	182.3 ug/L 913.2 ug/L	C077R015
ICB/CCB	Antimony Arsenic Cobalt Selenium Sodium	2.454 ug/L 2.418 ug/L 0.91 ug/L 3.5 ug/L 255.4 ug/L	C077S581 C077S582
ICB/CCB	Lead	0.938 ug/L	All soil samples in SDG 49363/49364

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G031	Beryllium	0.37 ug/L	0.37U ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G032	Beryllium	0.31 ug/L	0.31U ug/L
C077G033	Beryllium	0.33 ug/L	0.33U ug/L
C077R015	Beryllium Potassium Sodium	0.29 ug/L 378 ug/L 2190 ug/L	0.29U ug/L 378U ug/L 2190U ug/L
C077S581	Sodium	106 mg/Kg	106U mg/Kg
C077S582	Sodium	63.8 mg/Kg	63.8U mg/Kg

Sample C077R015 was identified as a rinsate. No metal contaminants were found in this blank with the following exceptions:

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
C077R015	12/16/05	Beryllium Calcium Magnesium Potassium Sodium	0.29 ug/L 33.5 ug/L 70.4 ug/L 378 ug/L 2190 ug/L	C077S581 C077S582 C077G031 C077G032 C077G033

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G031	Beryllium	0.37 ug/L	0.37U ug/L
C077G032	Beryllium	0.31 ug/L	0.31U ug/L
C077G033	Beryllium	0.33 ug/L	0.33U ug/L
C077S581	Beryllium Sodium	0.12 mg/Kg 106 mg/Kg	0.12U mg/Kg 106U mg/Kg
C077S582	Beryllium Sodium	0.1 mg/Kg 63.8 mg/Kg	0.1U mg/Kg 63.8U mg/Kg

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All samples in SDG 49363/49364	All TAL metals	No MS associated with these samples.	MS required.	None	P

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All samples in SDG 49363/49364	All TAL metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Internal Standards

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
C077S582L	Cobalt	63.2 (≤10)	C077S581 C077S582	J (all detects) UJ (all non-detects)	A
C077S582L	Copper Nickel	55.6 (≤10) 12.1 (≤10)	C077S581 C077S582	J (all detects) J (all detects)	A

XI. Sample Result Verification

Raw data were not reviewed for this SDG.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been qualified.

XIII. Field Duplicates

Samples C077G031 and C077G032 were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD
	C077G031	C077G032	
Arsenic	31.2	29.1	7
Barium	31.5	20.1	44
Beryllium	0.37	0.31	18
Cadmium	0.70	5U	200
Calcium	403000	375000	7
Chromium	6.4	5.6	13
Iron	28500	23000	21
Magnesium	121000	93900	25
Manganese	2470	1910	26
Potassium	54700	52200	5

Compound	Concentration (ug/L)		RPD
	C077G031	C077G032	
Selenium	18.9	13.2	36
Sodium	807000	741000	9
Vanadium	2.2	3.0	31

NAS Alameda Point, CTO 077
Metals - Data Qualification Summary - SDG 49363/49364

SDG	Sample	Analyte	Flag	A or P	Reason
49363/ 49364	C077S160 C077S161 C077S162 C077S581 C077S582 C077G031 C077G032 C077G033 C077R015	All TAL metals	None	P	Matrix spike analysis
49363/ 49364	C077S160 C077S161 C077S162 C077S581 C077S582 C077G031 C077G032 C077G033 C077R015	All TAL metals	None	P	Duplicate analysis
49363/ 49364	C077S581 C077S582	Cobalt	J (all detects) UJ (all non-detects)	A	ICP serial dilution (%D)
49363/ 49364	C077S581 C077S582	Copper Nickel	J (all detects) J (all detects)	A	ICP serial dilution (%D)

NAS Alameda Point, CTO 077
Metals - Laboratory Blank Data Qualification Summary - SDG 49363/49364

SDG	Sample	Analyte	Modified Final Concentration	A or P
49363/ 49364	C077G031	Beryllium	0.37U ug/L	A
49363/ 49364	C077G032	Beryllium	0.31U ug/L	A
49363/ 49364	C077G033	Beryllium	0.33U ug/L	A
49363/ 49364	C077R015	Beryllium Potassium Sodium	0.29U ug/L 378U ug/L 2190U ug/L	A
49363/ 49364	C077S581	Sodium	106U mg/Kg	A

SDG	Sample	Analyte	Modified Final Concentration	A or P
49363/ 49364	C077S582	Sodium	63.8U mg/Kg	A

NAS Alameda Point, CTO 077
Metals - Field Blank Data Qualification Summary - SDG 49363/49364

SDG	Sample	Analyte	Modified Final Concentration	A or P
49363/ 49364	C077G031	Beryllium	0.37U ug/L	A
49363/ 49364	C077G032	Beryllium	0.31U ug/L	A
49363/ 49364	C077G033	Beryllium	0.33U ug/L	A
49363/ 49364	C077S581	Beryllium Sodium	0.12U mg/Kg 106U mg/Kg	A
49363/ 49364	C077S582	Beryllium Sodium	0.1U mg/Kg 63.8U mg/Kg	A

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 19, 2005

LDC Report Date: January 9, 2006

Matrix: Soil/Water

Parameters: Metals

Validation Level: Level III

Laboratory: APPL, Inc./Brooks Rand LLC

Sample Delivery Group (SDG): 49373/49374/05BR1906

Sample Identification

C077S481
C077S482
C077S483
C077S484
C077S485
C077S486
C077S487
C077S488
C077S489
C077CB02
C077R016
C077G153
C077R017
C077G171
C077G172
C077G173
C077G174

Introduction

This data review covers 10 soil samples and 7 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 1631E and EPA SW 846 Methods 6010B and 7000 for Metals. The metals analyzed were Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Iron	8.897 mg/Kg	All soil samples in SDG 49373/49374/05BR1906
ICB/CCB	Antimony Arsenic Lead Selenium Sodium	2.474 ug/L 4.424 ug/L 1.922 ug/L 2.587 ug/L 481.4 ug/L	C077S481 C077S482 C077S483 C077S484 C077S485 C077S486 C077S487 C077S488
ICB/CCB	Antimony Arsenic Chromium Cobalt Selenium Sodium	4.393 ug/L 4.375 ug/L 0.4 ug/L 1.576 ug/L 3.798 ug/L 144.1 ug/L	C077S489
ICB/CCB	Antimony Arsenic Cobalt Lead Thallium	2.425 ug/L 3.88 ug/L 0.829 ug/L 1.922 ug/L 2.256 ug/L	All water samples in SDG 49373/49374/05BR1906
ICB/CCB	Mercury	0.145 ug/L	C077R016 C077G171 C077G172 C077G173 C077G174

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Sodium	456.1 ug/L	C077R016 C077R017 C077G174

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S481	Selenium	1.2 mg/Kg	1.2U mg/Kg
C077S484	Selenium	0.35 mg/Kg	0.35U mg/Kg
C077S485	Selenium	0.86 mg/Kg	0.86U mg/Kg
C077S487	Selenium Sodium	0.62 mg/Kg 179 mg/Kg	0.62U mg/Kg 179U mg/Kg
C077S488	Selenium	0.77 mg/Kg	0.77U mg/Kg
C077S489	Antimony	0.58 mg/Kg	0.58U mg/Kg
C077R016	Cobalt Mercury Sodium	0.85 ug/L 0.13 ug/L 161 ug/L	0.85U ug/L 0.13U ug/L 161U ug/L
C077G153	Arsenic Cobalt	5.5 ug/L 0.83 ug/L	5.5U ug/L 0.83U ug/L
C077R017	Arsenic Sodium	4.1 ug/L 116 ug/L	4.1U ug/L 116U ug/L
C077G171	Arsenic Mercury Thallium	18.6 ug/L 0.20 ug/L 3.5 ug/L	18.6U ug/L 0.20U ug/L 3.5U ug/L
C077G172	Arsenic Mercury	16.8 ug/L 0.10 ug/L	16.8U ug/L 0.10U ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G173	Arsenic Cobalt Mercury	4.6 ug/L 1.4 ug/L 0.073 ug/L	4.6U ug/L 1.4U ug/L 0.073U ug/L
C077G174	Arsenic Cobalt	6.5 ug/L 0.94 ug/L	6.5U ug/L 0.94U ug/L

Samples C077R016 and C077R017 were identified as rinsates. No metal contaminants were found in these blanks with the following exceptions:

Rinsate ID	Sampling Date	Analyte	Concentration	Associated Samples
C077R017	12/19/05	Arsenic Magnesium Sodium	4.1 ug/L 67.4 ug/L 116 ug/L	C077G153 C077G171 C077G172 C077G173 C077G174
C077R016	12/19/05	Cadmium Calcium Cobalt Magnesium Mercury Sodium	0.92 ug/L 27.2 ug/L 0.85 ug/L 68.0 ug/L 0.13 ug/L 161 ug/L	C077S481 C077S482 C077S483 C077S484 C077S485 C077S486 C077S487 C077S488 C077S489

Sample concentrations were compared to concentrations detected in the field blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated field blanks with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077G153	Arsenic	5.5 ug/L	5.5U ug/L
C077G171	Arsenic	18.6 ug/L	18.6U ug/L
C077G172	Arsenic	16.8 ug/L	16.8U ug/L
C077G173	Arsenic	4.6 ug/L	4.6U ug/L
C077G174	Arsenic	6.5 ug/L	6.5U ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
C077S481	Cadmium	0.081 mg/Kg	0.081U mg/Kg
C077S485	Cadmium	0.049 mg/Kg	0.049U mg/Kg
C077S488	Cadmium	0.32 mg/Kg	0.32U mg/Kg

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All samples in SDG 49373/49374/05BR1906	All TAL metals	No MS associated with these samples.	MS required.	None	P

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All samples in SDG 49373/49374/05BR1906	All TAL metals	No DUP analysis associated with these samples.	DUP analysis required.	None	P

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Internal Standards

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
C077S489L	Cobalt	18.5 (≤10)	C077S481 C077S482 C077S483 C077S484 C077S485 C077S486 C077S487 C077S488 C077S489	J (all detects)	A

XI. Sample Result Verification

Raw data were not reviewed for this SDG.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been qualified.

XIII. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Metals - Data Qualification Summary - SDG 49373/49374/05BR1906

SDG	Sample	Analyte	Flag	A or P	Reason
49373/49374/ 05BR1906	C077S481 C077S482 C077S483 C077S484 C077S485 C077S486 C077S487 C077S488 C077S489 C077CB02 C077R016 C077G153 C077R017 C077G171 C077G172 C077G173 C077G174	All TAL metals	None	P	Matrix spike analysis
49373/49374/ 05BR1906	C077S481 C077S482 C077S483 C077S484 C077S485 C077S486 C077S487 C077S488 C077S489 C077CB02 C077R016 C077G153 C077R017 C077G171 C077G172 C077G173 C077G174	All TAL metals	None	P	Duplicate analysis
49373/49374/ 05BR1906	C077S481 C077S482 C077S483 C077S484 C077S485 C077S486 C077S487 C077S488 C077S489	Cobalt	J (all detects)	A	ICP serial dilution (%D)

NAS Alameda Point, CTO 077
Metals - Laboratory Blank Data Qualification Summary - SDG 49373/49374/05BR1906

SDG	Sample	Analyte	Modified Final Concentration	A or P
49373/49374/ 05BR1906	C077S481	Selenium	1.2U mg/Kg	A
49373/49374/ 05BR1906	C077S484	Selenium	0.35U mg/Kg	A
49373/49374/ 05BR1906	C077S485	Selenium	0.86U mg/Kg	A
49373/49374/ 05BR1906	C077S487	Selenium Sodium	0.62U mg/Kg 179U mg/Kg	A
49373/49374/ 05BR1906	C077S488	Selenium	0.77U mg/Kg	A
49373/49374/ 05BR1906	C077S489	Antimony	0.58U mg/Kg	A
49373/49374/ 05BR1906	C077R016	Cobalt Mercury Sodium	0.85U ug/L 0.13U ug/L 161U ug/L	A
49373/49374/ 05BR1906	C077G153	Arsenic Cobalt	5.5U ug/L 0.83U ug/L	A
49373/49374/ 05BR1906	C077R017	Arsenic Sodium	4.1U ug/L 116U ug/L	A
49373/49374/ 05BR1906	C077G171	Arsenic Mercury Thallium	18.6U ug/L 0.20U ug/L 3.5U ug/L	A
49373/49374/ 05BR1906	C077G172	Arsenic Mercury	16.8U ug/L 0.10U ug/L	A
49373/49374/ 05BR1906	C077G173	Arsenic Cobalt Mercury	4.6U ug/L 1.4U ug/L 0.073U ug/L	A
49373/49374/ 05BR1906	C077G174	Arsenic Cobalt	6.5U ug/L 0.94U ug/L	A

NAS Alameda Point, CTO 077
Metals - Field Blank Data Qualification Summary - SDG 49373/49374/05BR1906

SDG	Sample	Analyte	Modified Final Concentration	A or P
49373/49374/ 05BR1906	C077G153	Arsenic	5.5U ug/L	A
49373/49374/ 05BR1906	C077G171	Arsenic	18.6U ug/L	A
49373/49374/ 05BR1906	C077G172	Arsenic	16.8U ug/L	A
49373/49374/ 05BR1906	C077G173	Arsenic	4.6U ug/L	A
49373/49374/ 05BR1906	C077G174	Arsenic	6.5U ug/L	A
49373/49374/ 05BR1906	C077S481	Cadmium	0.081U mg/Kg	A
49373/49374/ 05BR1906	C077S485	Cadmium	0.049U mg/Kg	A
49373/49374/ 05BR1906	C077S488	Cadmium	0.32U mg/Kg	A

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 20, 2005

LDC Report Date: January 9, 2006

Matrix: Soil

Parameters: Lead

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49394

Sample Identification

C077CB03

Introduction

This data review covers one soil sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 6010B for Lead.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004) as there are no current guidelines for the methods stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blanks are summarized in Section III.

Field duplicates are summarized in Section XIII.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Lead	2.903 ug/L	All samples in SDG 49394

Data qualification by the initial, continuing and preparation blanks (ICB/CCB/PBs) was based on the maximum contaminant concentration in the ICB/CCB/PBs in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated method blanks.

No field blanks were identified in this SDG.

IV. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

V. Matrix Spike Analysis

Matrix spike (MS) analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All samples in SDG 49394	Lead	No MS associated with these samples.	MS required.	None	P

VI. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All samples in SDG 49394	Lead	No DUP analysis associated with these samples.	DUP analysis required.	None	P

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Internal Standards

ICP-MS was not utilized in this SDG.

IX. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

X. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met.

XI. Sample Result Verification

Raw data were not reviewed for this SDG.

XII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been qualified.

XIII. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Lead - Data Qualification Summary - SDG 49394

SDG	Sample	Analyte	Flag	A or P	Reason
49394	C077CB03	Lead	None	P	Matrix spike analysis
49394	C077CB03	Lead	None	P	Duplicate analysis

NAS Alameda Point, CTO 077
Lead - Laboratory Blank Data Qualification Summary - SDG 49394

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Lead - Field Blank Data Qualification Summary - SDG 49394

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14479

TPH as Gasoline

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 14, 2005

LDC Report Date: January 10, 2006

Matrix: Water

Parameters: Total Petroleum Hydrocarbons as Gasoline

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49319/49320

Sample Identification

C077G201**
C077G202
C077R013

**Indicates sample underwent Level IV review

Introduction

This data review covers 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Gasoline.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent Level IV review. Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation for all compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as gasoline contaminants were found in the method blanks.

Sample C077R013 was identified as a rinsate. No total petroleum hydrocarbons as gasoline contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All samples in SDG 49319/49320	TPH as gasoline	No MS/MSD associated with these samples.	MS/MSD required.	None	P

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Data Qualification Summary - SDG 49319/49320

SDG	Sample	Compound	Flag	A or P	Reason
49319/ 49320	C077G201** C077G202 C077R013	TPH as gasoline	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Laboratory Blank Data Qualification Summary - SDG 49319/49320

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Field Blank Data Qualification Summary - SDG 49319/49320

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 19, 2005

LDC Report Date: January 10, 2006

Matrix: Water

Parameters: Total Petroleum Hydrocarbons as Gasoline

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49373/49374

Sample Identification

C077G174
C077G174MS
C077G174MSD

Introduction

This data review covers 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Gasoline.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

A curve fit, based on the initial calibration, was established for quantitation for all compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as gasoline contaminants were found in the method blanks.

No field blanks were identified in this SDG.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. All surrogate recoveries (%R) were within QC limits.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

Raw data were not reviewed for this SDG.

VI. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

VII. System Performance

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Data Qualification Summary - SDG 49373/49374

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Laboratory Blank Data Qualification Summary - SDG 49373/49374

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Gasoline - Field Blank Data Qualification Summary - SDG 49373/49374

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Data Validation Reports
LDC# 14479

TPH as Extractables

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 14, 2005

LDC Report Date: January 10, 2006

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Level III & IV

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49319/49320

Sample Identification

C077S001	C077G083
C077S002**	C077G002
C077S009	C077G201MS
C077S004	C077G201MSD
C077S005	
C077S006	
C077S007	
C077S008	
C077S010	
C077S461**	
C077S462**	
C077S463	
C077G161	
C077G201**	
C077G003**	
C077G001	
C077G081	
C077G202	
C077R013	
C077G084	

**Indicates sample underwent Level IV review

Introduction

This data review covers 12 soil samples and 12 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Extractables.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent Level IV review. Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

The percent relative standard deviations (%RSD) of calibration factors for selected compounds were less than or equal to 20.0% .

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample C077R013 was identified as a rinsate. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for sample C077S010. Since the sample was diluted out, no data were qualified.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All soil samples in SDG 49319/49320	TPH as extractables	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
C077G201MS/MSD (All water samples in SDG 49319/49320)	TPH as motor oil	-	-	26.4 (≤25)	J (all detects) UJ (all non-detects)	A

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

All target compound identifications were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VI. Compound Quantitation and CRQLs

All compound quantitation and CRQLs were within validation criteria for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VII. System Performance

The system performance was acceptable for samples on which Level IV review was performed. Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

Samples C077G084 and C077G083 were identified as field duplicates. No total petroleum hydrocarbons as extractables were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD
	C077G084	C077G083	
TPH as diesel	50U	3200	200
TPH as JP5	50U	2600	200

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 49319/49320

SDG	Sample	Compound	Flag	A or P	Reason
49319/ 49320	C077S001 C077S002** C077S009 C077S004 C077S005 C077S006 C077S007 C077S008 C077S010 C077S461** C077S462** C077S463	TPH as extractables	None	P	Matrix spike/Matrix spike duplicates
49319/ 49320	C077G161 C077G201** C077G003** C077G001 C077G081 C077G202 C077R013 C077G084 C077G083 C077G002	TPH as motor oil	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (RPD)

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 49319/49320

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 49319/49320

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: NAS Alameda Point, CTO 077

Collection Date: December 16, 2005

LDC Report Date: January 10, 2006

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Level III

Laboratory: APPL, Inc.

Sample Delivery Group (SDG): 49363/49364

Sample Identification

C077S141
C077S142
C077S561
C077S562
C077S581
C077S582
C077S601
C077S602
C077S661
C077S662
C077G041
C077R015
C077G211
C077G212
C077G221
C077G261
C077G231
C077S562MS
C077S562MSD
C077S602MS
C077S602MSD
C077G041MS
C077G041MSD

Introduction

This data review covers 14 soil samples and 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Extractables.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

The percent relative standard deviations (%RSD) of calibration factors for selected compounds were less than or equal to 20.0% .

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits with the following exceptions:

Date	Compound	%D	Affected Compound	Associated Samples	Flag	A or P
1/3/06	TPH as diesel	16	TPH as diesel	C077S141 C077S142 C077S561 C077S562 C077S581 C077S582 C077S601 C077S602 051220S-Blk	J (all detects) UJ (all non-detects)	A

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample C077R015 was identified as a rinsate. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for sample C077G211. Since the sample was diluted out, no data were qualified.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were not within the QC limits. Since the samples were diluted out, no data were qualified.

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

Raw data were not reviewed for this SDG.

VI. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

VII. System Performance

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

Samples C077G211 and C077G212 were identified as field duplicates. No total petroleum hydrocarbons as extractables were detected in any of the samples.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 49363/49364

SDG	Sample	Compound	Flag	A or P	Reason
49363/ 49364	C077S141 C077S142 C077S561 C077S562 C077S581 C077S582 C077S601 C077S602	TPH as diesel	J (all detects) UJ (all non-detects)	A	Continuing calibration (%D)

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 49363/49364

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 49363/49364

No Sample Data Qualified in this SDG

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	NAS Alameda Point, CTO 077
Collection Date:	December 19, 2005
LDC Report Date:	January 10, 2006
Matrix:	Soil/Water
Parameters:	Total Petroleum Hydrocarbons as Extractables
Validation Level:	Level III
Laboratory:	APPL, Inc.
Sample Delivery Group (SDG):	49373/49374

Sample Identification

C077S641
C077S642
C077G251
C077R016
C077G174
C077G174MS
C077G174MSD

Introduction

This data review covers 2 soil samples and 5 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015 for Total Petroleum Hydrocarbons (TPH) as Extractables.

This review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999) as there are no current guidelines for the method stated above.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified a P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG. The review was based on QC data.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

N Presumptive evidence of presence of the constituent.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

Initial calibration of compounds was performed as required by the method.

The percent relative standard deviations (%RSD) of calibration factors for selected compounds were less than or equal to 20.0% .

A curve fit, based on the initial calibration, was established for quantitation for selected compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 15.0% QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample C077R016 was identified as a rinsate. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

IV. Accuracy and Precision Data

a. Surrogate Recovery

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for samples C077S641 and C077S642. Since these samples were diluted out, no data were qualified.

b. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
All soil samples in SDG 49373/49374	TPH as extractables	No MS/MSD associated with these samples.	MS/MSD required.	None	P

Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Target Compound Identification

Raw data were not reviewed for this SDG.

VI. Compound Quantitation and CRQLs

Raw data were not reviewed for this SDG.

VII. System Performance

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of this report if data has been summarized.

IX. Field Duplicates

No field duplicates were identified in this SDG.

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG 49373/49374

SDG	Sample	Compound	Flag	A or P	Reason
49373/ 49374	C077S641 C077S642	TPH as extractables	None	P	Matrix spike/Matrix spike duplicates

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG 49373/49374

No Sample Data Qualified in this SDG

NAS Alameda Point, CTO 077
Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG 49373/49374

No Sample Data Qualified in this SDG

APPENDIX G

ANALYTICAL DATA TABLES

N00236.002712
ALAMEDA POINT
SSIC NO. 5090.3

APPENDIX G – ANALYTICAL DATA TABLES

THIS RECORD CONTAINS LARGE VOLUMES OF DATA AND IS NOT REQUIRED TO BE PHYSICALLY LOCATED WITH THE ADMINISTRATIVE RECORD DOCUMENT.

DUE TO EXTENSIVE VOLUME, THIS DATA WILL NOT BE IMAGED.

TO VIEW THE DATA, CONTACT:

DIANE C. SILVA
RECORDS MANAGEMENT SPECIALIST
NAVAL FACILITIES ENGINEERING COMMAND SOUTHWEST
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132

TELEPHONE: (619) 532-3676

APPENDIX H

BACKGROUND COMPARISON

Appendix H
BACKGROUND COMPARISON

This appendix documents a comparison of background metals concentrations at Installation Restoration (IR) Site 35 to those at Alameda Point. This appendix is provided as supporting material to a more detailed description and evaluation of background metals presented in Section 4.3 of the main Remedial Investigation (RI)/Feasibility Study (FS) Report as well as additional statistical analysis for select metals in soil or groundwater at Area of Concern (AOC) 11/Environmental Baseline Survey (EBS) Parcels 78–79 and AOC 23.

COMPARISON OF SITEWIDE DATA TO ALAMEDA POINT BACKGROUND

Support material for the comparison of sitewide metals data to Alameda Point background data presented in Section 4.3 includes the following.

- Figure H-1 shows the colored (i.e., pink, yellow, and blue) soil background areas at Alameda Point (PRC Environmental Management, Inc. 1997).
- Figures H-2 through H-11 are scatter plots of ten metals (i.e., arsenic, barium, chromium, cobalt, copper, iron, manganese, nickel, vanadium, and zinc) in soil with aluminum. These plots show a strong correlation among the metals and aluminum. Similar scatter plots are presented for ten metals (i.e., aluminum, arsenic, barium, chromium, cobalt, copper, manganese, nickel, vanadium, and zinc) in soil to show the correlation with iron (Figures H-12 through H-21). The scales for the scatter plots are determined by the range of concentrations for the individual metals. For example, the y axes for the plots of aluminum versus each metal will all be the same but will be different than the y axes for the plots of iron versus each metal. The range of the x axes varies with the range of concentrations for the individual metal. Correlation coefficients are presented in Table 4-14 of the main RI/FS Report.
- Figures H-22 through H-32 are probability plots of the concentrations of metals in soil for the pink background data set and the IR Site 35 data set. Eleven metals (i.e., aluminum, arsenic, barium, chromium, cobalt, copper, iron, manganese, nickel, vanadium, and zinc) are presented on the probability plots.
- Analytical worksheets showing statistical parameters and graphical presentations of data for arsenic, iron, manganese, and vanadium are included under separate cover at the end of this appendix.

STATISTICAL COMPARISON OF SELECT METALS AT AOC 11/EBS PARCELS 78–79 AND AOC 23 TO ALAMEDA POINT BACKGROUND

Statistical comparisons of select metals in soil and groundwater at AOC 11/EBS Parcels 78–79 and AOC 23 were conducted. Different statistical approaches were used to accommodate differences in the characteristics of the data set.

AOC 11/EBS PARCELS 78–79

The maximum concentrations of arsenic, iron, and manganese in groundwater are above the 95th percentiles in background but below the maximum concentrations in background. A graphical comparison of the data for these metals with the Alameda Point background data set provides evidence that the concentrations of these metals are not different from background. Individual value plots of groundwater concentrations for three metals (arsenic, iron, and manganese) are presented on Figures H-33 through H-35.

The maximum concentration of cadmium in soil is slightly above the 95th percentile but well below the maximum in pink background. Cadmium was evaluated by examining a dot plot of the data, which is shown on Figure H-36. The dot plot indicates that cadmium is not above background.

AOC 23

In soil, statistical analysis methods were used to compare concentrations of metals to Alameda Point pink background concentrations for aluminum, arsenic, chromium, iron, manganese, thallium, and vanadium. Results of these analyses are shown in Table H-1. Only iron and thallium have concentrations above background.

The Wilcoxon rank sum (WRS) and quantile tests were performed if both the study area and background data sets had at least 50 percent detected values. All analytes except thallium met this criterion. Thallium was assumed to be above background because there are detected concentrations in the study area data but not in the background data.

Both the WRS and quantile tests showed that aluminum, chromium, manganese, and vanadium are not above background. Iron was shown to be above background by the WRS and quantile tests. Arsenic was also analyzed using the two-sample t-test because the WRS and quantile tests gave contradictory results. Even though the arsenic data are not normally distributed, the t-test is robust to deviations from normality, particularly for large sample sizes (U.S. EPA 2000). The F-test for equality of variance showed the variances for site and background arsenic data to be equivalent, so the standard t-test was applied (versus Satterthwaite's two-sample t-test, which does not require equal variances). The t-test indicates that arsenic site concentrations are not above background.

Statistical tests were conducted using the software EnvironmentalStats for S-Plus (Millard 2002). A significance level of 0.05 was used, and nondetects were set equal to one-half the reporting limit.

In groundwater, a graphical comparison (Figure H-33) of arsenic concentrations at AOC 23 with those in background shows that these populations are similar.

REFERENCES

Millard, S.P. 2002. EnvironmentalStats for S-Plus, User's Manual for Version 2.0. Springer, second edition, 264 pages.

PRC Environmental Management, Inc. 1997. Samples for Use as Background, Naval Air Station Alameda, Alameda, California. Consultant's report for the Department of the Navy. CLEAN contract number N62474-88-D-5086.

United States Environmental Protection Agency. 2000. Guidance for Data Quality Assessment – Practical Methods for Data Analysis. EPA QA/G-9, QA00 update. Office of Research and Development, U.S. Environmental Protection Agency, Washington, DC. July. Document number EPA/600/R-96/084, p. 3-23.

U.S. EPA. *See* United States Environmental Protection Agency.

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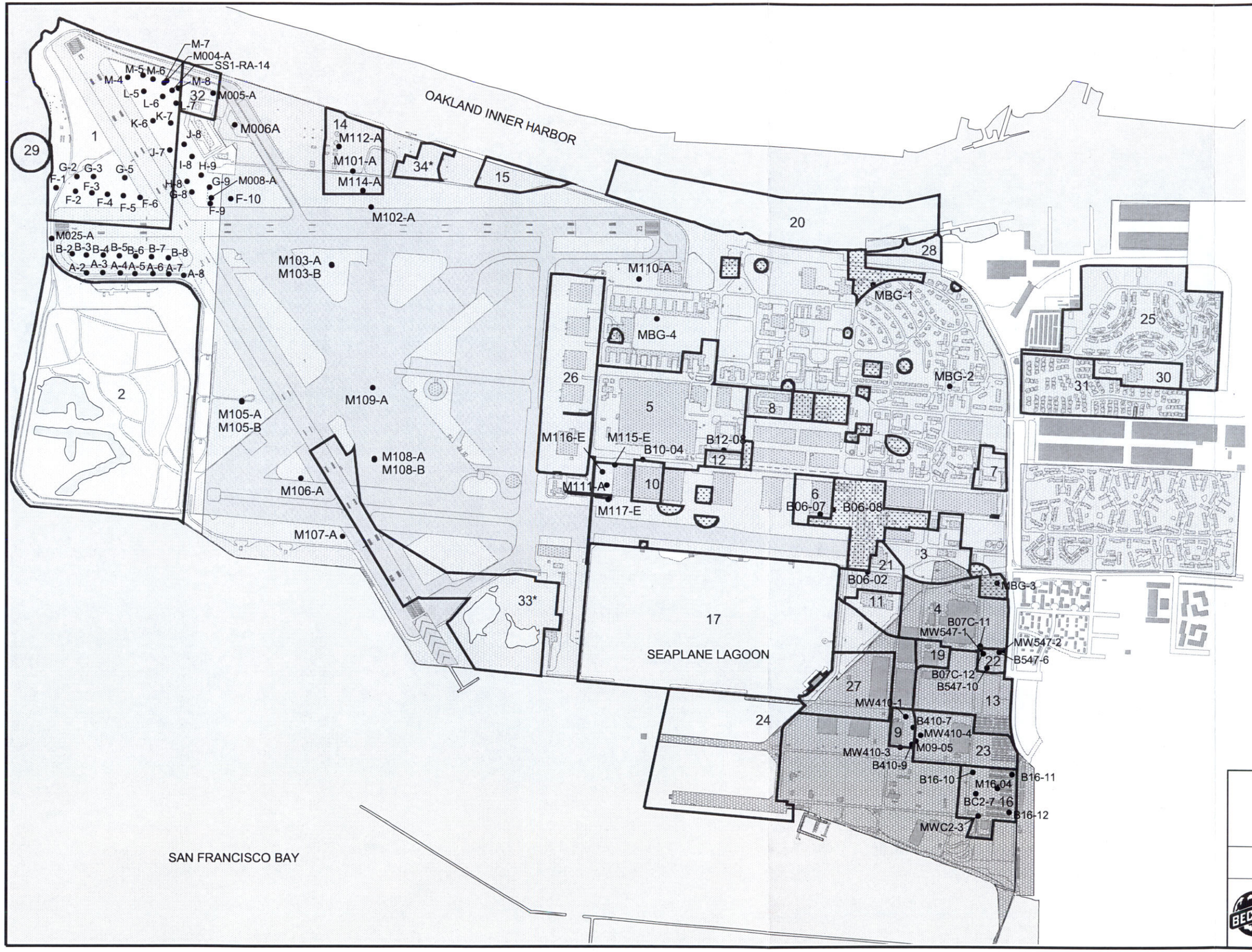


LEGEND

- MBG-4 — SOIL SAMPLE LOCATION
- BUILDING OR STRUCTURE
- ROAD OR RUNWAY
- FILL AREA 1
- FILL AREA 2
- FILL AREA 3
- WATER
- IR SITE BOUNDARY
- AOC BOUNDARIES WITHIN IR SITE 35

NOTES:

*SITE BOUNDARIES FOR IR SITES 33 AND 34 ARE ESTIMATED AND THEREFORE SUBJECT TO CHANGE

IR – INSTALLATION RESTORATION (PROGRAM)

RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

SOURCE:

PRC ENVIRONMENTAL MANAGEMENT, INC. 1997. SAMPLES FOR USE AS BACKGROUND, LETTER REPORT, NAVAL AIR STATION (NAS) ALAMEDA, ALAMEDA, CALIFORNIA. PREPARED FOR U.S. DEPARTMENT OF THE NAVY, ENGINEERING FIELD ACTIVITY WEST, NAVAL FACILITIES ENGINEERING COMMAND, SAN BRUNO, CALIFORNIA. FEBRUARY 6.

N

1200 0 1200 Feet

RI/FS Report for IR Site 35

Figure H-1

Soil Background Areas

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 7/19/06
File No.: 077L14597
Job No.: 23818-077
Rev No.: B

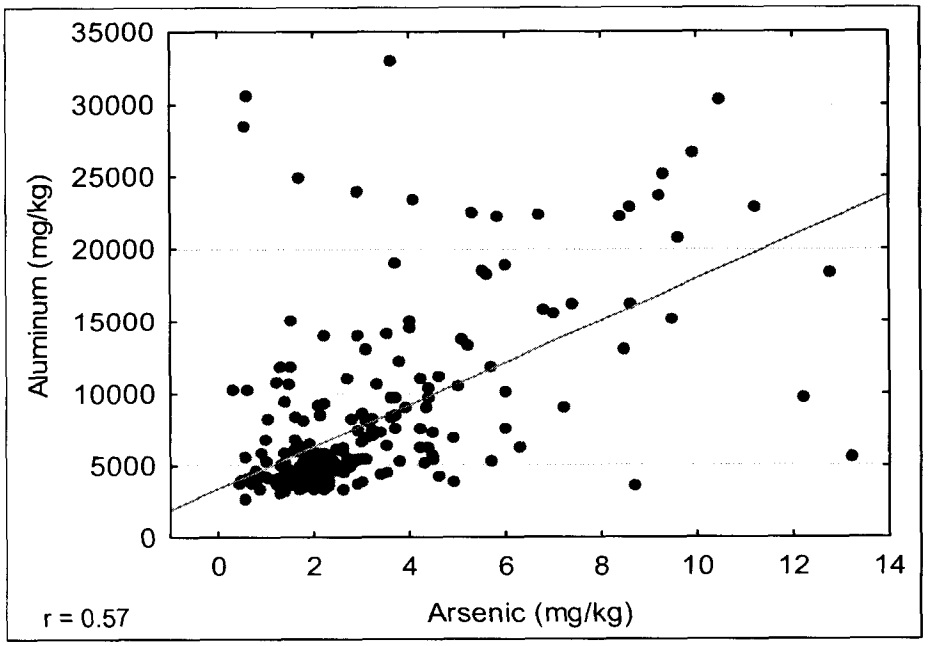


Figure H-2
Scatter Plot of Aluminum Versus Arsenic in Soil

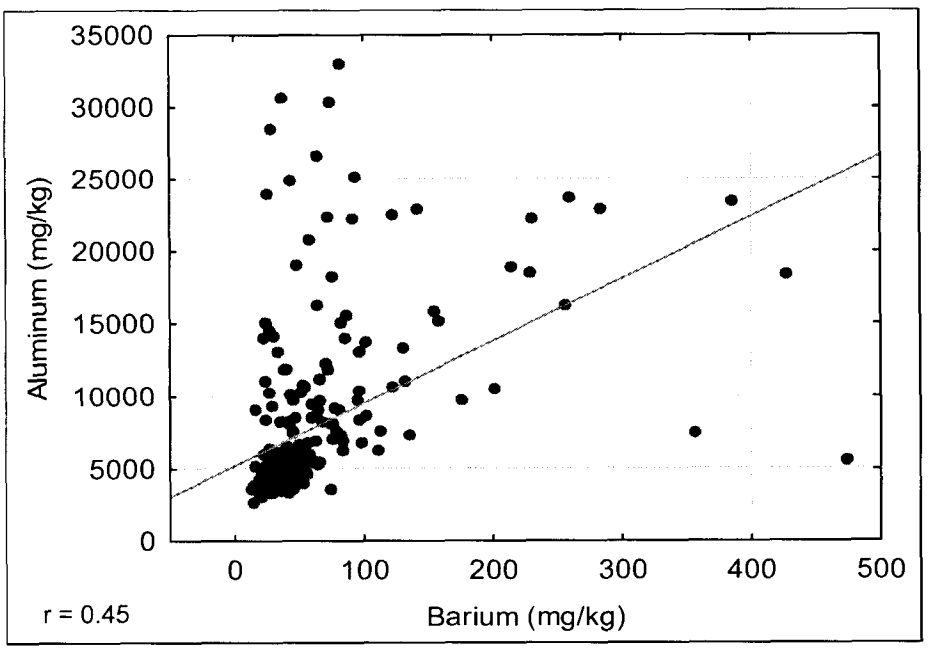


Figure H-3
Scatter Plot of Aluminum Versus Barium in Soil

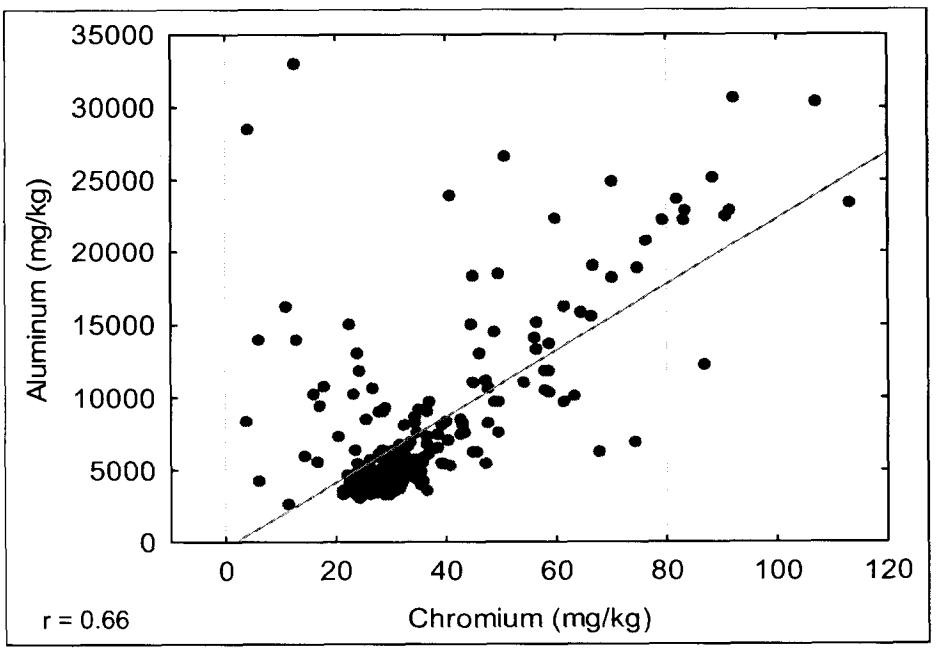


Figure H-4
Scatter Plot of Aluminum Versus Chromium in Soil

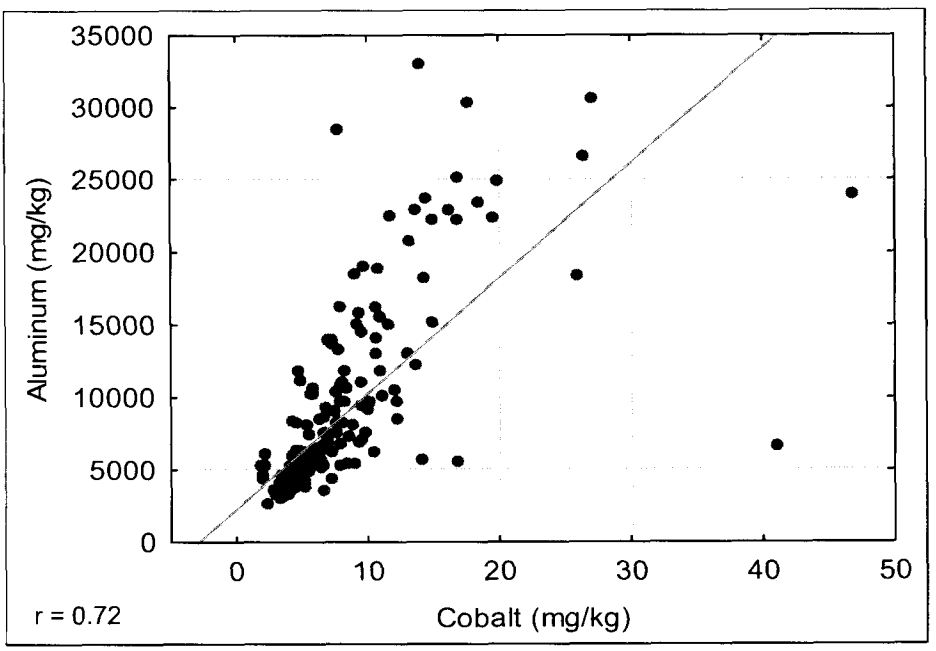


Figure H-5
Scatter Plot of Aluminum Versus Cobalt in Soil

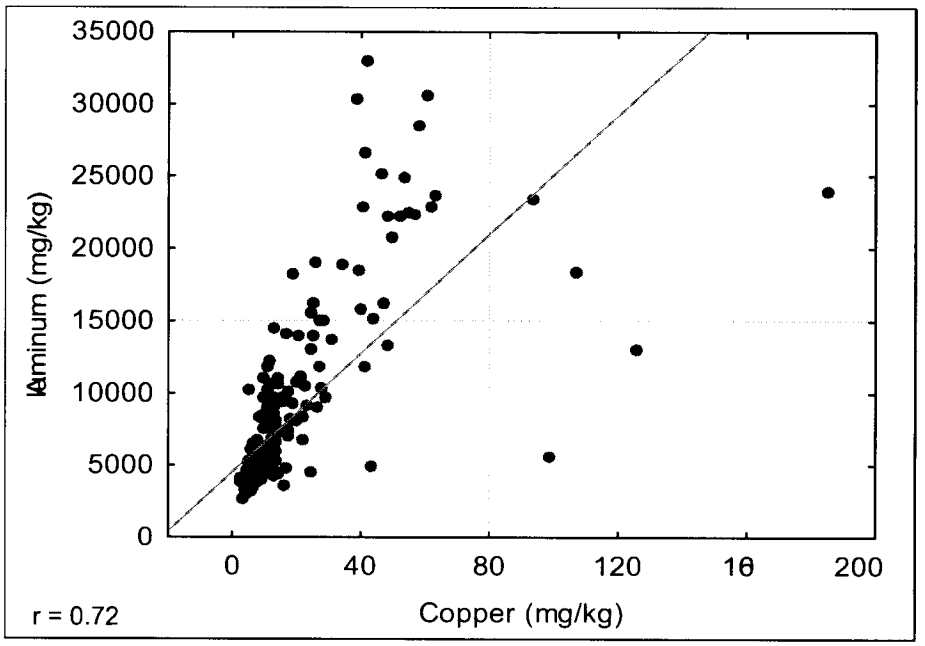


Figure H-6
Scatter Plot of Aluminum Versus Copper in Soil

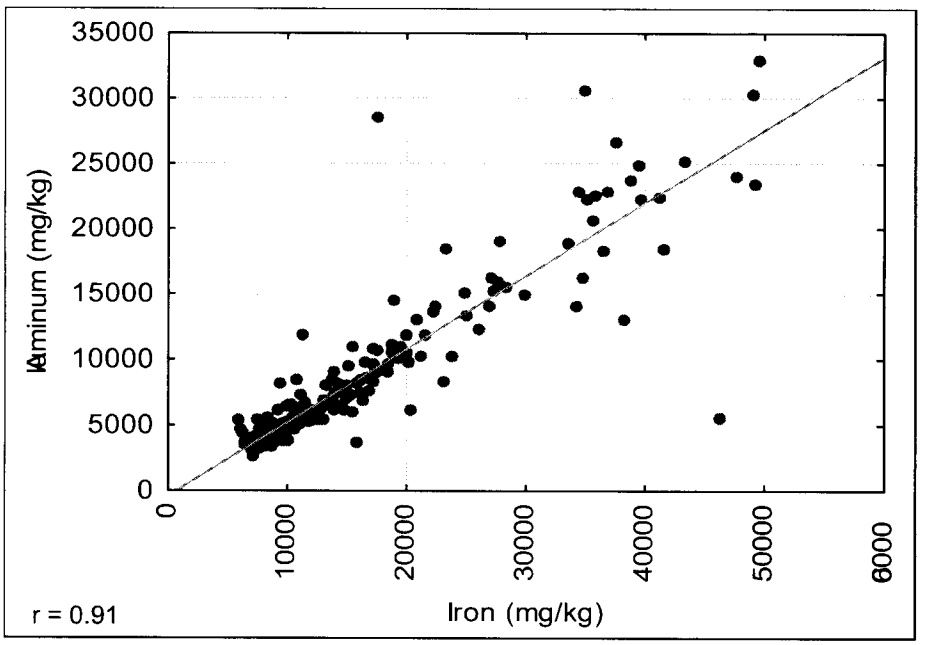


Figure H-7
Scatter Plot of Aluminum Versus Iron in Soil

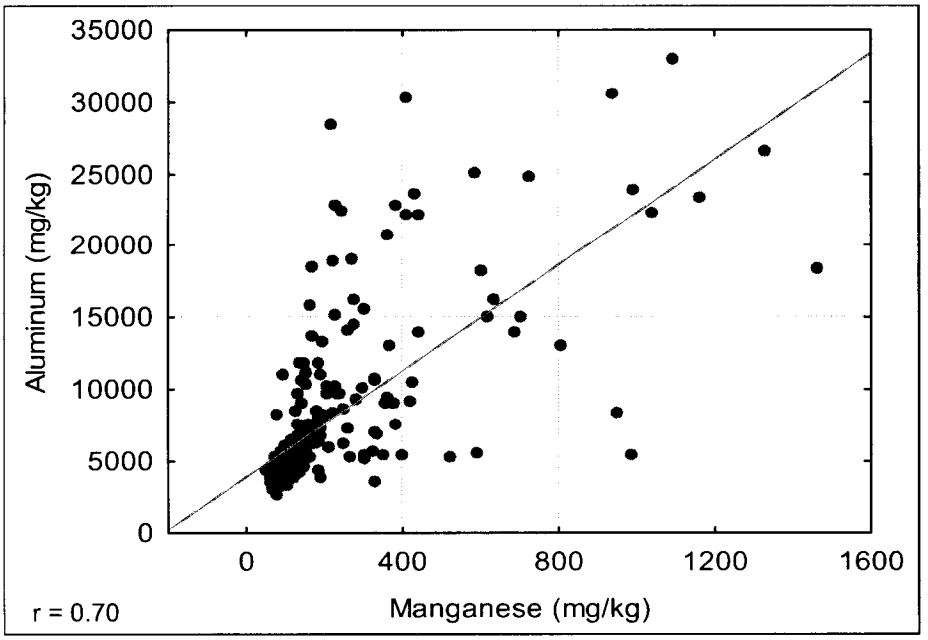


Figure H-8
Scatter Plot of Aluminum Versus Manganese in Soil

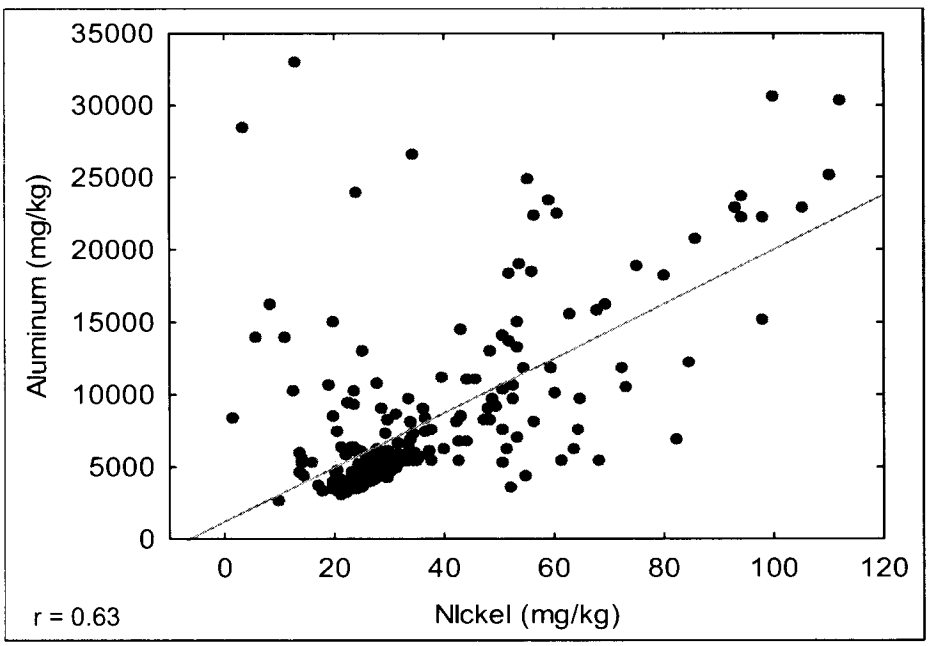


Figure H-9
Scatter Plot of Aluminum Versus Nickel in Soil

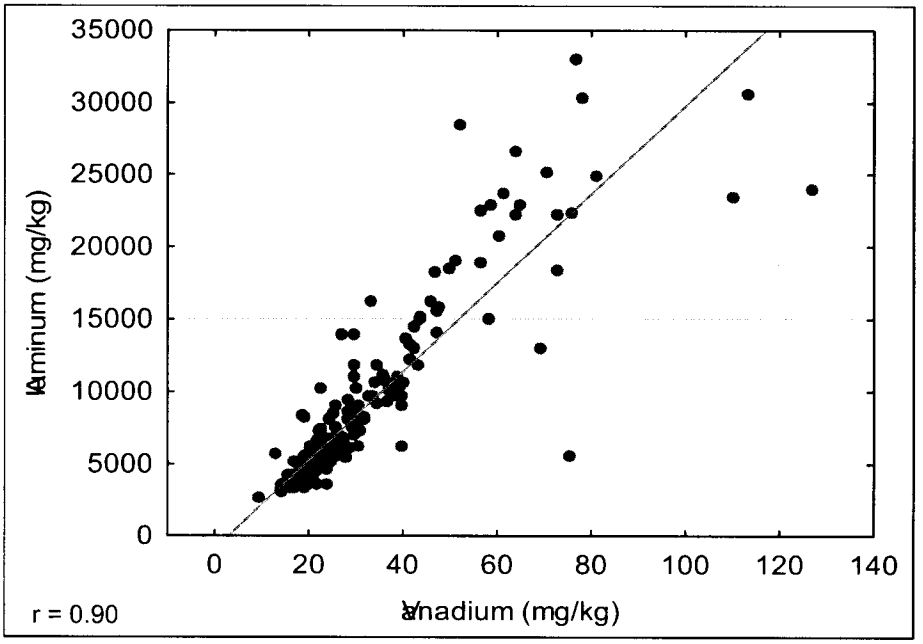


Figure H-10
Scatter Plot of Aluminum Versus Vanadium in Soil

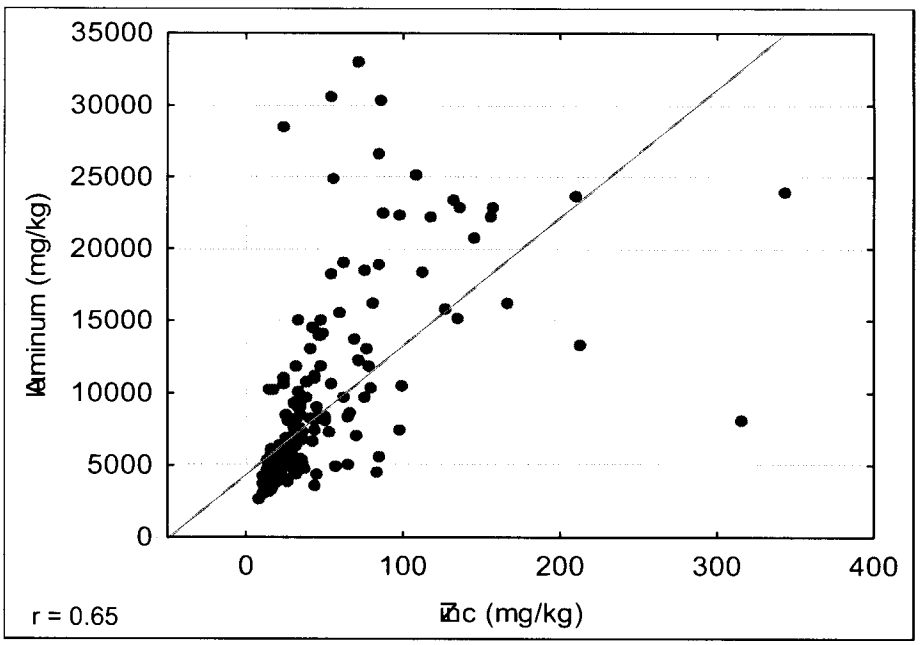


Figure H-11
Scatter Plot of Aluminum Versus Zinc in Soil

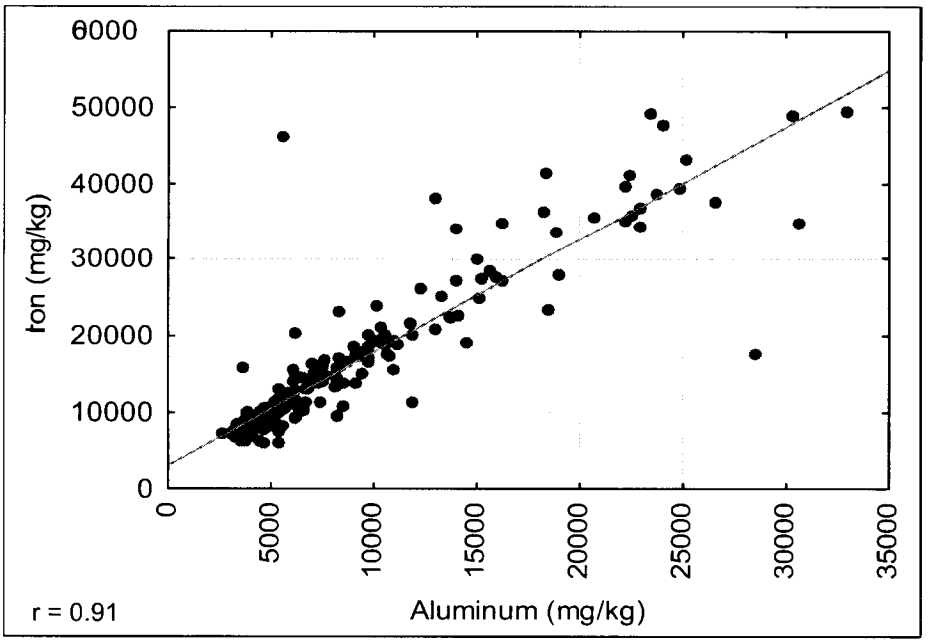


Figure H-12
Scatter Plot of Iron Versus Aluminum in Soil

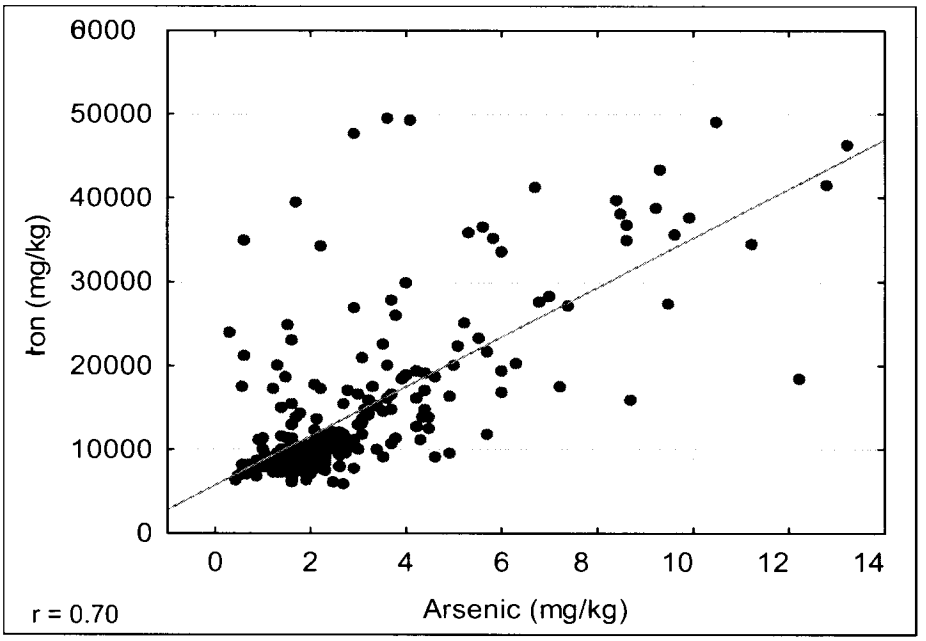


Figure H-13
Scatter Plot of Iron Versus Arsenic in Soil

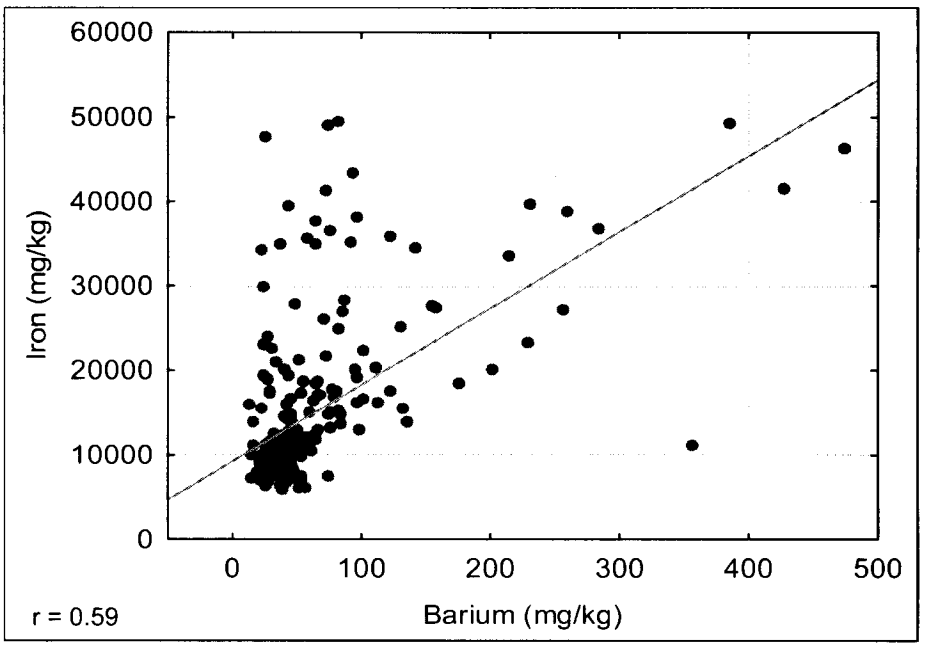


Figure H-14
Scatter Plot of Iron Versus Barium in Soil

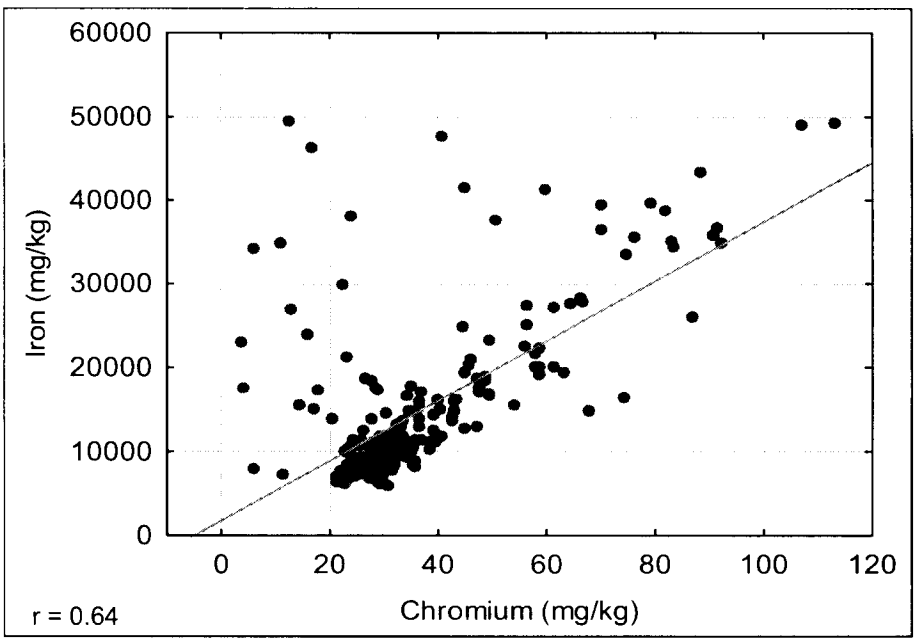


Figure H-15
Scatter Plot of Iron Versus Chromium in Soil

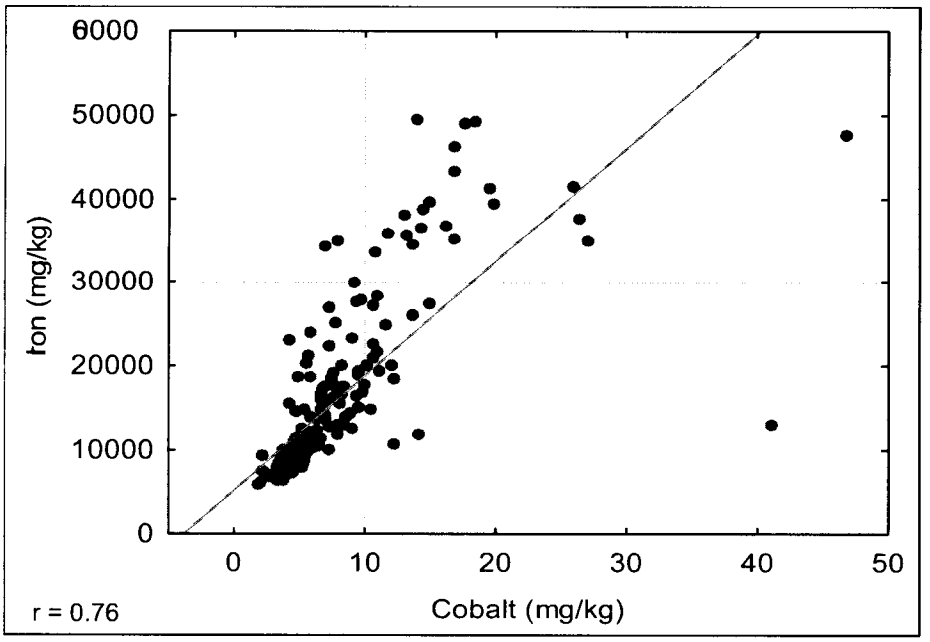


Figure H-16
Scatter Plot of Iron Versus Cobalt in Soil

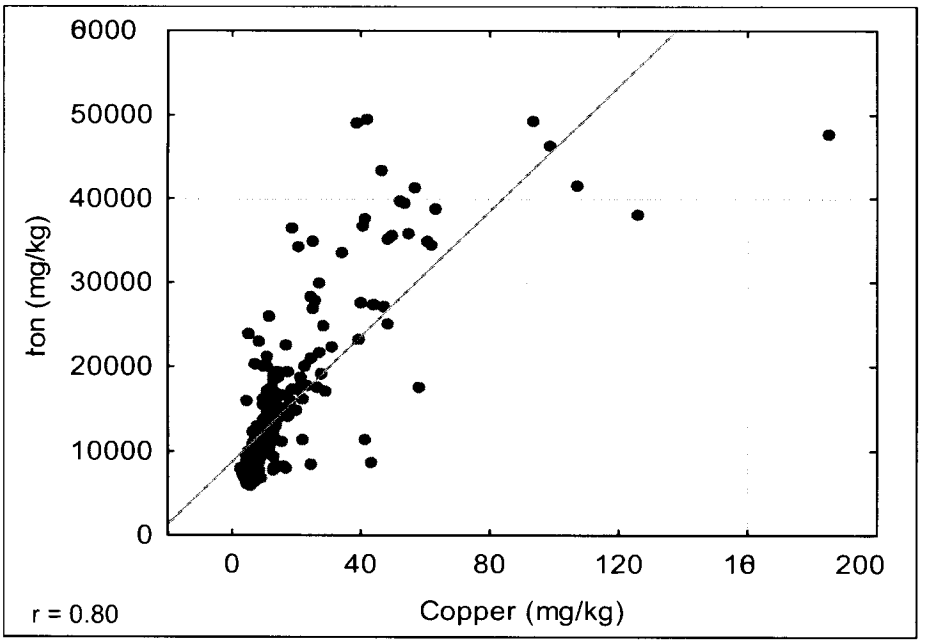


Figure H-17
Scatter Plot of Iron Versus Copper in Soil

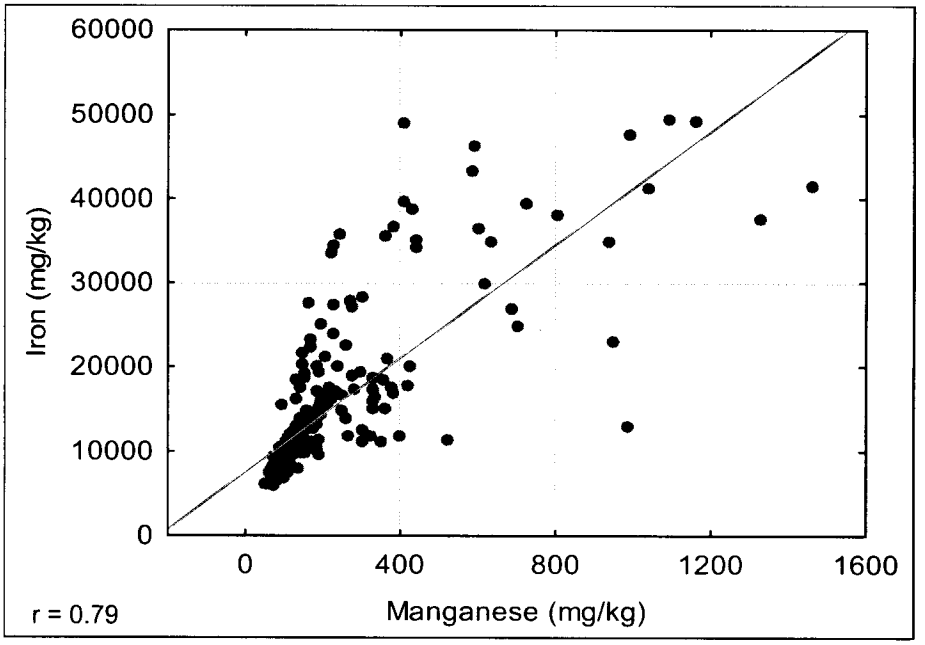


Figure H-18
Scatter Plot of Iron Versus Manganese in Soil

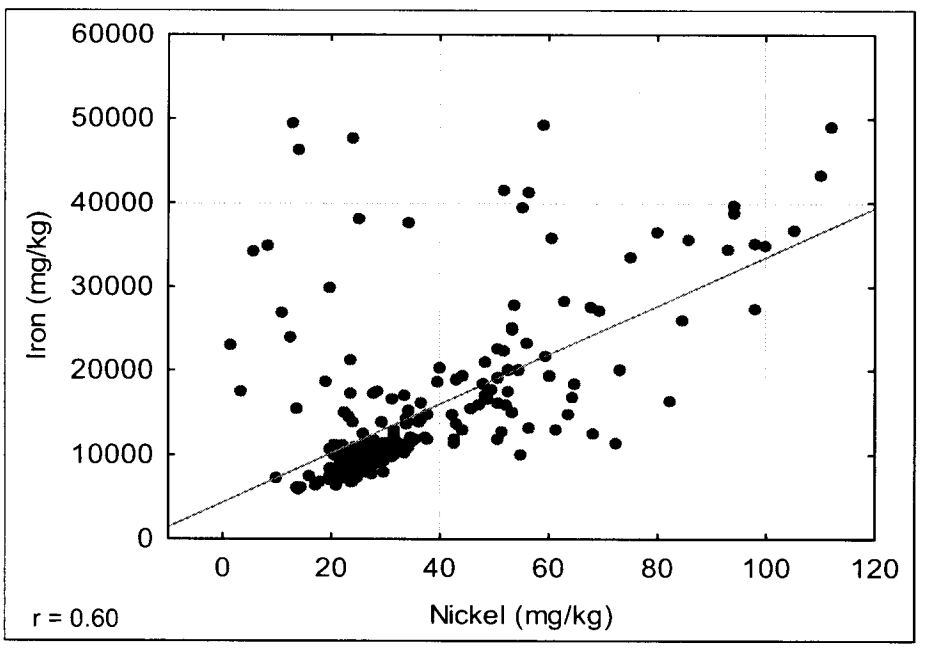


Figure H-19
Scatter Plot of Iron Versus Nickel in Soil

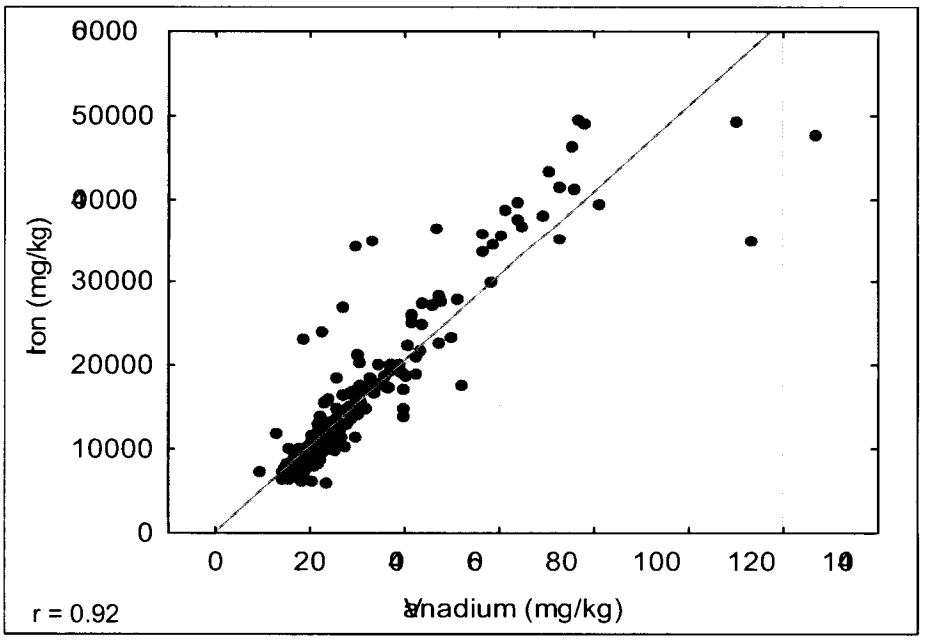


Figure H-20
Scatter Plot of Iron Versus Vanadium in Soil

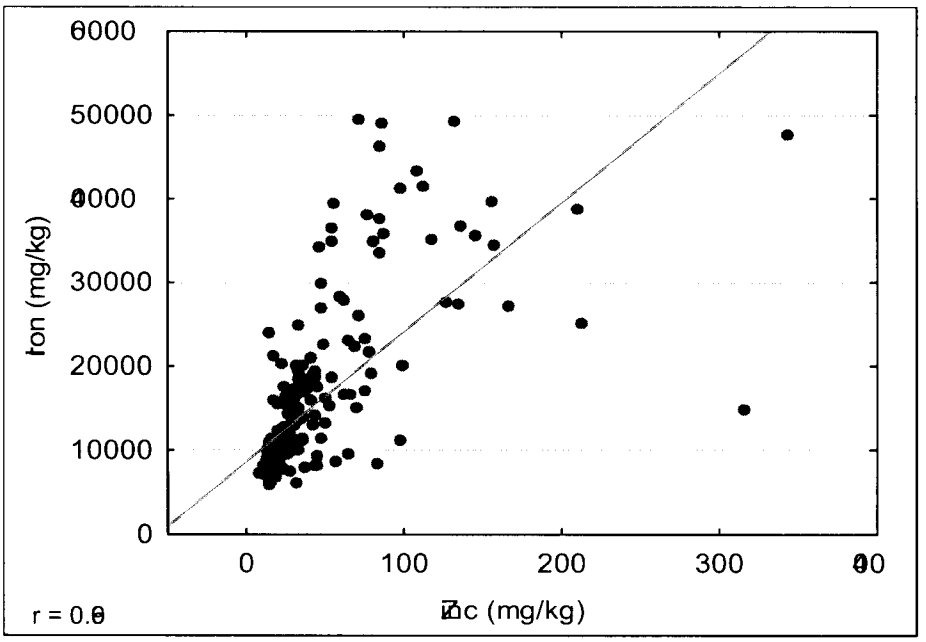
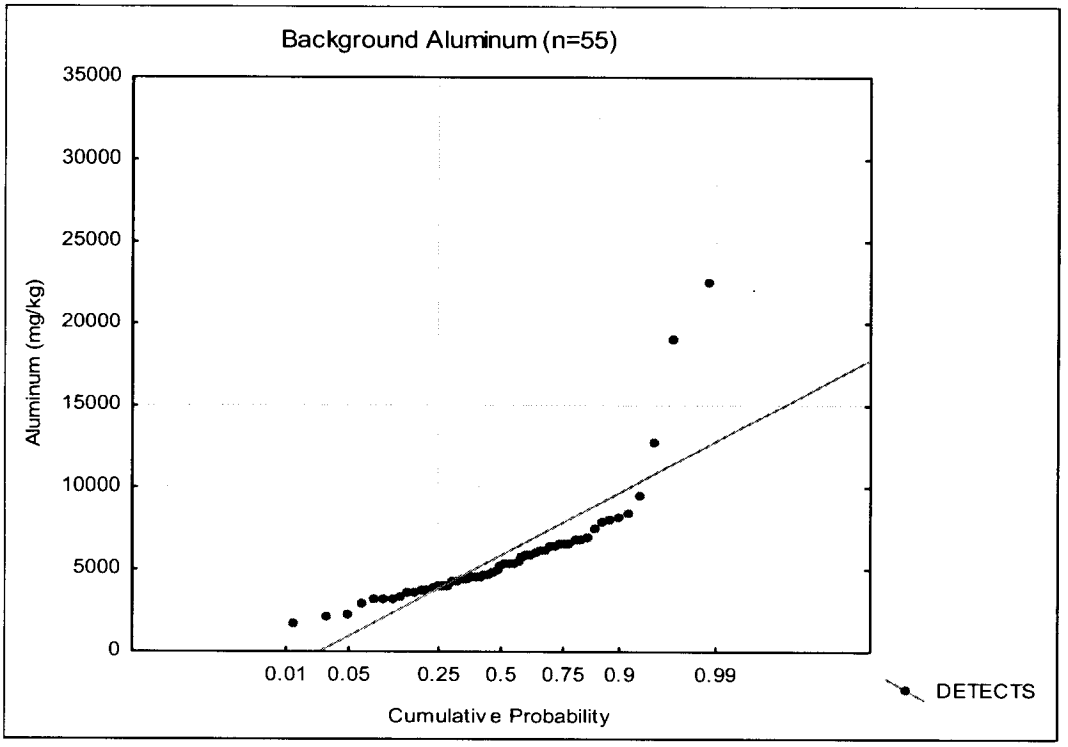


Figure H-21
Scatter Plot of Iron Versus Zinc in Soil



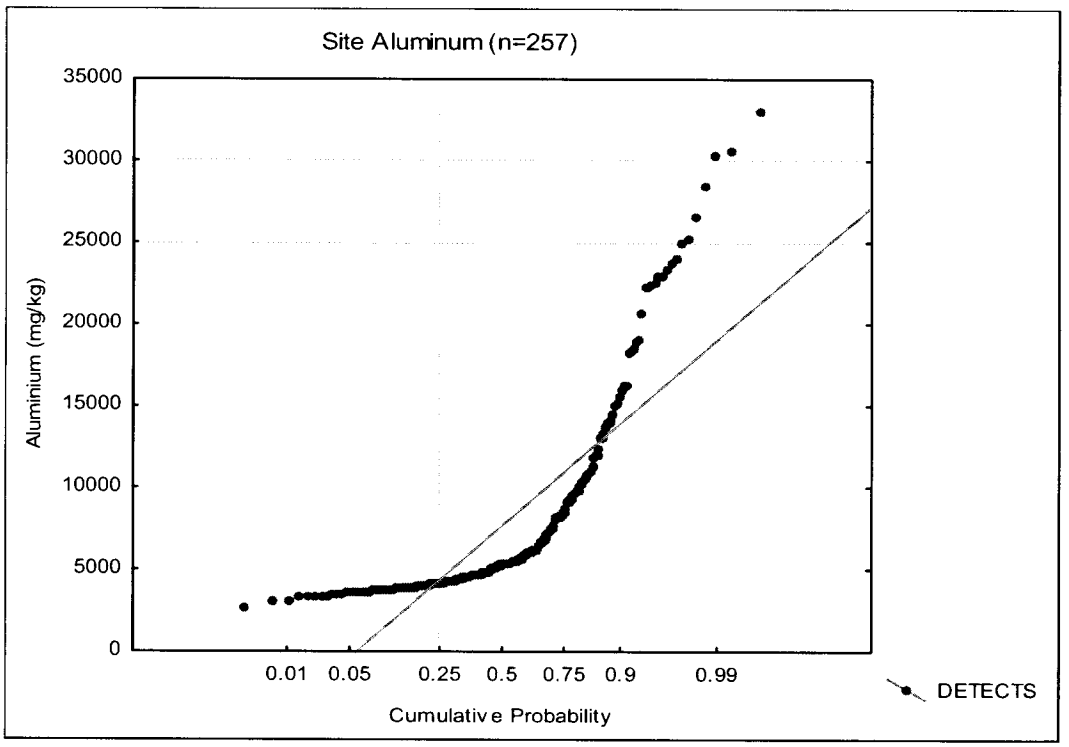
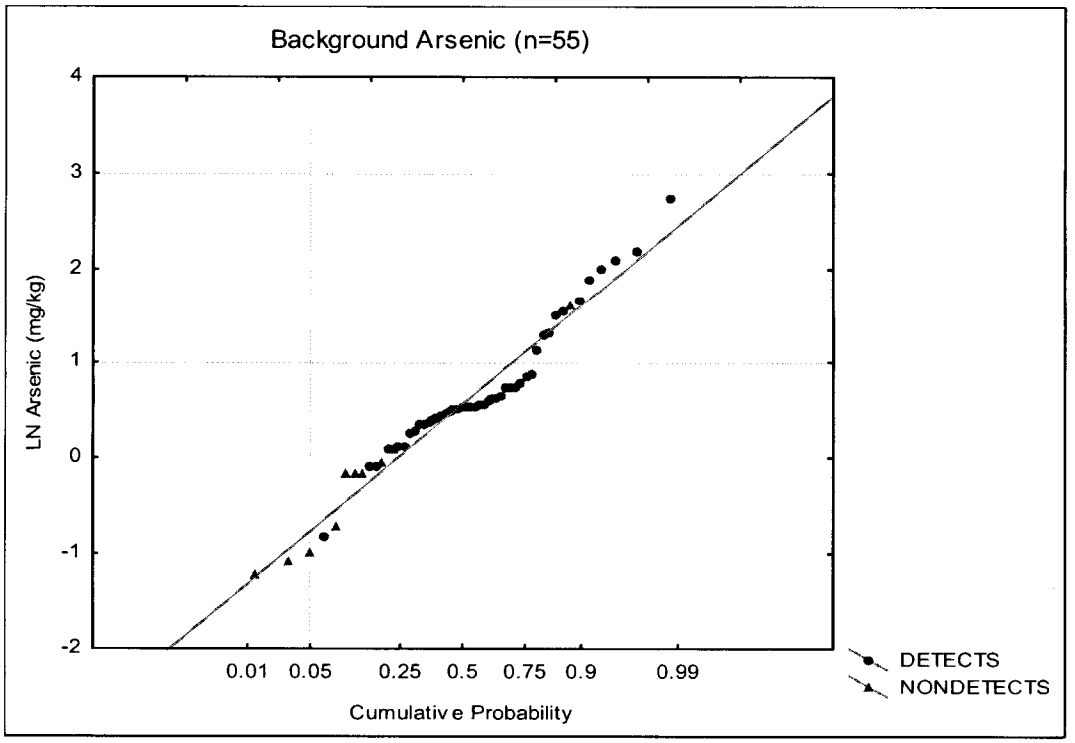


Figure H-2
Probability Plots of Aluminum Concentrations in Soil for Pinal Background and Site 5



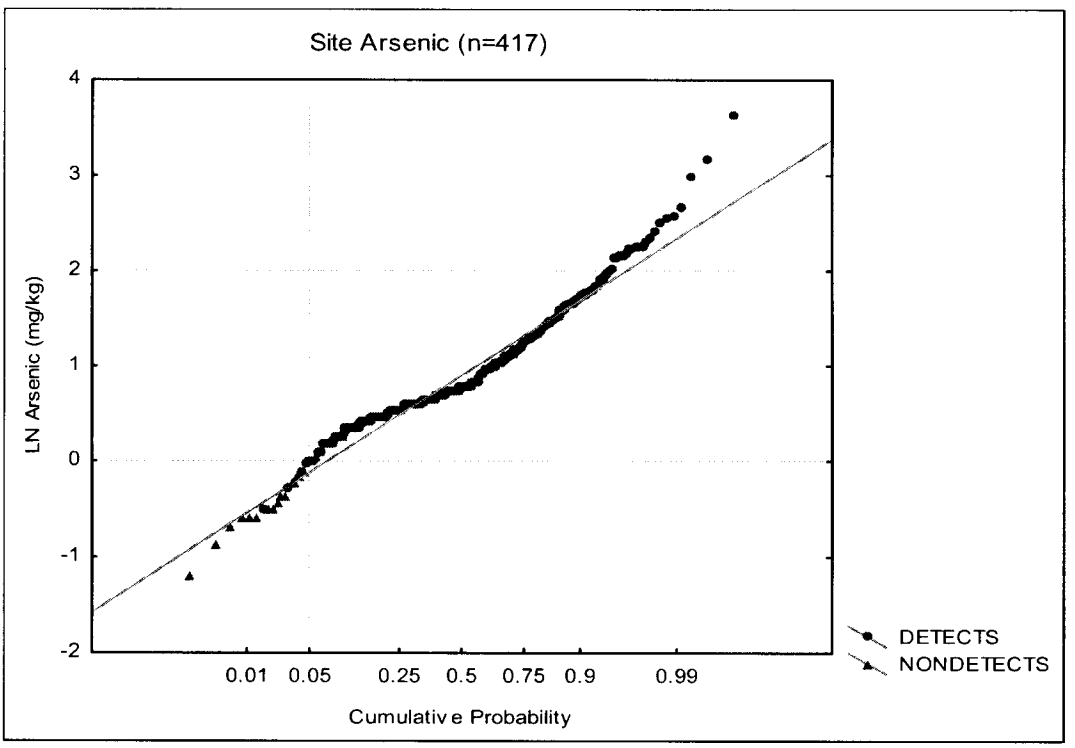
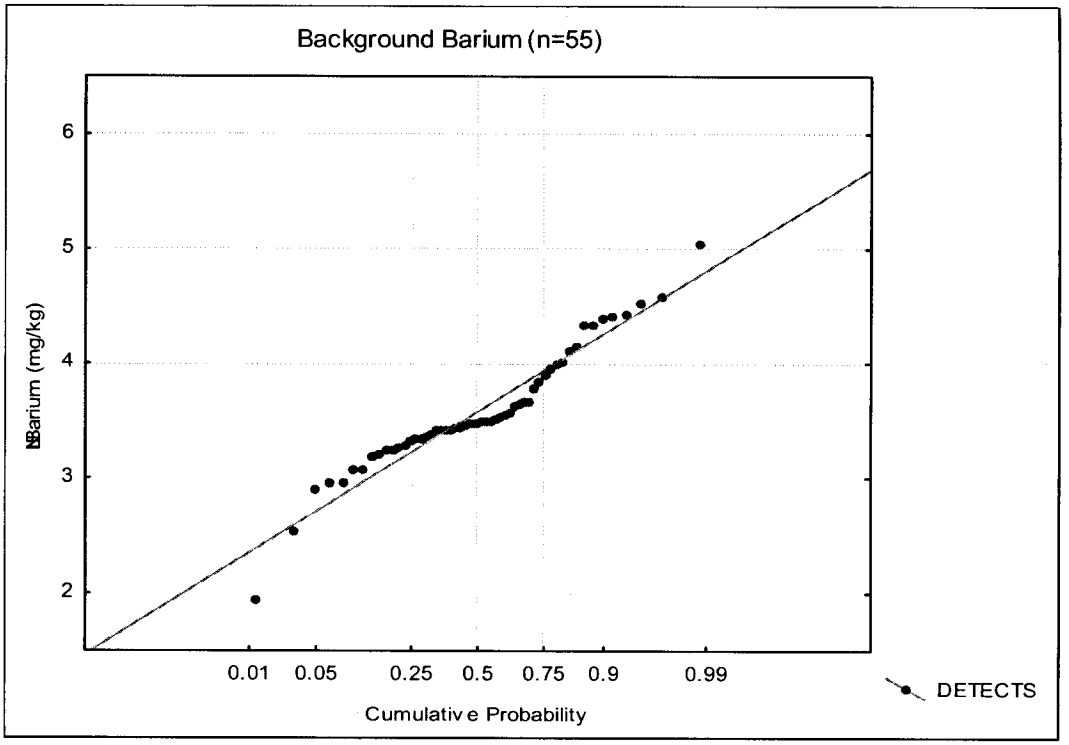


Figure H-2
Probability Plots of Arsenic Concentrations in Soil for Pinal Background and Site 5



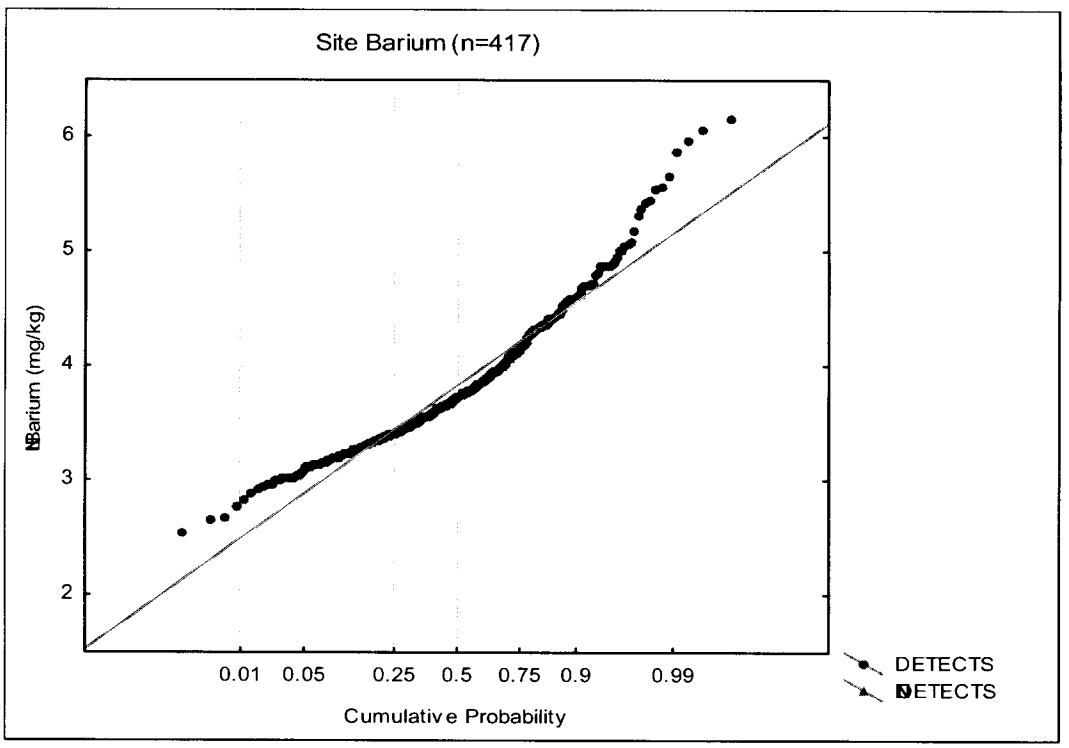
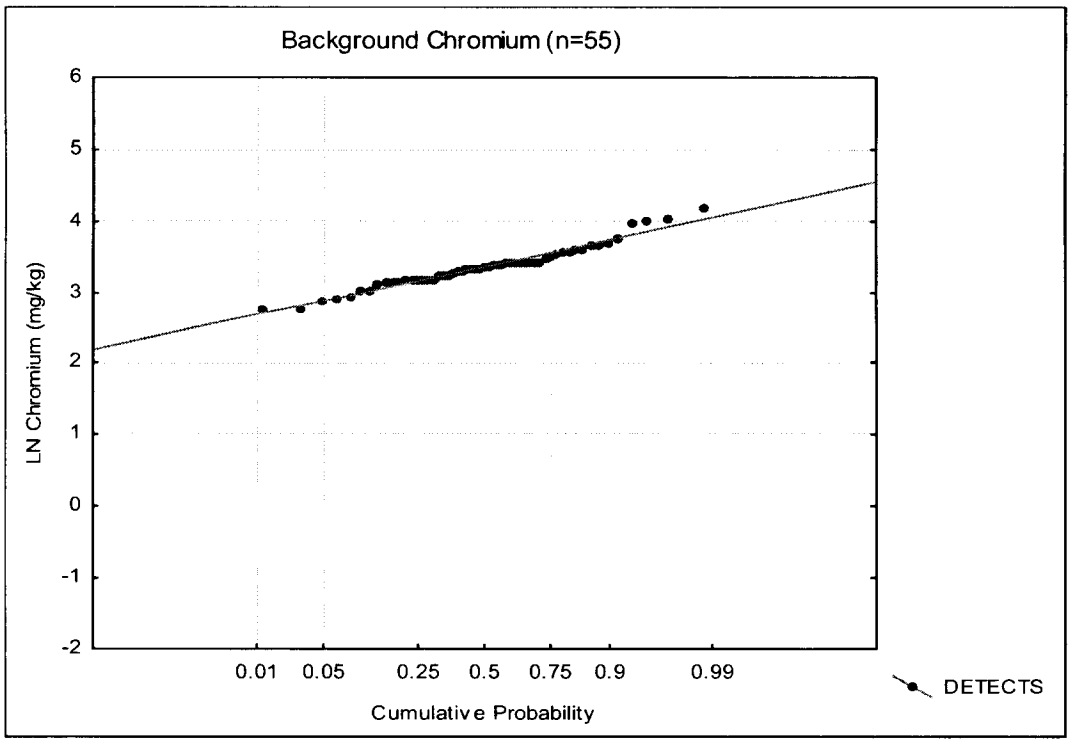


Figure H-22
Probability Plots of Barium Concentrations in
Soil for Pinellas Background and Site 5



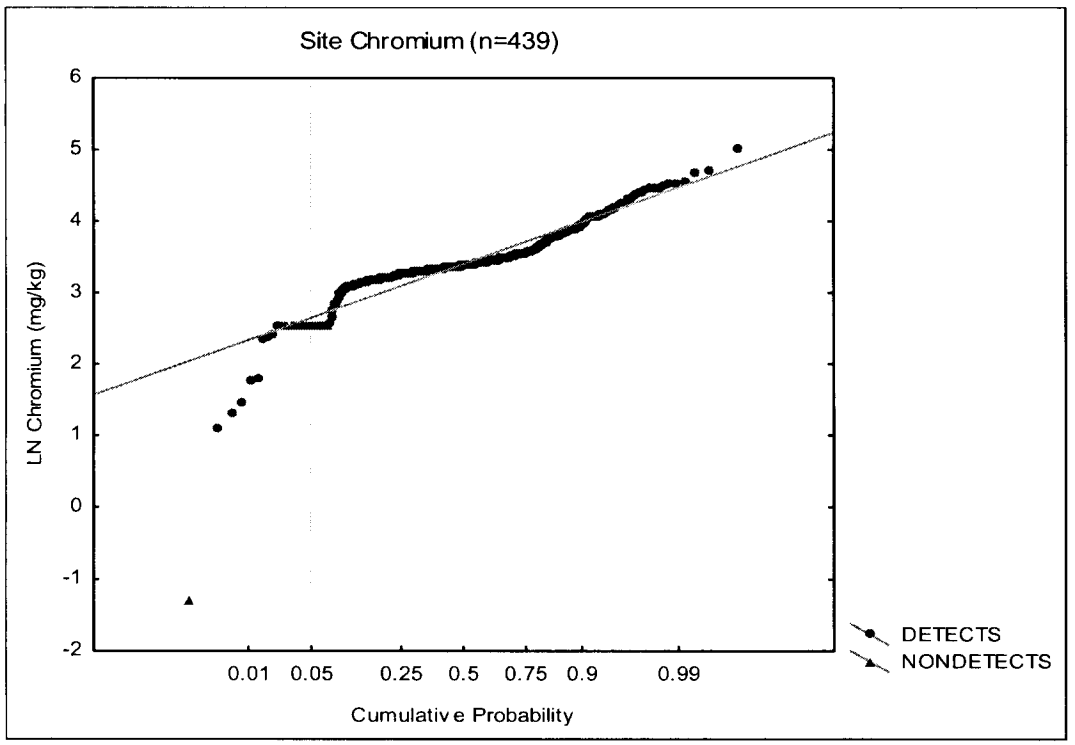
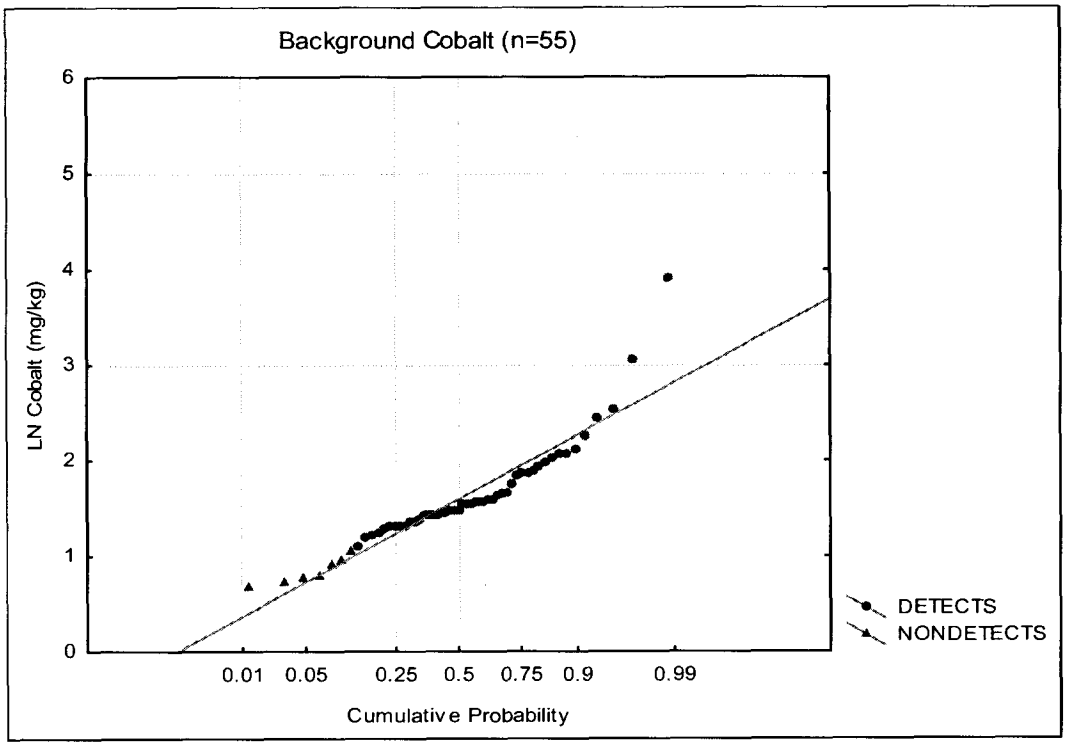


Figure H-22
Probability Plots of Chromium Concentrations in Soil for Background and Site 5



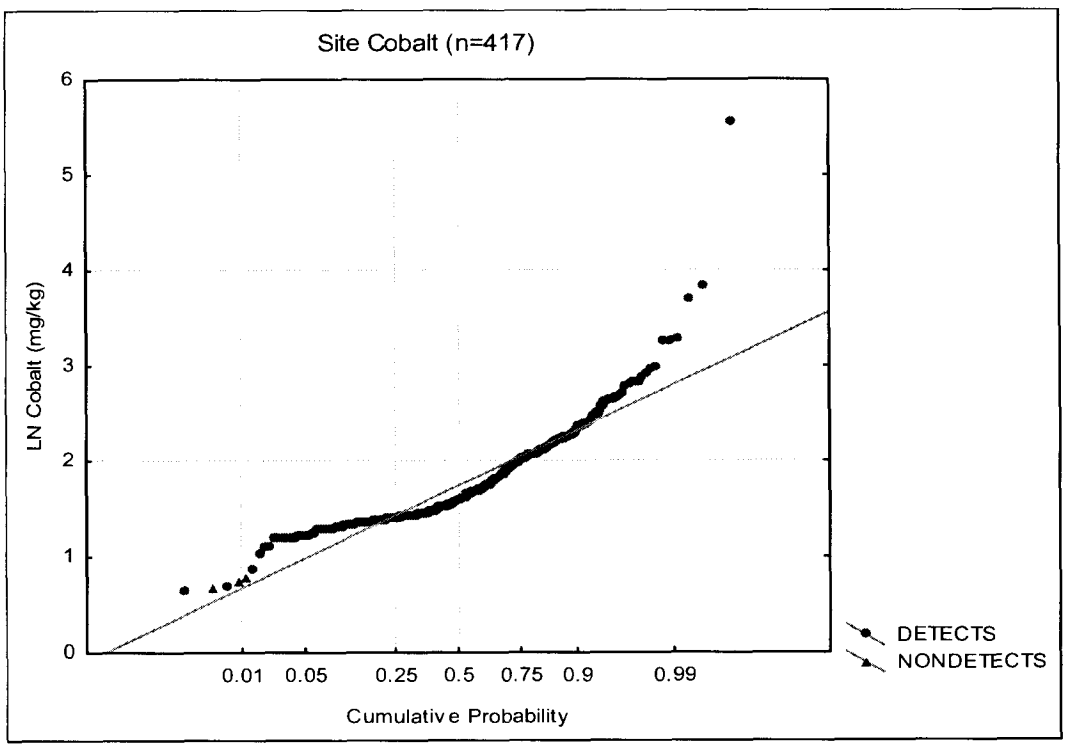
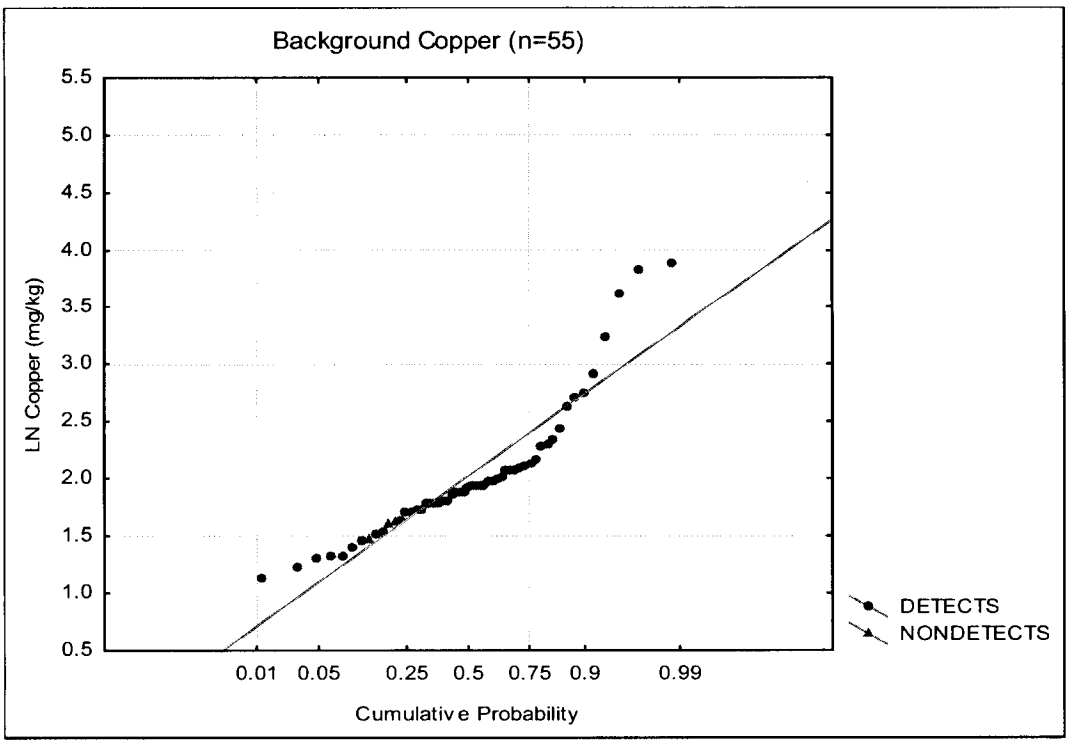


Figure H-26
Probability Plots of Cobalt Concentrations in Soil for Pink Background and Site 35



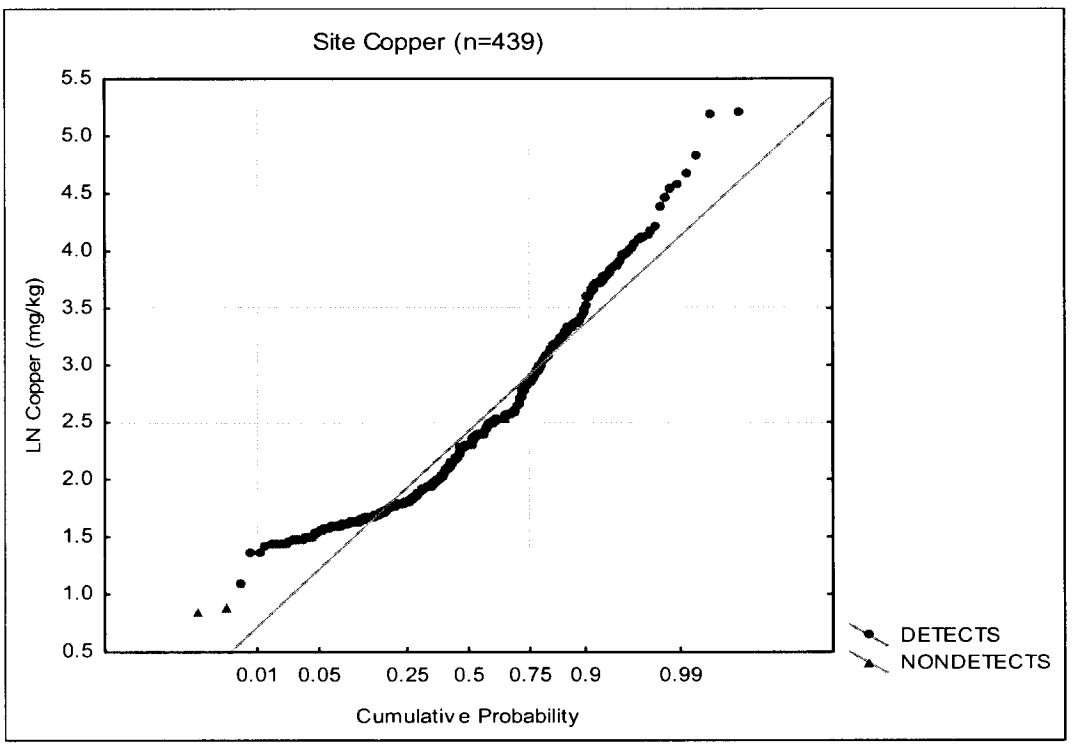
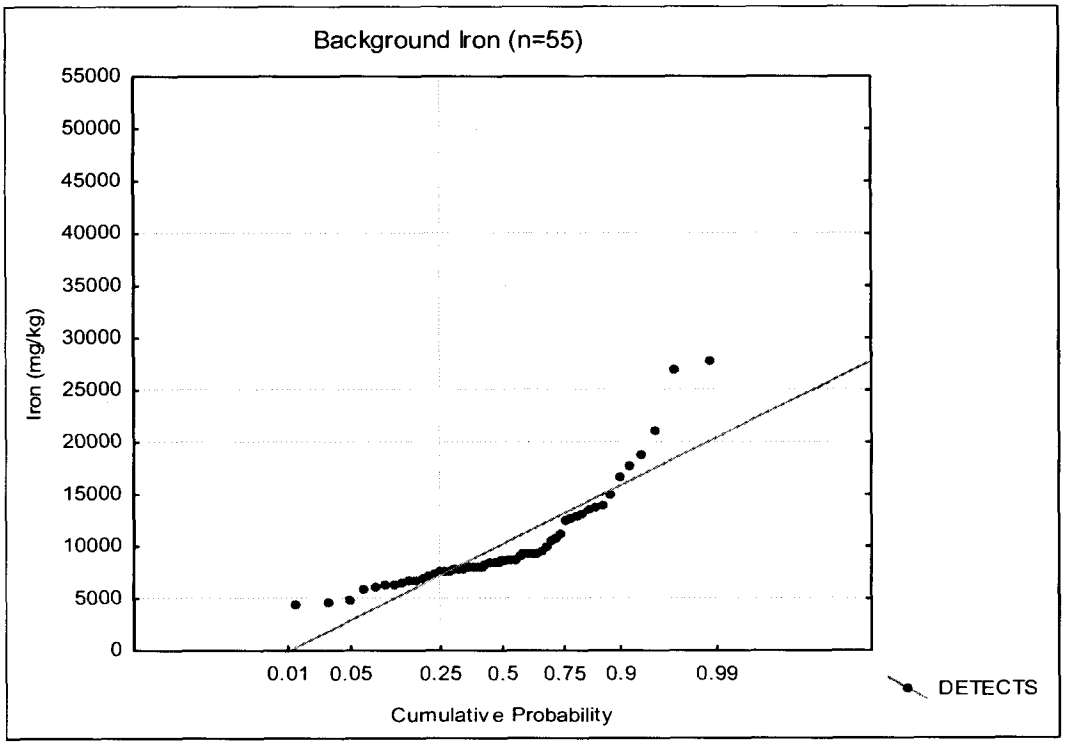


Figure H-27
Probability Plots of Copper Concentrations in Soil for Pink Background and Site 35



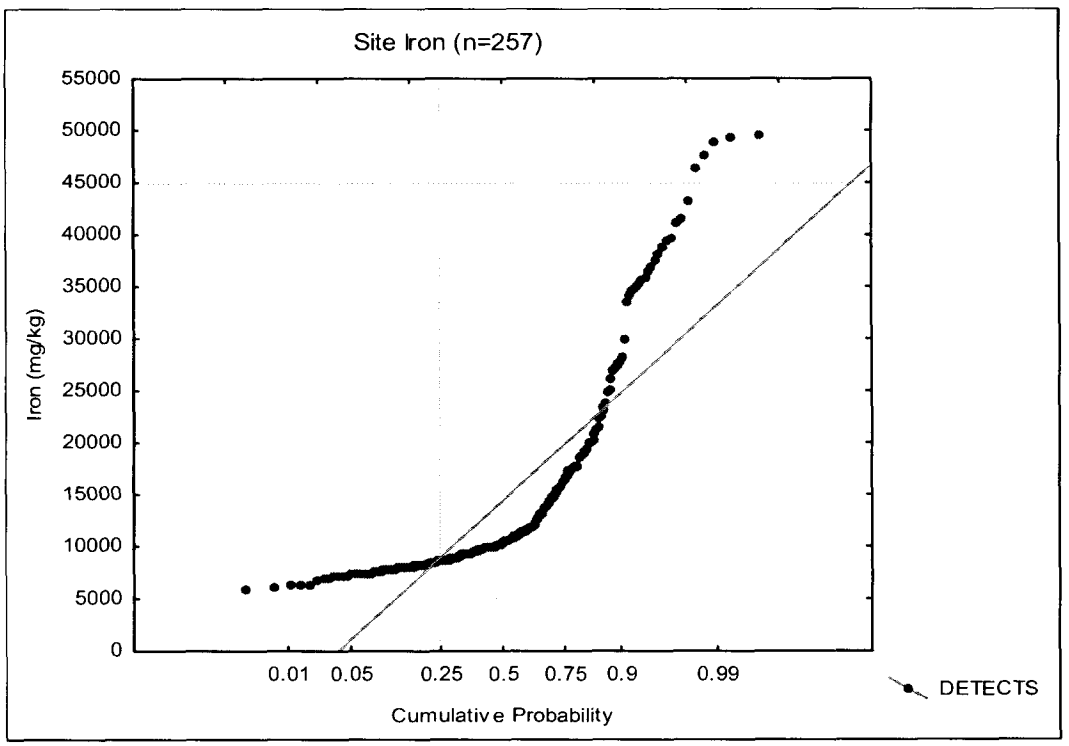
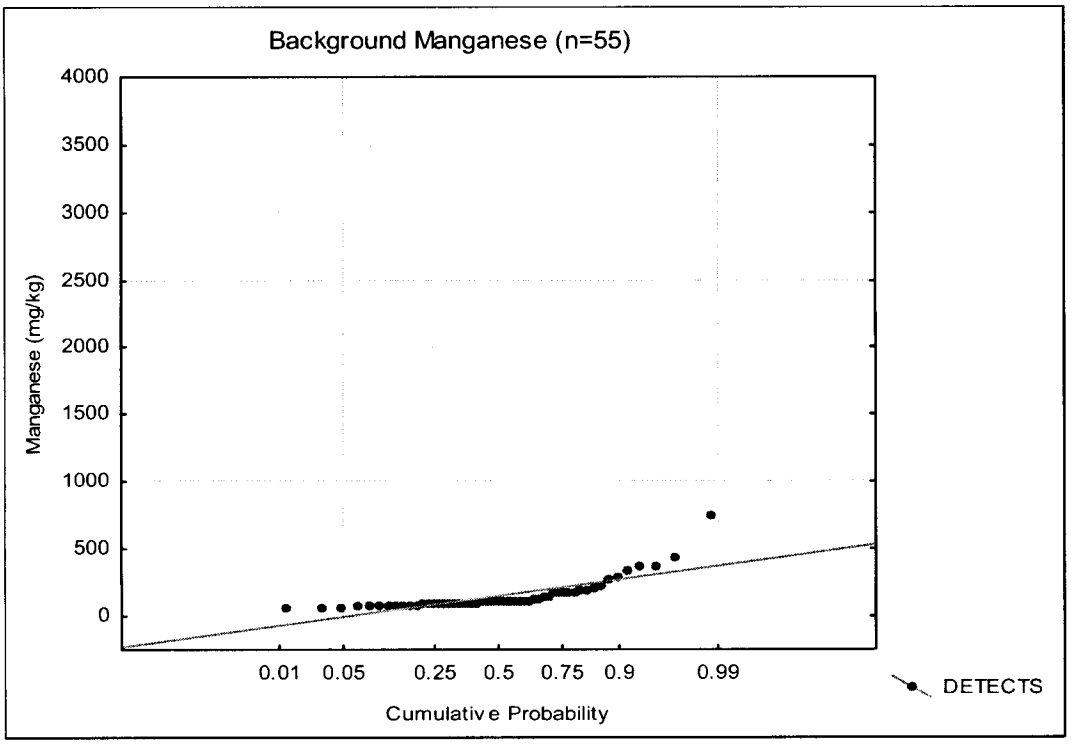


Figure H-28
Probability Plots of Iron Concentrations in Soil for Pink Background and Site 35



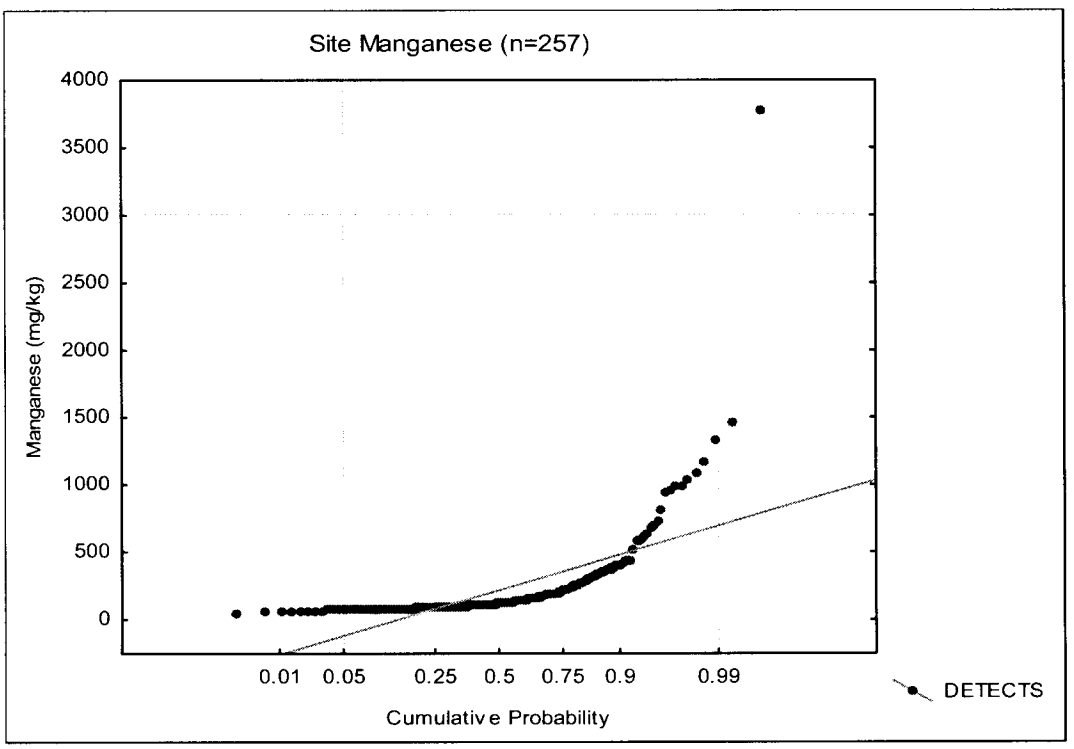
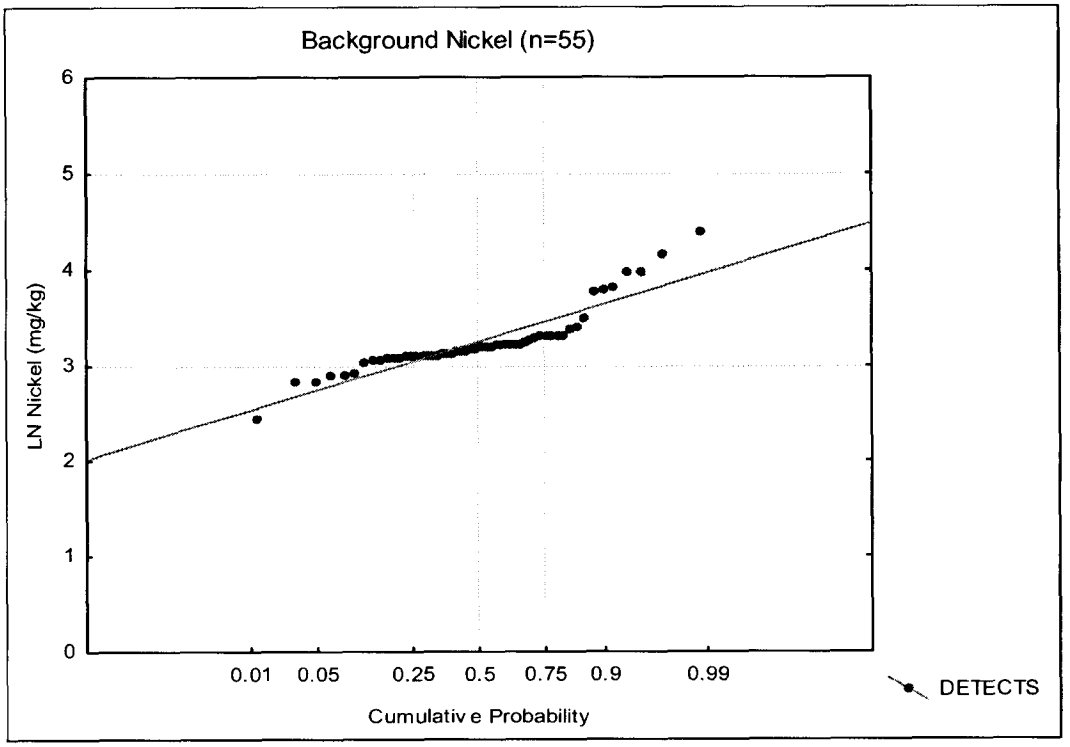


Figure H-29
Probability Plots of Manganese Concentrations in Soil for Pink Background and Site 35



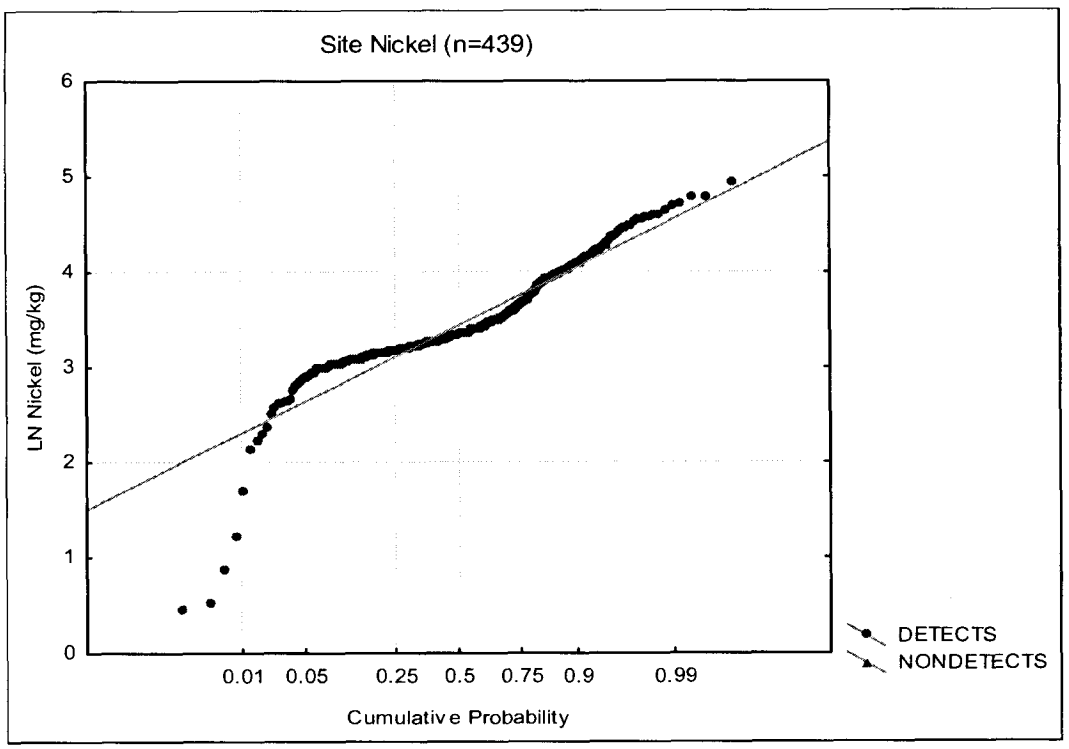
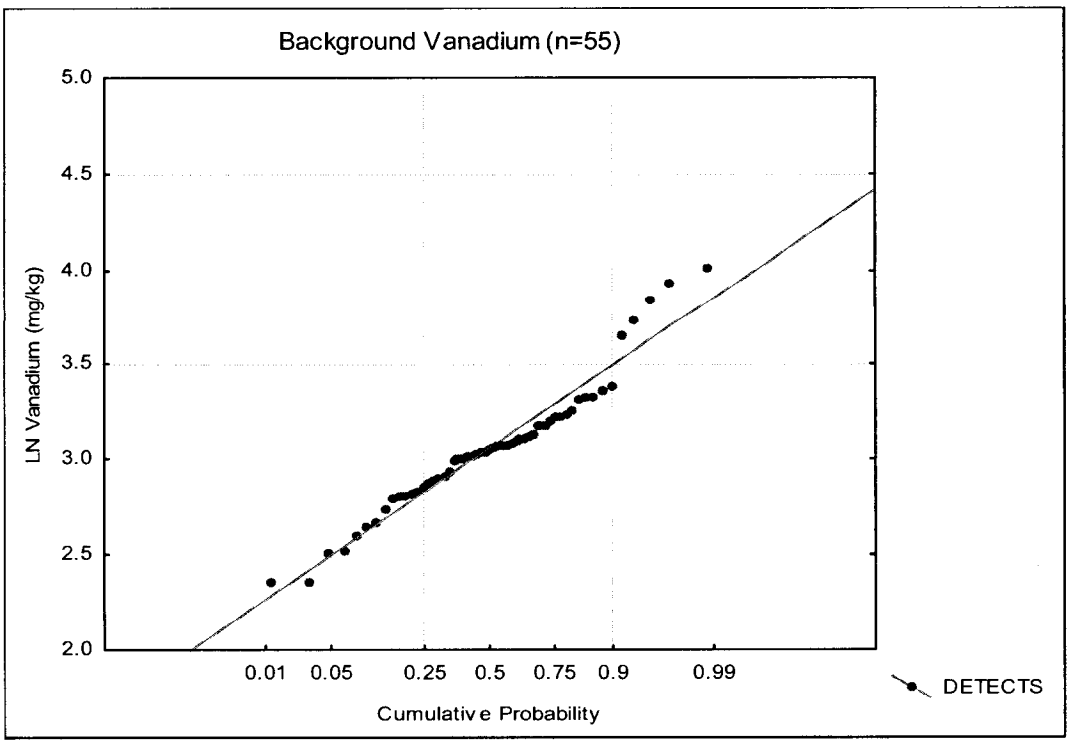


Figure H-30
Probability Plots of Nickel Concentrations in Soil for Pink Background and Site 35



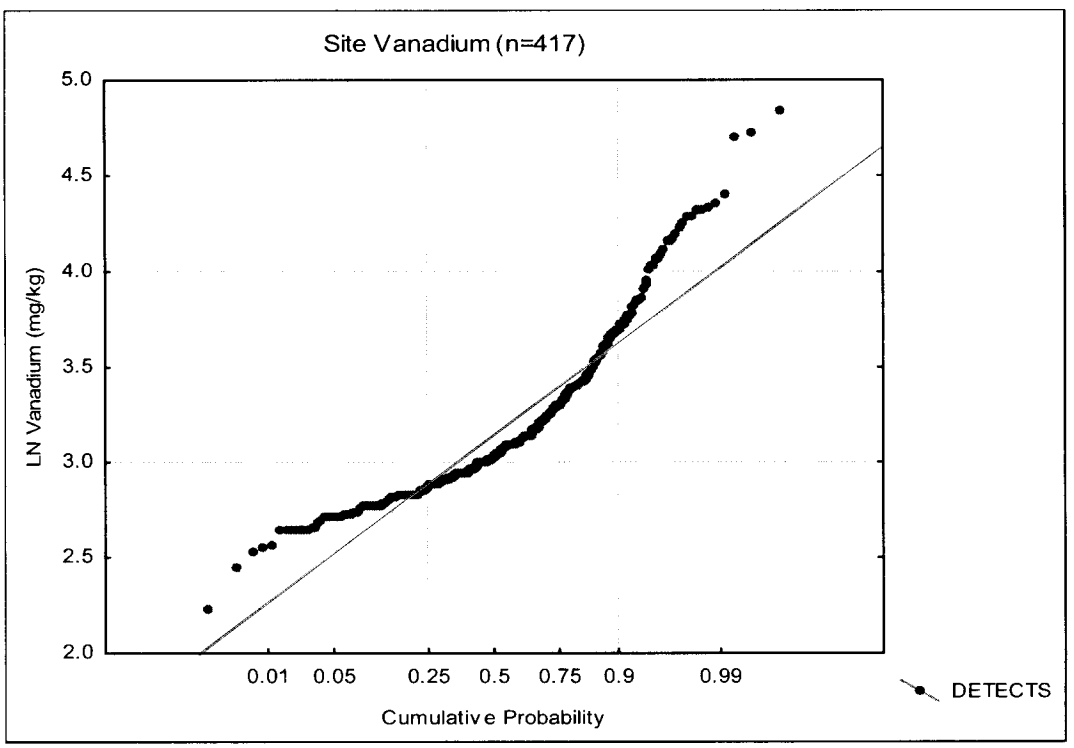
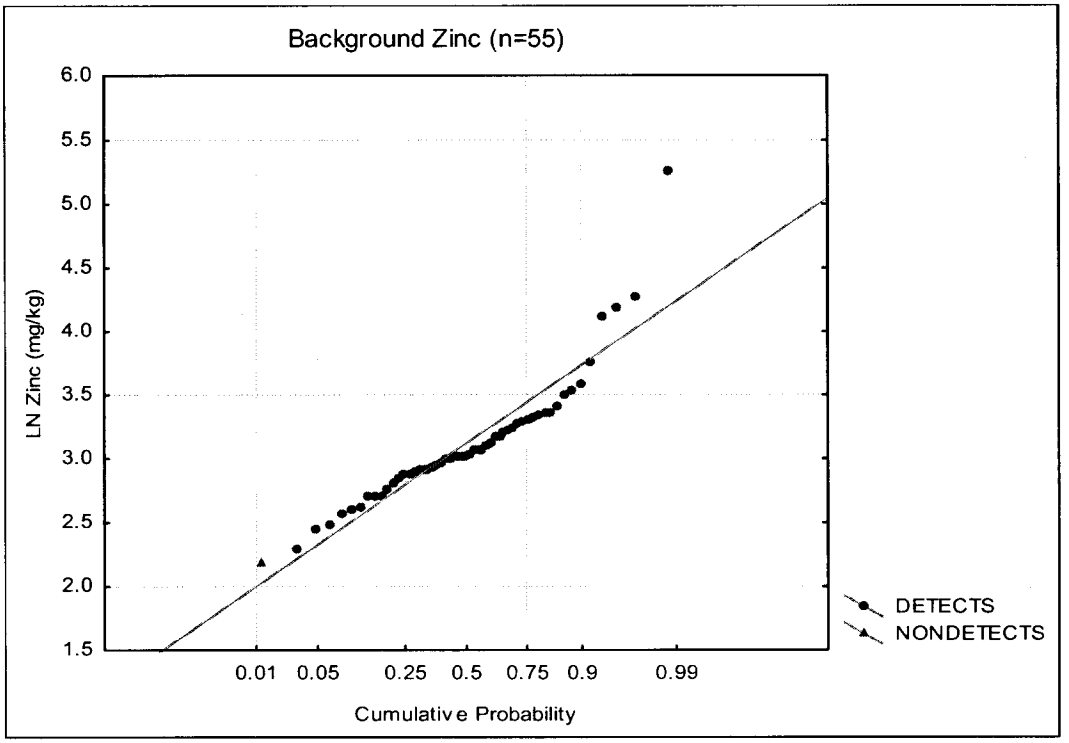


Figure H-31
Probability Plots of Vanadium Concentrations in Soil for Pink Background and Site 35



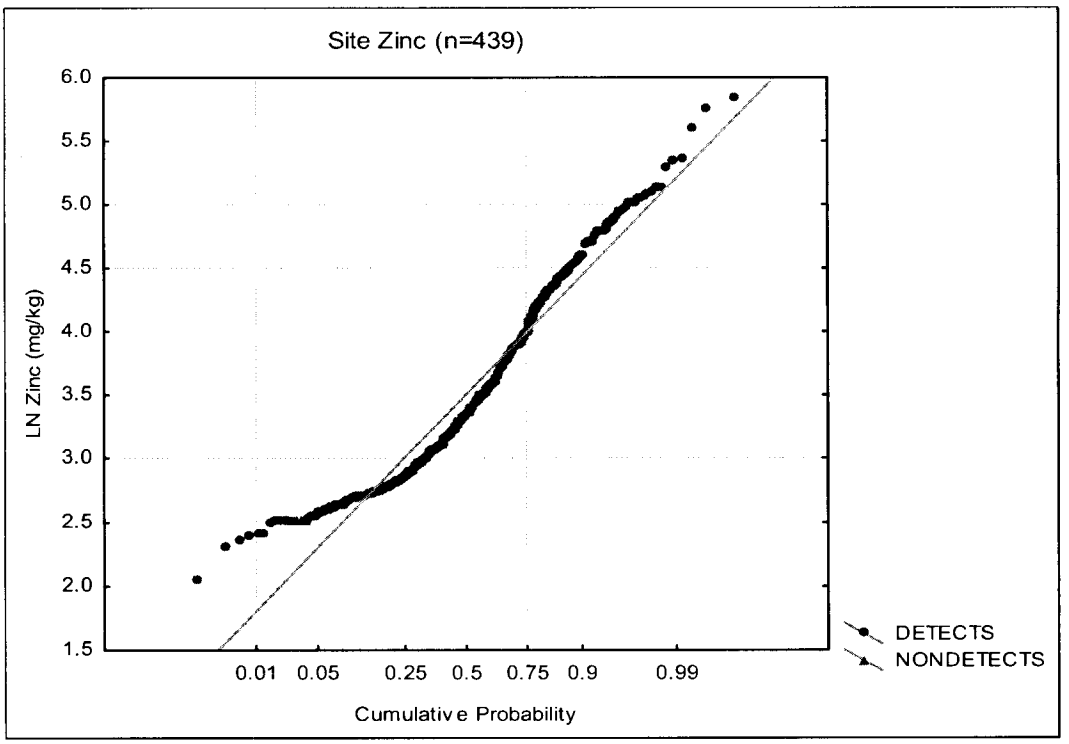


Figure H-32
Probability Plots of Zinc Concentrations in Soil for Pink Background and Site 35

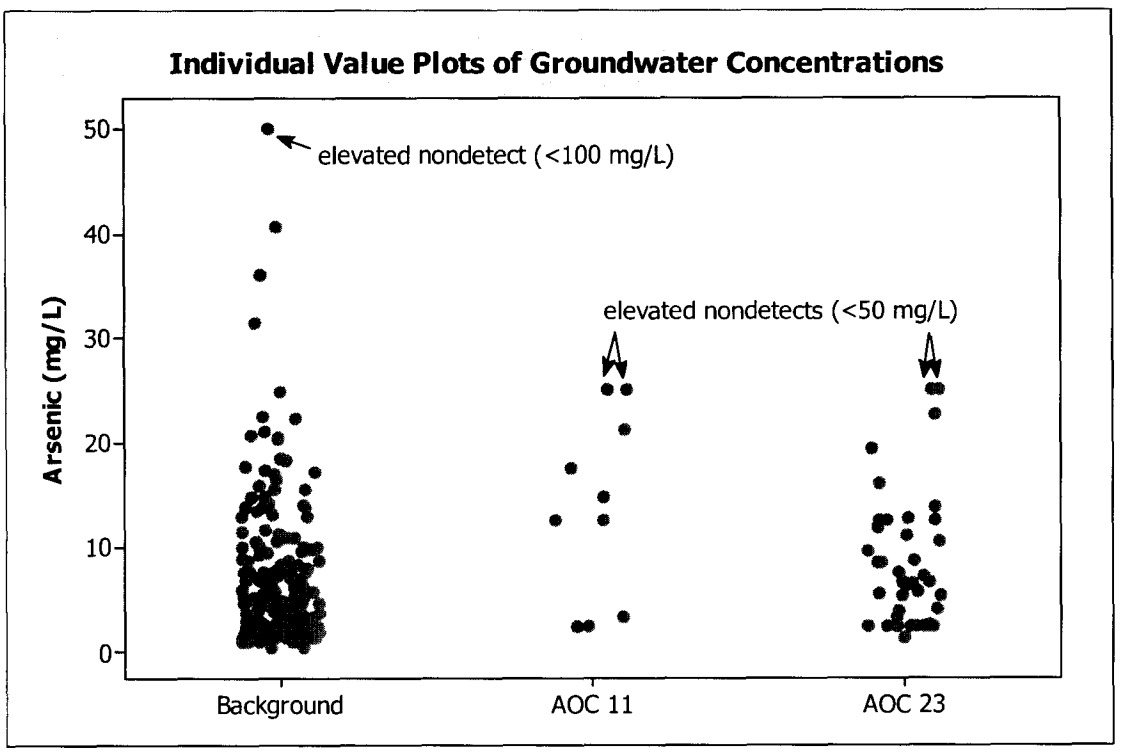


Figure H-33
Individual Value Plots of Groundwater Concentrations in Background, AOC 11/EBS 78–79, and AOC 23 – Arsenic

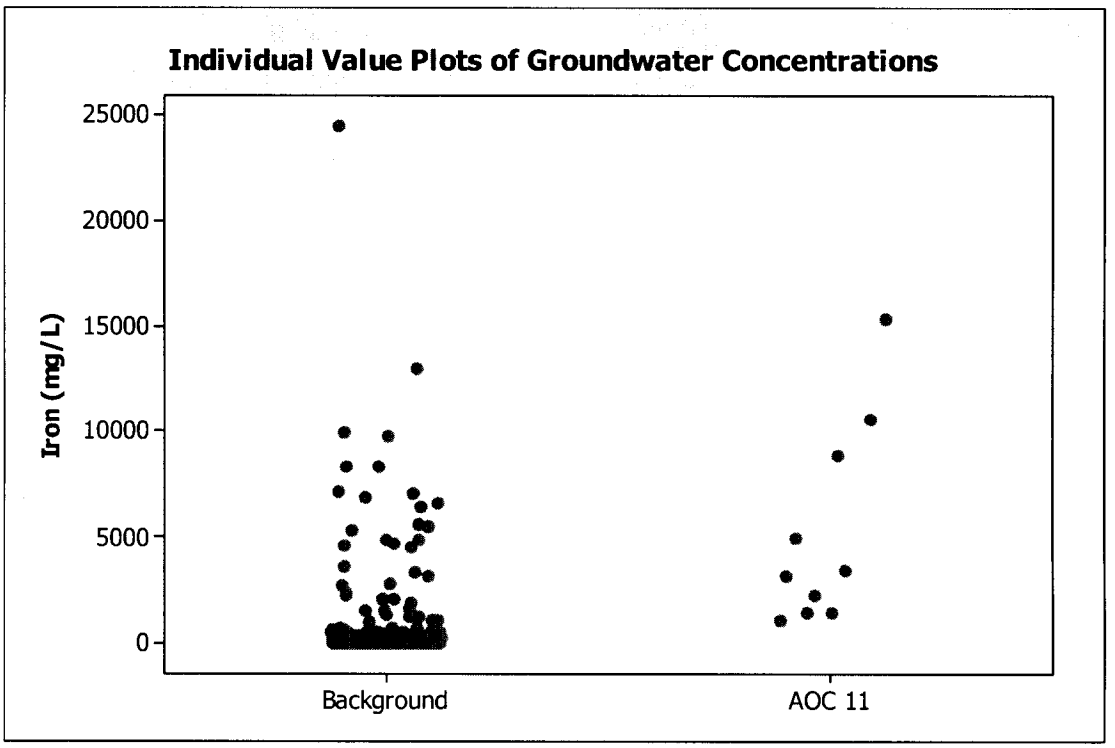


Figure H-34
Individual Value Plots of Groundwater Concentrations in Background and AOC 11/EBS 78–79 – Iron

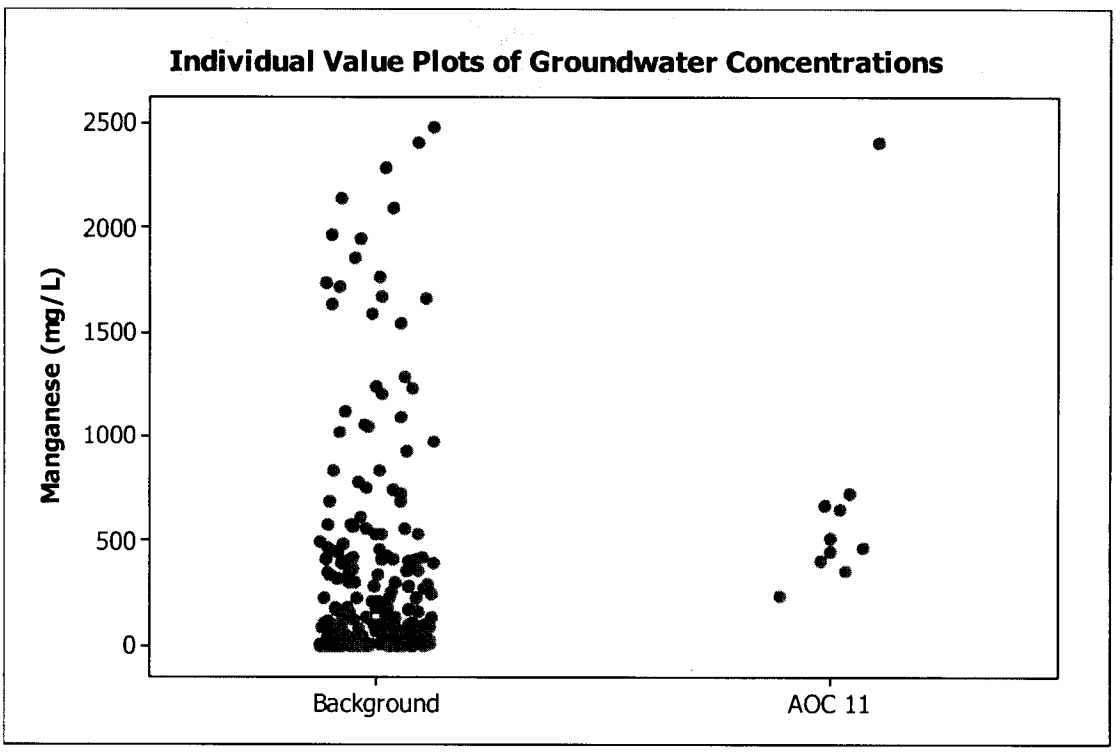


Figure H-35
Individual Value Plots of Groundwater Concentrations in Background and AOC 11/EBS 78–79 – Manganese

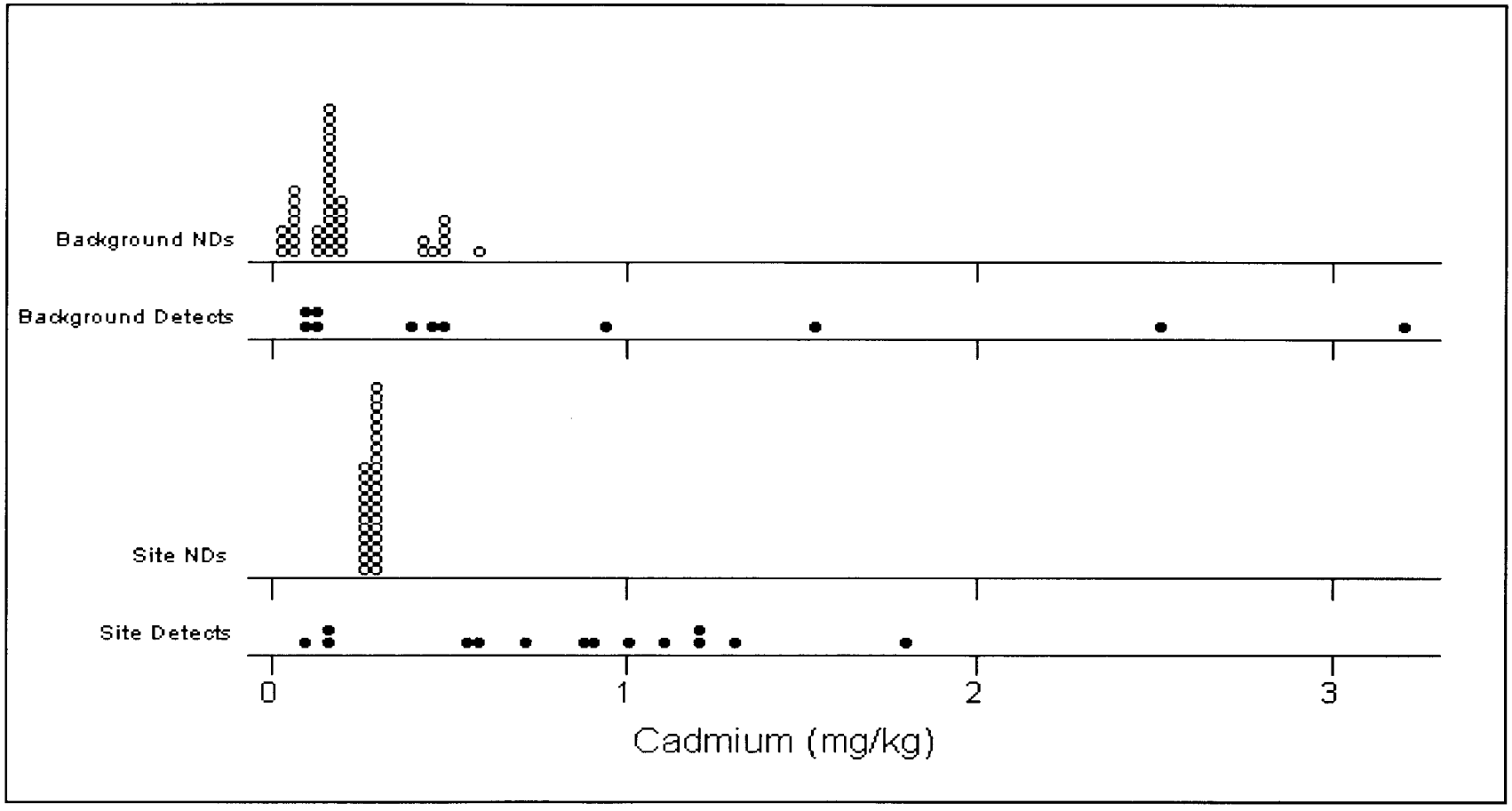
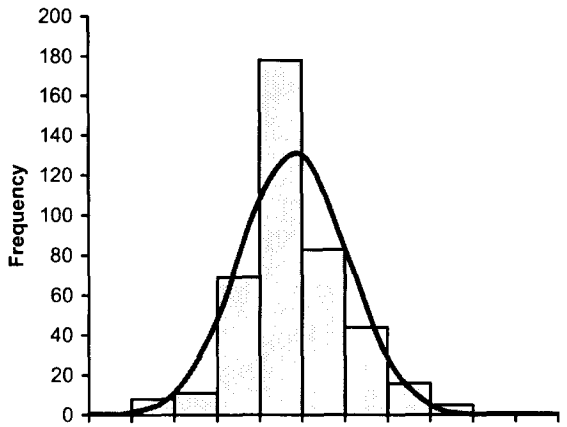
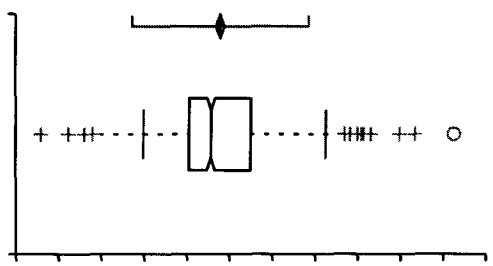
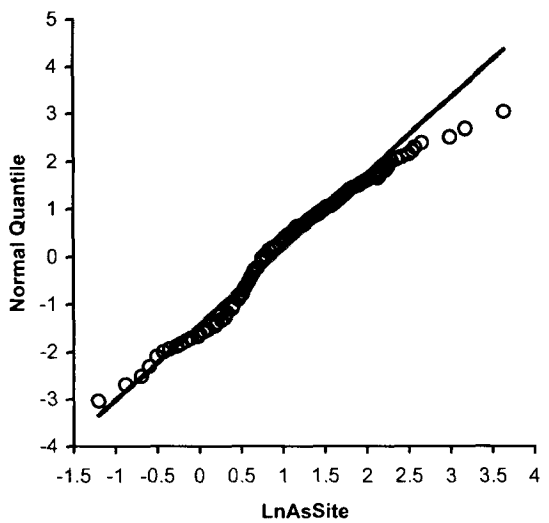


Figure H-36
Dot Plot of Cadmium in Soil at AOC 11/EBS 78–79

Test	**Continuous summary descriptives**
Variable	AsLnSite
Performed by	
Date	26 January 2007





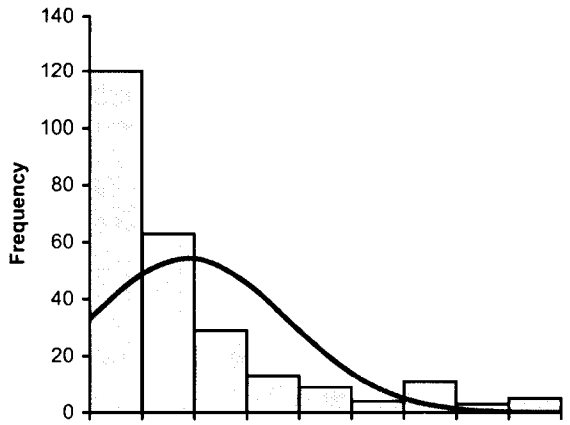


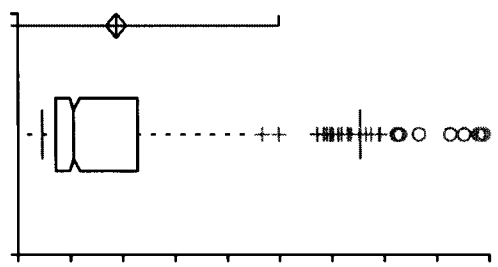
n	417
Mean	0.898
90% CI	0.847 to 0.949
Variance	0.3953
SD	0.6287
SE	0.0308
CV	70%
Median	0.788
90.4% CI	0.742 to 0.833
Range	4.841558964
IQR	0.722134717

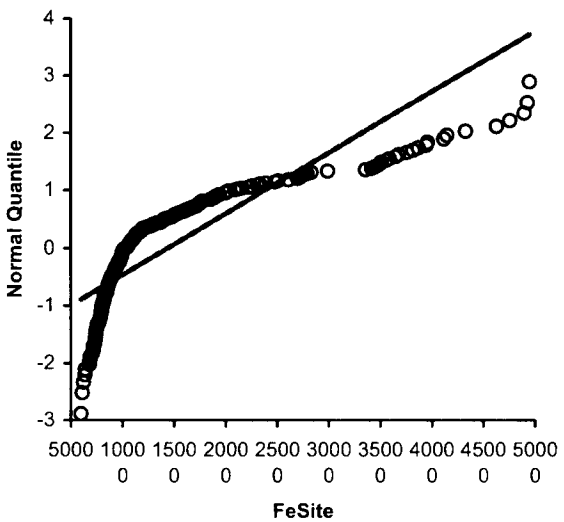
Percentile	
5th	-0.002
25th	0.531
50th	0.788
75th	1.253
95th	2.129

	Coefficient	**p**
Shapiro-Wilk	0.9628	<0.0001
Skewness	0.5387	<0.0001
Kurtosis	1.6281	<0.0001

Test	**Continuous summary descriptives**
Variable	FeSite
Performed by	
Date	26 January 2007







n	257
Mean	14403.580
90% CI	13432.291 to 15374.869
Variance	88966534.0102
SD	9432.2073
SE	588.3649
CV	65%

Median	10300.000
91.9% CI	9950.000 to 10900.000
Range	43510
IQR	7790

Percentile	
5th	7318.000
25th	8610.000
50th	10300.000
75th	16400.000
95th	37660.000

	Coefficient	**p**
Shapiro-Wilk	0.7231	<0.0001
Skewness	1.9728	<0.0001
Kurtosis	3.3258	<0.0001

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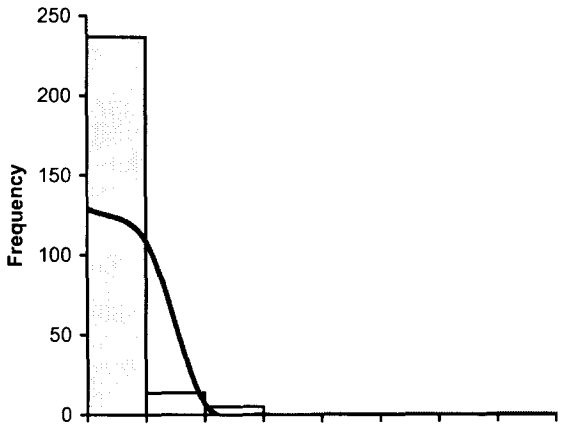
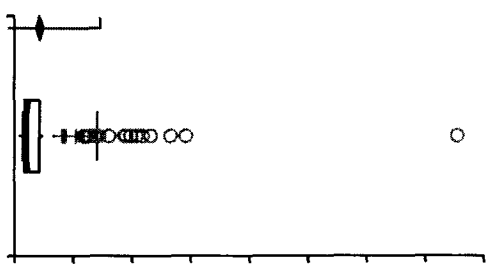
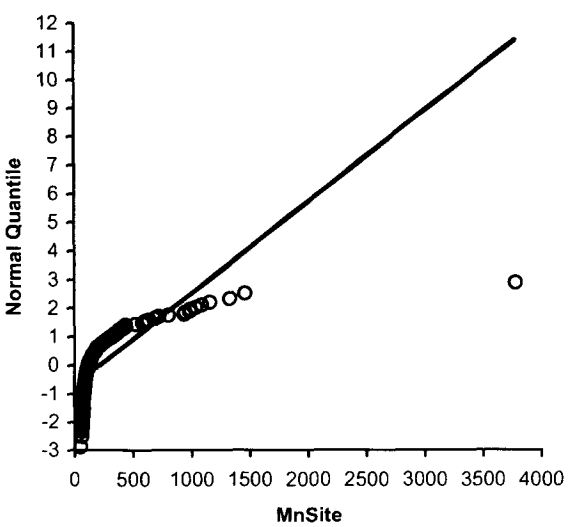
Variable	MnSite
Performed by	
Date	26 January 2007





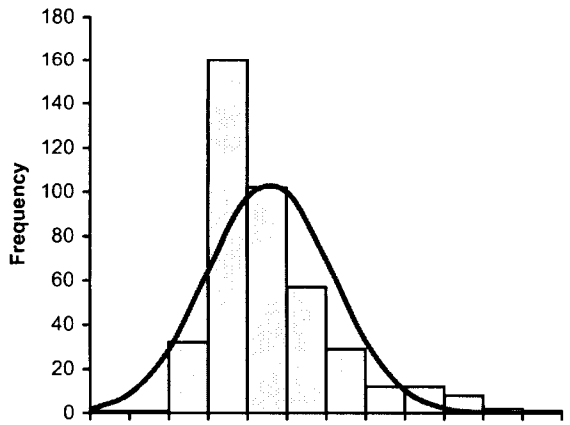


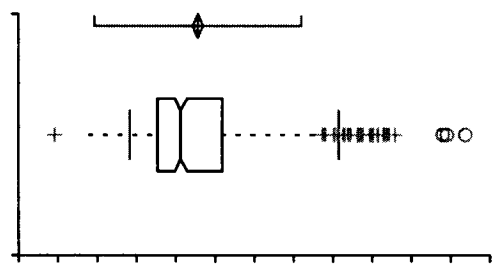
n	257
Mean	216.506
90% CI	184.323 to 248.688
Variance	97672.2706
SD	312.5256
SE	19.4948
CV	144%
Median	118.000
91.9% CI	110.000 to 130.000
Range	3730
IQR	124.8

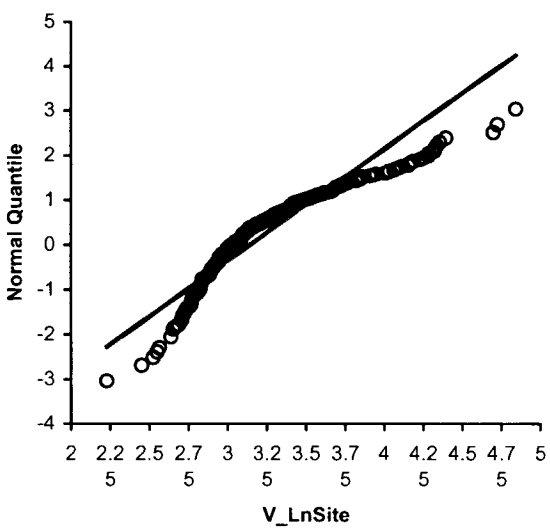
Percentile	
5th	70.960
25th	89.200
50th	118.000
75th	214.000
95th	705.000

	Coefficient	**p**
Shapiro-Wilk	0.4325	<0.0001
Skewness	6.8363	<0.0001
Kurtosis	67.7062	<0.0001

Test	**Continuous summary descriptives**
Variable	V_LnSite
Performed by	
Date	26 January 2007







n	417
Mean	3.142
90% CI	3.109 to 3.174
Variance	0.1605
SD	0.4006
SE	0.0196
CV	13%
Median	3.030
90.4% CI	2.996 to 3.073
Range	2.614172686
IQR	0.411036153

Percentile	
5th	2.708
25th	2.885
50th	3.030
75th	3.296
95th	4.037

	Coefficient	**p**
Shapiro-Wilk	0.8821	<0.0001
Skewness	1.4289	<0.0001
Kurtosis	2.2780	<0.0001

APPENDIX I

PRE-PAH TCRA
HUMAN-HEALTH RISK ASSESSMENT

N00236.002712
ALAMEDA POINT
SSIC NO. 5090.3

APPENDIX I – PRE-PAH TCRA HUMAN-HEALTH RISK ASSESSMENT

THIS RECORD CONTAINS LARGE VOLUMES OF DATA AND IS NOT REQUIRED TO BE PHYSICALLY LOCATED WITH THE ADMINISTRATIVE RECORD DOCUMENT.

DUE TO EXTENSIVE VOLUME, THIS DATA WILL NOT BE IMAGED.

TO VIEW THE DATA, CONTACT:

DIANE C. SILVA
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SAN DIEGO, CA 92132

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APPENDIX J

REMEDIAL INVESTIGATION
HUMAN-HEALTH RISK ASSESSMENT

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ATTACHMENTS (on compact disk)

Attachment

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ACRONYMS/ABBREVIATIONS

AOC	area of concern
B(a)P	benzo(a)pyrene
BGMP	basewide groundwater monitoring program
bgs	below ground surface
CAA	corrective action area
Cal/EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHHSL	California Human Health Screening Level
CLEAN	Comprehensive Long-Term Environmental Action Navy
COPC	chemical of potential concern
CSF	cancer slope factor
CTO	contract task order
DCE	dichloroethene
DDD	dichlorodiphenyldichloroethane
DDT	dichlorodiphenyltrichloroethane
DTSC	(Cal/EPA) Department of Toxic Substances Control
EBS	environmental baseline survey
EDC	economic development conveyance
EPC	exposure point concentration
ESL	environmental screening level
FS	feasibility study
GAP	generator accumulation point
g/day	grams per day
g/kg	grams per kilogram
g/kg-day	grams per kilogram per day
HHRA	human-health risk assessment
HI	hazard index
HQ	hazard quotient
IR	Installation Restoration (Program)
IRIS	Integrated Risk Information System
kg	kilogram

LDH	lactate dehydrogenase
LeadSpread 7	DTSC Lead Risk Assessment Spreadsheet Version 7
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
mg/day	milligrams per day
mg/kg	milligrams per kilogram
mg/kg-day	milligrams per kilogram per day
NADEP	Naval Aviation Depot
NAS	Naval Air Station
NCEA	National Center for Environmental Assessment
NTCRA	non-time-critical removal action
OU	operable unit
OWS	oil-water separator
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PPRTV	provisional peer-reviewed toxicity value
PRG	preliminary remediation goal
PSC	preliminary screening criterion
RfD	reference dose
RI	remedial investigation
RME	reasonable maximum exposure
SGOT	serum glutamic-oxalocetic transaminase
SI	site investigation
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TCE	trichloroethene
TCRA	time-critical removal action
TDS	total dissolved solids
TPH	total petroleum hydrocarbons
TRPH	total recoverable petroleum hydrocarbons
UCL	upper confidence limit
U.S. EPA	United States Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compound
Water Board	San Francisco Bay Regional Water Quality Control Board

Appendix J
REMEDIAL INVESTIGATION HUMAN-HEALTH RISK ASSESSMENT

Tier 1 evaluations and baseline human-health risk assessments (HHRAs) were performed to assess potential impacts on human health from exposure to chemicals at Installation Restoration (IR) Program Site 35 as part of this remedial investigation (RI)/feasibility study (FS). The Tier 1 evaluations and HHRAs evaluate current and future potential health risks if no remedial action takes place at the site. The results provide information for determining the need for remedial action and the selection of remedial alternatives.

These Tier 1 evaluations and HHRAs were conducted in accordance with guidelines published by the United States Environmental Protection Agency (U.S. EPA) in the Risk Assessment Guidance for Superfund Part A (U.S. EPA 1989), Part B (U.S. EPA 1991b), and Part E (U.S. EPA 2004a) and supporting documents and guidelines published by the California Environmental Protection Agency (Cal/EPA) (1993, 1994, 1999, 2005a).

IR Site 35 consists of study areas within Transfer Parcel Economic Development Conveyance (EDC)-5 including areas of concern (AOCs), data gap locations, and polynuclear aromatic hydrocarbon (PAH) areas. Two levels of risk assessment evaluation were conducted for the study areas. HHRAs for regulatory purposes are usually carried out using a step-wise or "tiered" approach (Cal/EPA 2005a). Tier 1 evaluations compare the maximum concentrations of contaminants to risk-based levels published by regulatory agencies. A baseline HHRA uses a site-specific approach. Tier 1 evaluations were conducted for 14 study areas where inspection of the analytical results indicated that decisions on whether remediation is warranted could be made based on the results of a Tier 1 approach. HHRAs were conducted for five study areas where site-specific considerations and statistical analyses of analytical data were needed. The following factors were considered when determining whether a Tier 1 or baseline risk assessment approach was most applicable for a study area:

- the presence of chemicals with concentrations above the preliminary screening criteria (PSCs) and/or background concentrations
- previously stated public interest (e.g., Environmental Baseline Survey [EBS] Parcels 78 and 79 were assigned to an HHRA)
- the frequency of detection and the distribution of the chemicals in light of the site history

Areas where the review indicated that a site-specific assessment was warranted to determine whether further action was needed were designated for a baseline HHRA. Areas where the review indicated that no further action would be warranted using protective assumptions and generic risk-based guidelines were designated for a Tier 1 assessment. After initial calculations, the assignments were reviewed for a second time to verify adequate AOC risk evaluation for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) decision-making purposes.

The results of the following residential risk evaluations are discussed below.

- Tier 1 risk evaluations for 14 study areas calculate a combined U.S. EPA and Cal/EPA cancer risk and noncancer hazard for non-PAH chemicals in soil and groundwater

based on the maximum reported concentrations and generic risk-based levels published by regulatory agencies (Cal/EPA 2005a).

- Baseline HHRAs for five study areas calculate U.S. EPA and Cal/EPA cancer risk and noncancer hazard using site-specific assumptions and the standard procedures for a baseline risk assessment included with an RI.
- Lead-only evaluations for two study areas compared concentrations of lead to site-specific preliminary remediation goals (PRGs) protective of children.

Appendix J is organized in the following sections.

- Section J1 presents general site information and an overview of the methodologies used in the Tier 1 evaluations, the HHRAs and the lead-only evaluations.
- Section J2 presents the results of the Tier 1 evaluations.
- Sections J3 through J7 present the results of the HHRAs.
- Section J8 presents the results of the lead-only evaluations.
- Section J9 presents the references.

J1 INTRODUCTION AND OVERVIEW

This section presents the description and background of IR Site 35 and an overview of the methodologies used in the Tier 1 evaluations and the HHRAs.

J1.1 Site Description and Background

IR Site 35 is located in the central portion of Alameda Point (formerly Naval Air Station [NAS] Alameda). Alameda Point is located at the western tip of Alameda Island, which is on the eastern side of San Francisco Bay. In September 1993, the United States Congress and Base Realignment and Closure Commission designated the former NAS Alameda for closure. NAS Alameda ceased naval operations in April 1997. The Navy is currently in the process of transferring the land to the City of Alameda and other federal agencies. On July 22, 1999, Alameda Point was placed on the National Priorities List (64 *Federal Register* 140, 39878–39885, Final Rule, July 22, 1999). The Comprehensive Environmental Response, Compensation, and Liability Information System identification number for NAS Alameda is CA2170023236.

Historical uses of Transfer Parcel EDC-5 by the Navy were industrial, residential, and recreational. These uses included living quarters, medical facilities, runway and aircraft maintenance facilities, offices, and also storage and warehousing of weapons, munitions, liquid oxygen/liquid nitrogen, and fuel. Future land use at IR Site 35 is designated for mixed use, which may include residential, commercial, office, and industrial mixed uses (LSA 2001).

IR Site 35 consists of many subareas within Transfer Parcel EDC-5. Twenty-five AOCs were recommended for further evaluation in the Site Inspection (SI) Report (BEI 2005). Subsequent to issuing the SI Report, Navy and regulatory agencies in four planning meetings held May through July 2005 agreed to add three areas with data gaps (EBS

Parcels 78, 79, and 205) to the risk assessment. The agencies also agreed that those AOCs in which the only chemicals of potential concern (COPCs) were PAHs would not be included in the risk assessment because PAHs would have site-specific risk management levels set for Alameda Point and could be considered separately.

J1.2 Tier 1 Evaluation Methods

A Tier 1 evaluation is a screening-level approach that calculates total cancer risk and noncancer hazard values using published risk-based guidelines from the U.S. EPA, Cal/EPA, and San Francisco Bay Regional Water Quality Control Board (Water Board). The Tier 1 evaluations include all chemicals identified in at least one sample except for PAHs in soil. PAHs in soil are not included because site-specific cleanup goals will be established for PAHs.

J1.2.1 TIER 1 DATA EVALUATION

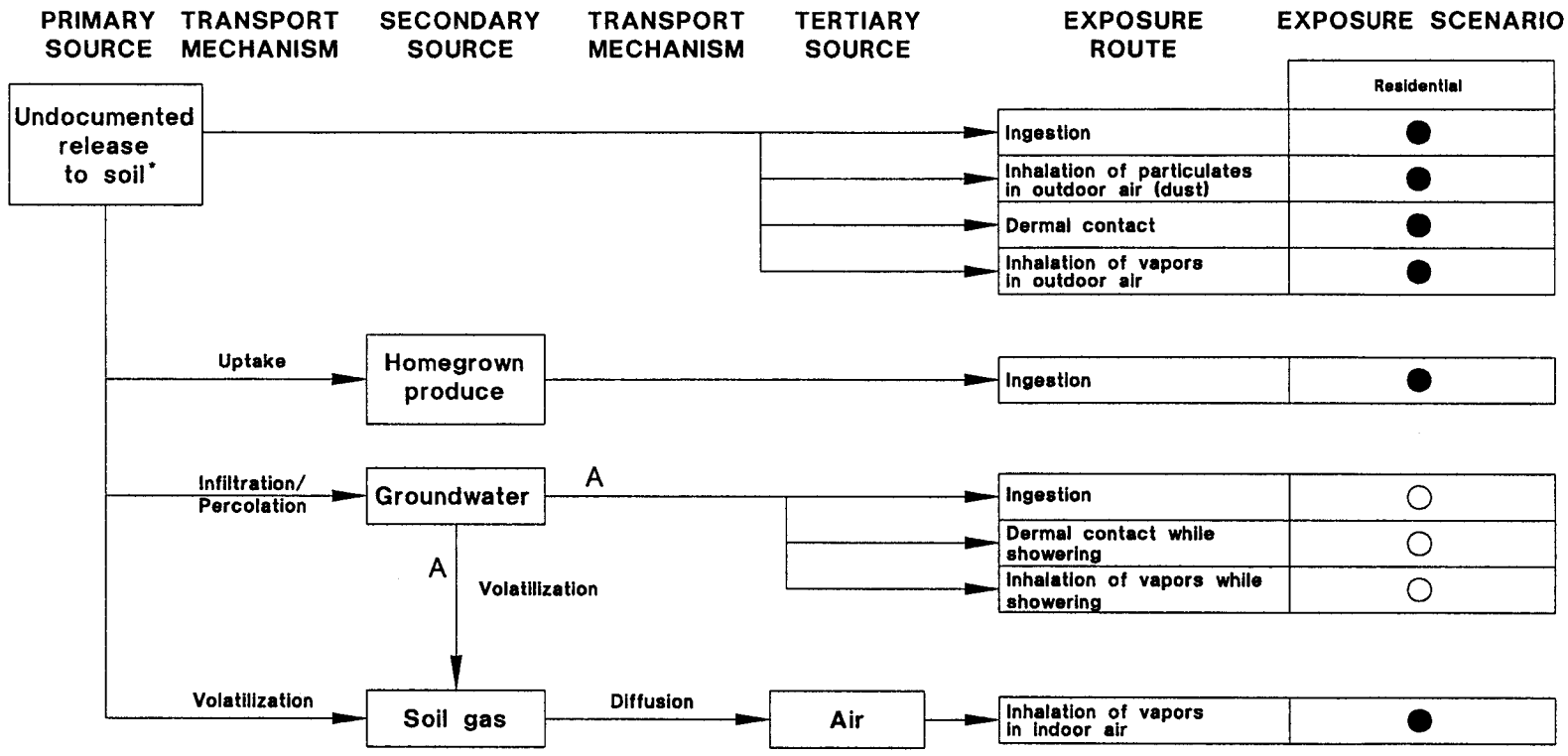
The identification of Tier 1 COPCs is based on a compilation of all usable data for soil and groundwater. All chemicals reported in at least one sample collected during the RI and/or included in the historical data were included as Tier 1 COPCs, except calcium, magnesium, potassium, and sodium, which are known to be required human trace nutrients. As noted earlier, Tier 1 COPCs do not include PAHs in soil.

The identification of Tier 1 COPCs in soil was based on the results from non-PAH analyses of samples without regard to depth. In the total risk calculations, metals were included in the list of Tier 1 COPCs regardless of whether the concentrations were above or below background.

J1.2.2 TIER 1 SOURCES OF RISK-BASED GUIDELINES

The selected risk-based guidelines represent the most protective of published levels for each exposure pathway shown on Figure J-1. The risk-based guidelines and the exposure pathways covered by these guidelines are as follows.

- For exposure to Tier 1 COPCs in soil, the most stringent of the following were used:
  - Ingestion, inhalation of particles and vapors in outdoor air, and dermal contact with soil were evaluated using the most stringent of the following:
    - U.S. EPA Region 9 PRGs (U.S. EPA 2004b)
    - Cal/EPA California Human Health Screening Levels (CHHSLs) (Cal/EPA 2005a)
  - Inhalation of vapors from soil in indoor air was evaluated using the Water Board's environmental screening levels (ESLs) for indoor air with high-permeability soil (volatile organic compounds [VOCs] only) (RWQCB 2005).



LEGEND

- ● POTENTIALLY COMPLETE EXPOSURE PATHWAY
- ○ POTENTIALLY COMPLETE EXPOSURE PATHWAY; CONSIDERED AN UNLIKELY PATHWAY, BUT WAS EVALUATED IN THE HUMAN-HEALTH RISK ASSESMENT
- A THESE PATHWAYS WILL NOT BE INCLUDED FOR AREAS WITHOUT GROUNDWATER DATA

NOTE:

* 0–10 FEET BELOW GROUND SURFACE OR 0 FEET TO GROUNDWATER, WHICHEVER COMES FIRST

RI/FS Report for IR Site 35

Figure J-1

Baseline Human-Health Risk Assessment
Conceptual Site Model

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/28/06
File No: 077C14598
Job No: 23818-077
Rev No: B

- For exposure to Tier 1 COPCs in groundwater, the most stringent of the following were used:
  - Ingestion and inhalation of vapors while showering were evaluated using the U.S. EPA Region 9 PRGs for tap water (U.S. EPA 2004b).
  - Inhalation of vapors from groundwater in indoor air was evaluated with the ESLs for indoor air with high-permeability soil (VOCs only) (RWQCB 2005).

The Tier 1 risk evaluation is protective for all pathways listed, including indoor air vapors from groundwater, because the most stringent of the published criteria for each chemical, including VOCs, was used. For example, at AOC 2, four VOCs were reported in soil. The ESLs for protection of indoor air are more stringent than the PRGs for soil for three of these VOCs but not for the fourth, carbon disulfide. So for carbon disulfide, the more stringent PRG was used for calculating risk, even though it is not based on indoor air, because it is the more protective criterion for the indoor air pathway.

There are two exposure pathways evaluated in the HHRA that are not covered by the Tier 1 risk-based guidelines: ingestion of homegrown produce and dermal exposure while showering. The uncertainties associated with these pathways are discussed in the results for each study area and in Section J1.2.4.

J1.2.3 TIER 1 CALCULATION OF CANCER RISK AND NONCANCER HAZARD VALUES

The cancer risk and noncancer hazard values were calculated for residential exposure pathways using the Tier 1 protocol from Cal/EPA (2005a). The maximum concentration of chemicals identified in soil and groundwater at any depth was used. Cumulative cancer risk and noncancer hazard values were also calculated by adding the hazard values for each Tier 1 COPC.

The results for total cancer risks and noncancer hazard values and the results without metals at concentrations below Alameda Point background are presented in the following three exposure groups for exposure pathways listed in Section J1.2.3:

- **Exposure Group 1**. All exposure pathways for soil and groundwater
- **Exposure Group 2**. Exposure pathways for soil and vapors from VOCs in groundwater
- **Exposure Group 3**. Exposure pathways for residential use of groundwater

Tier 1 Cancer Risk Characterization

Cancer risk represents the probability that exposure to COPCs could result in an increased risk of cancer. Cancer risk is termed "the probability of increased individual excess cancer." This means the risk over and above the natural risk of cancer in the general population. Cancer risk is a statistical probability, and does not predict how many cases of cancer will occur.

The risk-based guidelines that are based on the cancer end point are set at a target risk level of 1×10^{-6}. The cancer risk is calculated by dividing the maximum concentration by the risk-based guideline and multiplying by 1×10^{-6} as follows:

$$\text{cancer risk} = \frac{\text{maximum concentration} \times 1 \times 10^{-6}}{\text{risk-based guideline}}$$

The cancer risk for each chemical is added together to estimate cumulative cancer risk. Cancer risks are discussed in the context of a risk management range of 1 in 1,000,000 (1×10^{-6}) to 1 in 10,000 (1×10^{-4}). For risks between 10^{-6} and 10^{-4}, site-specific factors are considered when making decisions about whether or not action is required to reduce risk.

Tier 1 Noncancer and Lead Risk Characterization

Noncancer health effects are evaluated based on a hazard quotient (HQ) for individual chemicals. The HQ is the ratio of the maximum concentration to the risk-based guideline. The risk-based guideline is a concentration that is unlikely to lead to adverse health effects over a lifetime.

$$\text{hazard quotient} = \frac{\text{maximum concentration}}{\text{risk-based guideline}}$$

An HQ value of 1 indicates that lifetime exposure has limited potential for causing an adverse effect in sensitive populations, and values of less than 1 can generally be considered acceptable.

The sum of chemical-specific HQs is called a hazard index (HI). It is appropriate to add HQ values for different chemicals if they have the same health effect. Adding HQ values into a single, cumulative HI value across chemicals is a preliminary estimate of the highest possible noncancer hazard value. HI values of less than 1 can generally be considered acceptable. Values greater than 1 are usually given closer attention.

The total hazard value includes COPCs that are found at or below background concentrations. The noncancer hazard without background excludes metals reported at concentrations below background.

The maximum concentration of lead in soil is compared to the residential PRG of 150 milligrams per kilogram (mg/kg) to determine whether there is a potential risk associated with exposure to lead in soil. However, the health effects of lead are not considered additive with other noncancer health effects per U.S. EPA and Cal/EPA risk assessment practices. Therefore, lead is not included in the calculation of noncancer risk without background metals. For most study areas at IR Site 35, the maximum lead concentration is below the Alameda Point background 95th percentile.

Tier 1 Risk Characterization Without Metals Below Background Concentrations

A second risk calculation is presented that does not include metals reported at concentrations below Alameda Point background concentrations. Risk assessment guidance recommends calculation of a cancer risk without metals at concentrations below

background but does not recommend this approach for noncarcinogens. However, the noncancer hazard value without background is also presented to allow consideration of the effectiveness of any remediation. For example, as shown in AOC 2, the total noncancer hazard value of 3 for soil is above the risk management level of 1. However, the hazard value without metals found at concentrations below background is 0.9. Therefore, any corrective action based on the HI of 0.9 would have little impact, and remediation to concentrations below background is neither feasible nor required.

In a Tier 1 evaluation, a metal is judged as having concentrations above background if the maximum concentration is above the 95th percentile in the Alameda Point background (pink) data set. This is a protective estimate of metals above background. Use of the 95th percentile is more likely to conclude that concentrations are above background when, in fact, they are not when more rigorous, two-population comparison statistics are conducted.

Several of the study areas have iron and manganese and some trace metals reported at concentrations above the Alameda Point background 95th percentile. Correlation analysis suggests that these metals are present at naturally occurring concentrations and are not due to a release resulting from Navy activities (Section 4.3 of the main RI/FS Report). Nevertheless, only metals concentrations below Alameda Point background were excluded in these calculations.

J1.2.4 TIER 1 UNCERTAINTY ANALYSIS AND CONCLUSIONS

Varying degrees of uncertainty exist in each step of the risk assessment process. To compensate for these uncertainties, the U.S. EPA has developed risk assessment protocols that are designed so that potential risks are not underestimated. The following is a discussion of uncertainty that is common to all study areas.

Tier 1 Data Evaluation

The validity of any risk assessment is dependent on the adequacy of the site characterization. Sample collection at IR Site 35 was biased to areas known or suspected to have chemical impacts. This bias helps to offset the uncertainty. Each study area data set has a separate data evaluation section, which considers the adequacy of the study area characterization.

The maximum value at any depth was used in the Tier 1 evaluation. This is a protective approach for two reasons: 1) in an HHRA, it is assumed that exposure will only occur to the upper 10 feet or to the depth of groundwater, whichever is shallower, and 2) exposure is based on a 95th percent upper confidence limit (UCL) of the average concentration to represent exposure over 30 years.

Tier 1 Risk-Based Guidelines

Risk-based guidelines are calculated from exposure assumptions and toxicity factors and are based on specific exposure pathways. Two main sources of uncertainty in the risk-based guidelines are: 1) whether the exposure pathways address all possible exposure pathways, and 2) confidence in the toxicity factors.

Exposure Pathways and Assumptions. U.S. EPA, Cal/EPA, and Water Board risk-based guidelines are intended to be protective when applied correctly to the receptors and exposure pathways. Each exposure assumption is designed to estimate the potential risk to assure that any actual risk will be less than the estimated risk. The risk-based guidelines assume that residents would engage regularly in activities that would result in exposure to site COPCs for 30 years. It is also assumed that the individual would be exposed for 24 hours per day for the entire 30-year duration. Although this scenario is unlikely, due to frequency of relocation and time spent indoors, it provides a protective estimate of exposure, which would overestimate any actual risk.

The risk-based concentrations considered in this Tier 1 evaluation address the principal exposure pathways, including ingestion of soil, inhalation of vapors in outdoor air from soil, ingestion of groundwater and inhalation of vapors while showering, and inhalation of vapors in indoor air from soil and groundwater. Uncertainty is associated with two pathways that are not included in this list: dermal contact with soil and groundwater and ingestion of homegrown produce. The results of the Tier 1 risk evaluation are protective of these two pathways for the following reasons.

- Generic risk-based values are designed to be protective in a range of situations.
- The most stringent of several risk-based values for each chemical was used to calculate the cumulative total risk.
- The maximum reported concentration of each chemical (except PAHs) detected at the AOC was used. In a baseline risk assessment, an upper bound average concentration is used, which can be much lower than the maximum concentration.
- Data from samples from all depths were included in the selection of the maximum concentration. In a site-specific baseline risk assessment, only chemicals reported at certain relevant depths are used.

The uncertainty associated with the omission of the dermal pathway for residential use of groundwater can be determined semiquantitatively based on the ratio of the dermal-to-ingestion pathways calculated for the HHRA study areas. It is possible to estimate the increase in the Tier 1 pathway for residential use of groundwater due to inclusion of the dermal pathway from the ratio of the dermal-to-ingestion pathways. This is done for each study area in the Uncertainty Analysis.

Toxicity Values. There is uncertainty associated with some of the toxicity values used to calculate the PRGs, CHHSLs, and ESLs. Some of the toxicity values have been accepted by U.S. EPA and are presented in the Integrated Risk Information System (IRIS) (U.S. EPA 2006). The remaining toxicity values are provisional. Provisional values include provisional peer-reviewed toxicity values (PPRTVs) and toxicity values from the National Center for Environmental Assessment (NCEA). The values from NCEA have not been peer-reviewed. There is an increased level of uncertainty associated with the use of provisional toxicity values for which U.S. EPA has not yet completed the scientific review process.

The health effects for iron, manganese, thallium, and vanadium are highlighted in this subsection because these metals are present at concentrations above Alameda Point background, and the noncancer health effects are above the risk management range at a few study areas. The following information indicates that the health effects of iron, manganese, thallium, and vanadium are not additive, because the health effects are different.

- **Iron**. The reference dose (RfD) for iron is provisional. Iron is a required nutrient and the required daily level is highest for pregnant women (30 milligrams per day [mg/day] or 0.44 milligrams per kilogram per day [mg/kg-day]) and children (6 to 15 mg/day). The form (e.g., food or water) of the iron is a key factor. Bantu men who drank iron at a rate of 50 to 100 mg/day in beer showed effects on the liver while people in Ethiopia with an average daily intake of 471 mg/day from food showed no adverse health effects from iron. The RfD is not based on adverse health effects but on healthy people with normal levels of iron in their blood. The RfD of 0.3 mg/kg-day (4.5 mg/day for a child or 21 mg/day for a 70-kilogram [kg] adult) is an upper estimate of intake of iron in healthy adults and children in the United States whose iron levels were 20 to 40 percent of normal iron levels. In other words, people could increase their daily level of iron without exceeding normal levels in blood. This information is evidence that the RfD could overstate the possible health effects of iron.
- **Manganese**. The toxicity value for manganese published in IRIS is based on the potential for neurological effects at doses above a body's daily requirement for this important mineral. Manganese is a required nutrient and included in multivitamins. While the body does efficiently control the level of manganese, there is a concern for long-term effects of high levels of exposure.
- **Thallium**. The toxicity value for thallium published in IRIS is based on increased levels of lactate dehydrogenase (LDH) and a liver enzyme, serum glutamic-oxalocetic transaminase (SGOT). SGOT is associated with the liver and LDH is found in all tissues. Increases in these enzymes have a general association with tissue damage that could be caused by the high doses of chemicals used in the experiment. Increases were the only significant finding at the highest dose in a study with rats.
- **Vanadium**. The toxicity value of vanadium is based on a decrease in the amount of cystine, an amino acid, in the hair of rats exposed to vanadium in their diets for 2.5 years. This change in cystine was the only adverse effect noted.

Therefore, because their effects are different, the HQ values for these metals are not considered additive when interpreting the HI results for each study area.

J1.3 HHRA Methodology

The methods for the baseline HHRA are presented in this section. The subsections include the site description and background, data evaluation, exposure assessment, toxicity assessment, risk characterization, uncertainty analysis, and conclusions.

J1.3.1 HHRA DATA EVALUATION

The identification of HHRA COPCs is based on a compilation of all usable data for soil and groundwater. All chemicals reported in at least one sample collected during the RI as well as historical data were included as HHRA COPCs, except calcium, magnesium, potassium, and sodium, which are known to be required human trace nutrients. The HHRA included PAHs in soil. All reported metals were included in the list of HHRA COPCs regardless of whether the concentrations were above or below background.

The identification of HHRA COPCs in soil was based on the results from analyses of samples collected from 0 to 10 feet below ground surface (bgs) or to groundwater if depth to groundwater is less than 10 feet bgs.

J1.3.2 HHRA EXPOSURE ASSESSMENT

The exposure assessment evaluates the ways in which people may come in contact with COPCs at the site now and in the future. An exposure assessment is a multistage process. First, the receptors (i.e., individuals using the site) are identified. Second, the complete exposure pathways by which these human receptors may be exposed are identified. Finally, the chemical concentrations at the point of exposure, the exposure point concentration (EPC), and the daily intake rates associated with each exposure pathway are quantified. The following sections describe the receptors, pathways, and the methodology used to calculate EPCs and daily intake.

Receptor Analysis

The HHRA assessed risk to human health from chemicals in soil and groundwater. In order to conduct multiple risk assessments within the time allotted under the accelerated schedule for IR Site 35, U.S. EPA concurred with the following simplifications to the U.S. EPA's baseline risk assessment process.

- Baseline risks were evaluated for residential receptors.
- Baseline risks were evaluated for reasonable maximum exposure (RME).

Exposure Pathways

An exposure pathway is the means by which a chemical moves through the environment from the source to a receptor. Exposure pathways are identified by analysis of the distribution of COPCs in the environment and the physical and chemical properties of each COPC. For an exposure pathway to be complete, there must be a chemical source, a mechanism for chemical release to the environment, an environmental transport medium (soil, groundwater, or air), and an exposure route (e.g., ingestion or inhalation). A scenario is a group of exposure pathways associated with a particular activity or land use.

Several exposure pathways for the residential scenario at IR Site 35 are considered complete for this risk assessment (Figure J-1, Table J1-1)

Future residents could potentially come into contact with COPCs in vadose zone soil (0 to 10 feet bgs or to the water table, if depth to groundwater is less than 10 feet bgs).

During future site activities, deeper soil that is above the water table could be brought to the surface during construction.

Although it is considered unlikely that groundwater would be used as a domestic water supply for drinking and showering, the hypothetical exposure pathways associated with residential use of groundwater were included in the HHRA to provide additional information for risk management decisions.

Specific exposure pathways for soil and groundwater evaluated for a future resident include the following:

1. incidental ingestion of soil and dermal contact with soil
2. inhalation of soil particulates and vapors from soil in outdoor air
3. inhalation of vapors from soil and groundwater that may migrate to indoor air
4. ingestion of produce grown in local soil
5. residential use of groundwater for sites with groundwater data (ingestion, inhalation of vapors and dermal contact while showering)

Quantification of Exposure

Exposure quantification is a two-step process that involves estimating EPCs and estimating daily intake rates. The goal of exposure quantification is to identify the combination of exposure assumptions that result in the maximum exposures that may be reasonably expected to occur.

Exposure Point Concentration

The EPC is the concentration in soil, air, or groundwater that represents the level of exposure for a human lifetime. The U.S. EPA recommends using the 95 percent UCL of the arithmetic mean or the maximum concentration, whichever is lower. In cases where there are fewer than ten samples, the maximum concentration was used. An EPC was calculated for each COPC using the U.S. EPA software ProUCL, Version 2.3, as follows.

1. The distribution of the data was determined. Samples reported as nondetect were included as values with a concentration of one-half the detection limit. There were no limitations on the percentage of nondetects.
2. The Student's t-test was used to calculate the EPC for normal data, the Land equation for lognormal data, and the gamma UCL for data that fit a gamma distribution. The approximate Chebyshev limit was used for nonparametric data.
3. The maximum concentration was used as the exposure EPC if the appropriate 95 percent UCL was greater than the maximum concentration or if there were ten or fewer samples.

Quantification of Daily Intake

Daily intake is the amount of a chemical that a person could take into his or her body averaged over the period that he or she could be exposed. Daily intake is estimated by

combining variables including contact rate, body weight, exposure duration, and averaging time with the EPC. The calculation using these variables results in an estimate of daily intake for each exposure pathway.

Daily intakes for RME were calculated. The RME represents the upper end of exposure. Table J1-2 presents the equations and exposure parameters that were used to estimate daily intake, or dose, for residential for RME assumptions. Site-specific values, U.S. EPA default values, and Cal/EPA default values for exposure parameters were used in this risk assessment. Chemical-specific variables used in the exposure calculations are provided in Table J1-3 (dermal factors for contact with soil), Table J1-4 (dermal factors for contact with groundwater), and Table J1-5 (uptake factors for homegrown produce). The general equation for calculating intake is shown below:

$$D = (C \times CR \times EF \times ED) / (BW \times AT)$$

where

D = dose (mg/kg-day)
C = exposure point concentration (mg/kg)
CR = contact rate (kg per day)
EF = exposure frequency (days per year)
ED = exposure duration (years)
BW = body weight (kg)
AT = averaging time (days)

Equations for dermal contact with soil have additional exposure parameters of adherence and absorption factors. Adherence factors indicate the amount of soil that adheres to the skin. Absorption factors (Table J1-3) reflect absorption of the chemical from soil across the skin membrane. According to Cal/EPA Department of Toxic Substances Control (DTSC) (Cal/EPA 1994) and U.S. EPA Region 9 guidance (U.S. EPA 2004a), the dermal absorption factors were used in conjunction with toxicity values unadjusted for gastrointestinal absorption. Additional parameters from U.S. EPA sources for dermal contact with groundwater while showering are shown in Table J1-4.

The Johnson and Ettinger model, using site-specific input parameters, was used to calculate EPCs for inhalation of vapors in indoor air originating in soil and groundwater. The geophysical properties from the sample that gave the highest indoor air concentrations were selected from among the 12 samples analyzed for geophysical data (Table J1-6):

- soil type — sand
- soil vapor permeability — 8.58E-08 square centimeters
- vadose zone soil dry bulk density — 1.578 grams per cubic centimeter
- vadose zone soil total porosity — 0.416
- vadose zone soil water-filled porosity — 0.104
- average soil temperature — 16.67 degrees Celsius

• residential air exchange rate	0.66 (U.S. EPA 1997a, using San Francisco heating degree days)

The U.S. EPA Region 9 volatilization factors and particulate emission factor presented in the PRGs were used to calculate EPCs for inhalation of vapors and particulates in outdoor air originating in soil.

Site-specific assumptions were developed for ingestion of homegrown produce. The transfer of COPCs from soil to plants is estimated with an uptake factor (Cal/EPA 1993). Uptake factors for inorganic chemicals were developed by U.S. EPA from empirical data for plant uptake (U.S. EPA 1996). For PAHs, field data are used from studies that measured the concentrations in the soil and in produce (Samsφe-Petersen et al. 2002). For other organic chemicals, uptake factors are calculated from the chemical-specific octanol-water partition coefficient and the organic-carbon-normalized partition coefficient (Cal/EPA 1993). The uptake factors are presented in Table J1-5.

Volatile chemicals are not included in this pathway because they are not known to accumulate appreciably in plants or vegetables. Also, volatile chemicals are not likely to be persistent in shallow soils where the roots of plants would be able to absorb them.

The exposure frequency for ingestion of homegrown produce was calculated using 20 percent of the total days of exposure frequency for the residential scenario (resulting in 70 days per year). Ingestion rates were selected from U.S. EPA guidance (U.S. EPA 1997a). U.S. EPA estimates that homegrown fruits and vegetables account for 4 percent and 6.8 percent, respectively, of receptor diets. Using the 95th percentile of fruit and vegetable intakes (12 grams per kilogram [g/kg] per day [g/kg-day], and 10 g/kg-day, respectively), a 70-kg adult would ingest 33.6 and 47.6 grams per day (g/day) of homegrown fruit and vegetables, respectively, and a 15-kg child would ingest 7.2 and 10.2 g/day, respectively. These values were summed to provide the total daily intake of homegrown produce. These values are for total produce intake, and represent the edible portions of the produce (U.S. EPA 1997a). This means that a family of four would grow and consume 50 pounds of homegrown fruits and vegetables from their yard each year.

J1.3.3 HHRA TOXICITY ASSESSMENT

The objective of the toxicity assessment is to assess the relationship between daily intake and toxic response. The toxicity assessment identifies toxicity values for each COPC and the type of effect each COPC is capable of producing. Toxicological effects fall into two categories: those that could potentially cause cancer (carcinogens) and those that cause other types of adverse health effects (noncarcinogens).

The toxicity value for carcinogenic effects is called a cancer slope factor (CSF), and the toxicity value for noncarcinogenic effects is called an RfD. Chemicals that show a potential for both carcinogenic and noncarcinogenic health effects are assigned both CSFs and RfDs. Toxicity values are presented in Table J1-7. Toxicity profiles for each COPC are presented in Attachment J1.

Toxicity values are specific to the route of exposure (i.e., oral, inhalation, or dermal routes). Oral toxicity values were used in a route-to-route extrapolation for dermal values

consistent with practices by U.S. EPA Region 9 (U.S. EPA 2004a) except that the adjustment to the oral RfD for cadmium for dermal absorption was not made.

Toxicity Values for Carcinogens

CSFs express the relationship between daily intake and the potential for an increase in cancer in people or a response associated with cancer in animals. CSFs are developed by the U.S. EPA with a mathematical model that uses data from the results of human epidemiological studies or laboratory animal studies.

Most of the CSFs are developed from data on laboratory animals that are exposed to the maximum dose that they can tolerate for relatively short periods. This is intended to be protective, as human receptors are more often exposed to much lower levels over long periods of time. To account for any uncertainty in calculating CSFs using this method, the U.S. EPA uses the 95 percent UCL of the mean CSF to assure that any actual risk will be less than the estimated risk.

Toxicity Values for Noncarcinogenic Effects

The potential for noncarcinogenic health effects is estimated using a toxicity value known as the RfD. Each RfD is associated with a specific adverse health effect (e.g., central nervous system damage). The RfD is a concentration below which there is little potential for adverse health effects over the exposure period. RfDs are derived from either human or animal studies and are adjusted using uncertainty factors. The RfD is calculated from the highest long-term exposure level that did not cause adverse effects. An uncertainty factor is applied to the RfD to allow for any uncertainty, such as using data from animals to predict effects on humans. Uncertainty factors range from 10 to 10,000, depending on the confidence level associated with the data.

Toxicity Values for Lead

Exposures to lead in soil were evaluated using DTSC's Lead Risk Assessment Spreadsheet Version 7 (LeadSpread 7) (Cal/EPA 1999). This model calculates a PRG that represents a safe concentration of lead in soil for children that is protective for a combined exposure to lead in the air, drinking water, food, and soil. The acceptable blood lead concentration is 10 micrograms per deciliter. Modeling output and supporting input documentation are presented in Attachment J2.

Site-specific PRGs for lead in soil of 184 mg/kg including ingestion of homegrown produce and 322 mg/kg without ingestion of homegrown produce were calculated using local concentrations for lead in outdoor air and drinking water supply. The closest monitoring stations to Alameda with ambient toxics data for lead are the San Francisco Arkansas Street station (14.7 miles west), the Richmond 13th Street station (17.5 miles northeast), and the San Pablo station (17.8 miles northeast). The maximum lead concentration reported in the last 6 years (0.055 micrograms per cubic meter, reported in 2000 at the San Francisco station) was selected as representative of lead in air at Alameda Point (California Air Resources Board 2006). The East Bay Municipal Utility District's Annual Water Quality Report, Year 2004, presents chemical concentrations in the

drinking water supply for the City of Alameda. The value for lead is 7 micrograms per liter (μg/L).

Sources of Toxicity Criteria

The hierarchy of human-health toxicity values used by U.S. EPA Region 9 in their PRGs follows Directive 9285.7-53, issued by U.S. EPA's Office of Solid Waste and Emergency Response on December 5, 2003:

- Tier 1 – U.S. EPA's IRIS database
- Tier 2 – U.S. EPA's PPRTVs
- Tier 3 – Health Effects Assessment Summary Tables (U.S. EPA 1997b) and NCEA

The toxicity values used in this risk assessment were obtained from the table of PRGs published by U.S. EPA Region 9 (U.S. EPA 2004b). Values from IRIS are confirmed through a review of the U.S. EPA IRIS database (U.S. EPA 2006) to check for updates that have occurred since the publication of the PRGs. Toxicity values are presented in Table J1-7.

Toxicity values are compiled from U.S. EPA Region 9 PRGs because PPRTVs and values from NCEA are provisional and not available to the public. Therefore, any updates to PPRTVs since publication of the PRGs are not available for inclusion.

Toxicity values developed by Cal/EPA were also used in the risk assessment. The Cal/EPA CSFs for carcinogens are listed in the Office of Environmental Health and Hazard Assessment toxicity database (Cal/EPA 2005b). Use of Cal/EPA toxicity values in addition to the U.S. EPA toxicity values results in the creation of a separate risk assessment incorporating the Cal/EPA toxicity values. However, it should be noted that the Navy agrees at this time to evaluate Cal/EPA toxicity values, but clearly and expressly reserves the right to evaluate the legal and technical justification for these values, and accept or reject them, before or at the time of the Navy cleanup decisions.

When no toxicity value was available for a chemical, a value for another chemical was assigned based on chemical or structural similarity as shown in Table J1-8.

J1.3.4 HHRA RISK CHARACTERIZATION

The final step in any risk assessment is the combination of daily intake and toxicity values to calculate potential cancer and noncancer health risks. According to the U.S. EPA directive, Memorandum Regarding the Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions (U.S. EPA 1991a),

> Where cumulative carcinogenic site risk to an individual based on reasonable maximum exposure for both current and future land use is less than 1E-04, and the noncarcinogenic HQ is less than 1, action generally is not warranted unless there are adverse environmental impacts.

Cancer Risk Characterization

The cancer risk is calculated as follows for an HHRA:

cancer risk = daily intake × CSF

The cancer risks are added across all the exposure pathways for each chemical and then across chemicals to estimate overall risk. As with the Tier 1 evaluation, cancer risks are discussed in the context of a risk management range of 1 in 1,000,000 (1×10^{-6}) to 1 in 10,000 (1×10^{-4}). For risks between 10^{-6} and 10^{-4}, site-specific factors are considered when making decisions about whether or not action is required to reduce risk.

The total cancer risk includes COPCs that are found at or below background concentrations. The cancer risk without background excludes the cancer risk attributed to metals reported at concentrations below the 95th percentile in the Alameda Point background data set.

A current and reasonable future use scenario is discussed that includes exposure to COPCs in soil and indoor air (from incidental ingestion of soil, dermal contact with soil, inhalation of soil particulates and vapors from soil in outdoor air, inhalation of vapors from soil and groundwater in indoor air, and ingestion of produce grown in local soil) without metals below background and without PAHs in soil. PAHs will be addressed on a sitewide basis for specific criteria.

Noncancer and Lead Risk Characterization

Noncancer health effects are evaluated based on an HQ for individual chemicals. An HQ value of 1 indicates that lifetime exposure has limited potential for causing an adverse effect in sensitive populations, and values of less than 1 can generally be considered acceptable. Adding HQ values into a single cumulative HI value across chemicals is a preliminary estimate of the highest possible noncancer risk. HI values of less than 1 can generally be considered acceptable. Values greater than 1 are usually given closer attention.

noncancer risk = daily intake / RfD

As discussed in Section J1.2.4, an HQ for iron above 1 is not considered above the risk management range, nor are the health effects of iron considered additive with other chemicals.

The EPC for lead in soil is compared to the site-specific PRGs of 184 mg/kg for a residential scenario including homegrown produce and 322 mg/kg without homegrown produce to determine whether there is a potential risk associated with exposure to lead in soil.

The EPC for lead in groundwater is compared to the federal action level of 15 µg/L to determine whether there is a potential risk associated with exposure to lead in groundwater.

J1.3.5 HHRA RISK CHARACTERIZATION WITHOUT METALS AT CONCENTRATIONS BELOW BACKGROUND

For the calculation of risk without metals below background, the COPC list was refined to eliminate metals in soil or groundwater with maximum concentrations at or below the 95th percentile in the Alameda Point pink background data set. Additionally, statistical evaluations were conducted for metals at AOC 11/EBS Parcels 78–79 and AOC 23 with their maximum concentrations above the Alameda Point 95th percentiles but below the maximum concentration in the Alameda Point pink background data set (Appendix H) for the metal. These analyses indicated that at AOC 11/EBS Parcels 78–79, cadmium in soil, and arsenic, iron, and manganese in groundwater are below background. These analyses indicated that at AOC 23, aluminum, arsenic, chromium, manganese, and vanadium in soil are below background, and arsenic in groundwater is below background.

J1.3.6 HHRA UNCERTAINTY ANALYSIS

Varying degrees of uncertainty exist in each step of the risk assessment process. To compensate for these uncertainties, the U.S. EPA has developed risk assessment protocols that are designed so that potential risks are not underestimated.

Data Evaluation

The validity of any risk assessment is dependent on the adequacy of the site characterization. Sample collection at IR Site 35 was biased to areas known or suspected to have chemical impacts. This bias helps to offset the uncertainty. Each study area data set has a separate data evaluation section that considers the adequacy of the study area characterization.

Exposure Assessment

Uncertainties are also associated with the parameters presented as exposure and in the quantification of exposure. Each exposure assumption is designed to estimate the potential risk to assure that any actual risk will be less than the estimated risk. In this risk assessment, for example, it was assumed that residents would engage regularly in activities that would result in exposure to site COPCs over 30 years. It was also assumed that the individual would be exposed for 24 hours per day for the entire 30-year duration. Although this scenario is unlikely, due to frequency of relocation and time spent indoors, it provides a protective estimate of exposure that would overestimate any actual risk.

For ingestion of locally grown produce, the uptake of organic chemicals (except PAHs) was estimated from theoretical equations rather than from field studies; therefore, uptake may be overestimated. PAH uptake is based on field studies that show that uptake is minimal. Alameda Point–specific studies found no uptake of PAHs in homegrown produce (U.S. EPA 2005).

Toxicity Assessment

Provisional toxicity values were used for many chemicals for which the U.S. EPA has not yet completed the scientific review process. Also, HI values are only additive for

chemicals that impact the same target organ. For this risk assessment, HI values were added together to represent a conservative estimate of noncancer health effects. Information presented in Section J1.2.4 indicates that the health effects of iron, manganese, thallium, and vanadium are not additive.

Toxicity values have been developed to be protective of the most sensitive potential receptors. However, for some COPCs, CSFs and RfDs are not available. Toxicity information for surrogate compounds (based on chemical or structural similarity) was substituted. This may result in an underestimation or overestimation of risk.

Risk Characterization

Although there is some uncertainty associated with risk assessment, the calculated cancer risks and HIs are protective estimates, so that any actual risk, if it exists, will likely be lower than the estimates.

For noncancer hazard, acceptable lifetime exposure levels correspond to HIs equal to or less than 1. The individual HQs for each chemical are added together only for chemicals that affect the same target organ. Therefore, adding all HQs for each chemical into a single HI value represents a protective estimate of the potential for noncancer health effects.

J1.3.7 HHRA CONCLUSIONS

The section summarizes the findings of the baseline risk assessment. The total cancer risks and noncancer hazard are discussed in a context of the risk management range. Another consideration in the risk management decision is the cancer risk and noncancer hazard associated with the potentially complete exposure pathways for current and reasonable future use without metals below background and without PAHs in soil. The potentially complete exposure pathways for current and reasonable future use include ingestion of soil, dermal contact with soil, inhalation of particulates and vapors in indoor and outdoor air, and ingestion of homegrown produce. PAHs have site-specific risk management levels being developed for Alameda Point and can be considered separately.

J1.4 Lead-Only Evaluation

Two study areas subject to previous lead removals, AOC 10 and AOC 12, were evaluated only for lead. The health effects of lead are evaluated by comparing the EPC (Section J1.3.2) to the site-specific PRGs for lead (Section J1.3.4) of 184 mg/kg for a residential scenario including homegrown produce and 322 mg/kg without the homegrown produce exposure pathway.

J2 TIER 1 EVALUATION RESULTS

This section presents the results of the Tier 1 risk assessments conducted on data from 14 study areas including AOCs 2, 4, 5, 6, 7, 8, 9, 13, 17, 18, 20, 21, 24, and 25. The results are presented in Tables J2-1 through J2-14. The site descriptions and backgrounds

are presented in applicable attachments to the main RI/FS Report. The Tier 1 evaluation methods are presented in Section J1.2.

The results for cancer risks and noncancer hazard values are presented for the following three exposure groups.

- **Exposure Group 1.** All soil and groundwater pathways (residential development and residential use of groundwater) – for ingestion of soil and groundwater, inhalation of vapors in indoor and outdoor air, inhalation of vapors in indoor air while showering, inhalation of particulates from soil in outdoor air, and dermal contact with soil.
- **Exposure Group 2.** Pathways for soil and vapors from VOCs in groundwater (reasonable current and future use exposure, which includes residential development with the current municipal water supply) – for ingestion of soil, inhalation of vapors in indoor and outdoor air, and dermal contact with soil. These exposure pathways represent the most reasonable current and future use as it is highly unlikely that shallow groundwater at IR Site 35 would ever be used as a source of drinking water.
- **Exposure Group 3.** Exposure pathways for residential use of groundwater – for ingestion of groundwater, and inhalation of vapors in indoor air while showering.

For the dermal groundwater pathway, as noted in Section J1.2.4, the tap water PRG is based only on ingestion and inhalation while showering. To address the impact that dermal exposure will have on the risks, the ratio of the risk from dermal exposure to ingestion from the HHRA calculations is presented in Table J2-15. These ratios are used in the uncertainty analysis for each study area to determine if including the dermal pathway for Tier 1 COPCs in water has an impact on the risk based on the tap water PRGs.

Results are presented for total risk and risk without metals at concentrations below the Alameda Point background data set. The exposure pathways and risk-based guidelines used to calculate the cancer risk and noncancer hazard value are presented in detail in Section J1.2.3. Note that the Tier 1 calculations do not include PAHs because decisions on PAHs are made separately.

J2.1 AOC 2 Tier 1 Evaluation

The total cancer risk and noncancer hazard values for AOC 2 are shown in Table J2-1. The cancer risk and hazard values without metals with concentrations below background are also included in Table J2-1.

J2.1.1 AOC 2 SITE DESCRIPTION AND BACKGROUND

AOC 2 is an approximately 1.13-acre area in the northeastern corner of Transfer Parcel EDC-5 that includes portions of EBS Parcels 61A and 194 (Figure 1-1). Buildings 30, 30A, and 562 are in the central portion of AOC 2.

The portion of EBS Parcel 61A located within AOC 2 historically had a sewage pump station (Building 562), storage, vehicle parking, open space, and a dog-training and kennel area. Two buildings of unknown use (Building 29 and a portion of Building 103) were also historically present on EBS Parcel 61A. During the EBS (IT 2001a), no chemical storage was observed; however, undocumented spills were noted on the west side of Building 562, attributed to the sewage pump station. The stained area measured approximately 30 by 20 feet.

Numerous items were observed in the open space at EBS Parcel 61A, including two 55-gallon drums (one with unknown contents and the other containing solvent), solvents with paintbrushes, a gun-cleaning barrel, cargo containers holding a total of 110 gallons of corrosives, spray paint, dry-cleaning solvents, dispersant and toner, gasoline, paint, as well as 40-foot storage trailers with paint, paint thinner, and an empty flammable liquid storage cabinet; however, the exact location of these items is not known.

EBS Parcel 194 historically housed a military police station (Building 30) and two buildings of unknown use (Building 30A and a portion of Building 103). Chemical storage in EBS Parcel 194 included approximately 10 gallons of nonhalogenated organic chemicals and petroleum products that were stored in Building 30. During the EBS, only minor stains associated with vehicle parking were observed in the open space of EBS Parcel 194 (IT 2001a).

Three investigations conducted at AOC 2 were used to support this Tier 1 risk assessment. During the EBS, surface and subsurface soil samples were collected and analyzed for total petroleum hydrocarbons (TPH), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and metals (IT 2001a). Additionally, six subsurface soil samples were collected at three locations along the sanitary sewer corridor and analyzed for VOCs, TPH, SVOCs, pesticides, PCBs, and metals. Reported concentrations of analytes in surface and subsurface samples were below PSCs.

During the 2002 PAH study (BEI 2005), soil samples were collected from four depth intervals between 0 and 8 feet bgs, at two boring locations, and analyzed for PAHs. Analytical results indicate that benzo(a)pyrene (B[a]P) equivalent concentrations exceeded the PSC (620 micrograms per kilogram [µg/kg]) in soil samples from two locations (32-EDC-5-33 and A02SB01). These locations were incorporated into the PAH Area evaluation and were not included in this Tier 1 risk assessment.

During the 2005 RI, soil samples were collected from four borings outside Building 562. Groundwater samples were collected from the two soil borings on the assumed downgradient side of the building; the northwesternmost groundwater sample (A02SB01) was collected near the area where spillage from the sewage pump station occurred west of Building 562. Soil and groundwater samples collected during the RI were analyzed for VOCs, SVOCs, PAHs, pesticides, PCBs, and metals. Groundwater samples were also analyzed for total dissolved solids (TDS). Because AOC 2 is located near Oakland Inner Harbor, groundwater was also analyzed for low-detection-level mercury for comparison to the surface water PSC.

For soil, the PCB Aroclor 1260 was reported at concentrations above the PSC in soil samples from borings A02SB03 and A02SB04.

For groundwater, only manganese was reported at a concentration above the Alameda Point background 95th percentile in one sample.

J2.1.2 AOC 2 TIER 1 DATA EVALUATION

In soil at AOC 2, there are 36 Tier 1 COPCs, including 16 metals based on 14 to 17 samples, 7 pesticides or PCBs (Aroclor 1260) based on 15 to 17 samples, 9 non-PAH SVOCs based on 17 samples, and 4 VOCs based on 12 samples (Table J2-1).

In groundwater at AOC 2, there are 13 Tier 1 COPCs, including 10 metals, 1 SVOC, and 2 VOCs in two samples for all analytes, except mercury with five samples.

J2.1.3 AOC 2 TIER 1 RISK CHARACTERIZATION

For soil and groundwater data for the three exposure groups at AOC 2, the calculated cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 2×10^{-3} and 7

  Without metals below background: 1×10^{-5} and 4

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 2×10^{-4} and 3

  Without metals below background: 9×10^{-6} and 0.6

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 2×10^{-3} and 4

  Without metals below background: 4×10^{-8} and 4

For reasonable future use, for Exposure Group 2 without metals below background, the majority of the cancer risk for soil is associated with Aroclor 1260, which had a low detection frequency.

For residential use of groundwater, the Exposure Groups 1 and 3 noncancer hazard without metals below background is due largely to manganese (HQ of 3).

J2.1.4 AOC 2 TIER 1 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation are representative of any potential health concerns at AOC 2. The results are consistent with the site history and previous investigations. This approximately 1.13-acre site was adequately characterized by the three investigations.

The contribution of vapors for the two VOCs reported in groundwater to indoor air is negligible. The cancer risk and noncancer HI for these two VOCs, based on the tap water PRGs, are well below 10^{-6} and 1, respectively, and PRGs are higher than ESLs that are protective of indoor air.

The uncertainty associated with the omission of the dermal pathway for groundwater is low because exposure from the dermal pathway for the Tier 1 COPCs would not result in an increase in the cancer risk or HI for residential use of groundwater (Exposure Groups 1 and 3). Cancer risk and hazard values are reported in one significant figure, so small changes will not necessarily result in an overall increase. This finding is based on the ratio of dermal exposure to ingestion for each Tier 1 COPC shown in Table J2-15.

J2.1.5 AOC 2 TIER 1 CONCLUSIONS

For all three exposure groups, the total cancer risks are above the risk management range due to arsenic in soil and groundwater. However, arsenic concentrations in soil and groundwater are below Alameda Point background, and the total cancer risks without arsenic are within the risk management range.

For exposure pathways for soil and VOC vapors from groundwater, the cancer risks without metals below background are within the risk management range at 9×10^{-6}, and the noncancer HI is below 1 (0.6). The residual cancer risk is associated with Aroclor 1260 in soil at 8×10^{-6}. The only PCB reported was Aroclor 1260, in 4 of 17 samples.

For residential use of groundwater, the noncancer HI value above 1 is due to manganese in groundwater (HQ of 3).

J2.2 AOC 4 Tier 1 Evaluation

The total cancer risk and noncancer hazard values for AOC 4 are shown in Table J2-2. The cancer risk and hazard without metals concentrations below background are also included in Table J2-2.

J2.2.1 AOC 4 SITE DESCRIPTION AND BACKGROUND

AOC 4 is an approximately 4.6-acre area in the northeastern portion of Transfer Parcel EDC-5. AOC 4 includes a portion of the eastern edges of EBS Parcels 62 and 96, the entirety of EBS Parcel 97, and a small portion of the northern edge of EBS Parcel 98. Most of AOC 4 is in the portion of Transfer Parcel EDC-5 known as the West Housing Area.

Current and historical uses at AOC 4 are described below, by EBS parcel.

- EBS Parcel 62 is currently open space/parking lot.
- EBS Parcel 96 is currently open space/parking lot and a paved road; it was formerly used for materials storage, washdown, vehicle parking, and disposal.
- EBS Parcel 97 (located completely within AOC 4) contained a water storage tank (Building 95), a well with a potable-water pump station (Building 176) that was shut down due to mercury contamination, and a transformer house (Building 177) used to store irrigation equipment.

- Only a small portion of EBS Parcel 98 is located in AOC 4; this area is open space formerly used for material storage, vehicle parking, outdoor repair, drum storage, and recreation.

Four investigations conducted at AOC 4 were used to support this Tier 1 risk assessment. A basewide groundwater monitoring program (BGMP) was implemented in 2002 and is ongoing at Alameda Point (Shaw 2004), which includes well MBG-1 located in AOC 4. Soil samples collected from this location during well installation were analyzed for VOCs, TPH, SVOCs, pesticides, PCBs, and metals. One soil sample had concentrations of iron that exceeded the screening criterion. Groundwater samples collected in 1998 from well MBG-1 were analyzed for VOCs, TPH, SVOCs, pesticides, PCBs, and metals. Arsenic was reported above the PSC (maximum contaminant level of 10 µg/L) but below the Alameda Point background 95th percentile of 21 µg/L. Mercury and zinc were reported in only one of the three samples collected in 1998; both concentrations were above surface water PSCs.

During the 2002 PAH study (BEI 2005), the identification of PAH concentrations above the screening criterion in soil samples collected from Transfer Parcel EDC-5 prompted the Navy to conduct a removal action. The PAH time-critical removal action (TCRA) involved excavation and off-site disposal of soil in PAH-affected areas, including those in AOC 4. Soil in the upper 2 feet bgs containing PAHs with B(a)P equivalent concentrations greater than 1,000 µg/kg was removed from portions of AOC 4, using a grid pattern. After the TCRA, PAH concentrations at eight locations deeper than 2 feet bgs exceeded the screening criterion. These locations were incorporated into the PAH Area evaluation and were not included in this Tier 1 risk assessment.

The RI was conducted to evaluate the nature and extent of primary chemicals reported at AOC 4, which were metals in groundwater at concentrations above surface water PSCs. No sampling was conducted at AOC 4 during the RI, because the Navy and regulatory agencies agreed that there were sufficient existing analytical results to support a risk evaluation and decisions regarding the necessity for remedial actions at AOC 4.

J2.2.2 AOC 4 TIER 1 DATA EVALUATION

In soil at AOC 4, there are 15 Tier 1 COPCs, including 13 metals based on 2 samples (except arsenic based on 11 samples), a PCB (Aroclor 1260) based on 11 samples, and a VOC (tetrachloroethene) based on 4 samples.

In groundwater at AOC 4, there are 13 Tier 1 COPCs, including 12 metals in three samples and an SVOC, pyrene, in one sample.

J2.2.3 AOC 4 TIER 1 RISK CHARACTERIZATION

For soil and groundwater data for the three exposure groups at AOC 4, the calculated cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 2×10^{-3} and 5

Without metals below background: 5×10^{-7} and 3

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 9×10^{-5} and 2

  Without metals below background: 5×10^{-7} and 2

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 2×10^{-3} and 3

  Without metals below background: 4×10^{-9} and 1

For the three exposure groups, the cancer risk and noncancer HI values without metals below background are below 10^{-6} and are less than 1 without iron, respectively.

J2.2.4 AOC 4 TIER 1 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation are representative of any potential health concerns at AOC 4. The results are consistent with the site history. This approximately 4.6-acre site is adequately characterized with three investigations and a Tier 1 evaluation based on 11 soil samples for PCBs and samples for other organic chemicals in soil and groundwater.

The uncertainty associated with the omission of the dermal pathway for groundwater is low because exposure from the dermal pathway for the Tier 1 COPCs would not result in an increase in the cancer risk or HI for residential use of groundwater (Exposure Groups 1 and 3). Cancer risk and hazard values are reported in one significant figure, so small changes will not necessarily result in an overall increase. This finding is based on the ratio of dermal exposure to ingestion for each Tier 1 COPC shown in Table J2-15.

J2.2.5 AOC 4 TIER 1 CONCLUSIONS

For all three exposure groups, the total cancer risk that includes residential use of groundwater (Exposure Groups 1 and 3) is above the risk management range. The cancer risk without metals below background is below the de minimis level of 10^{-6} for all three exposure groups.

The noncancer HI values above 1 for soil and groundwater are due largely to iron. Without iron, the HI values do not exceed 1. The soil sample for iron is part of the Alameda Point background data set and so is background by definition. The maximum concentration in groundwater of 7,070 µg/L is only slightly above the Alameda Point background 95th percentile of 6,586 µg/L and well below the maximum in the background data set of 24,000 µg/L. Also, as noted in Section J1.2.4, the health effects of iron are not considered additive with other chemicals.

As discussed in Section 4 of the main RI/FS Report, correlation analysis indicates that the concentrations of iron are naturally occurring and not due to a release resulting from Navy activities.

J2.3 AOC 5 Tier 1 Evaluation

The total cancer risk and noncancer hazard values for AOC 5 are shown in Table J2-4. The cancer risk and hazard without metals with concentrations below background are also included in Table J2-3.

J2.3.1 AOC 5 SITE DESCRIPTION AND BACKGROUND

AOC 5 is an approximately 0.2-acre area along the northeastern boundary of EBS Parcel 98, which is also the northeastern boundary of Transfer Parcel EDC-5. AOC 5 includes the area surrounding a former sewage pump station located immediately south of the intersection of Ferry and Main Streets. Building 493 is the only structure located in AOC 5; the remainder of AOC 5 is landscaped open space. The portion of EBS Parcel 98 located in AOC 5 was historically used as residential and open space and is part of the West Housing Area. Building 493 housed the sewage pump station.

Three investigations conducted at AOC 5 were used to support this Tier 1 risk assessment. During the 2002 PAH study (BEI 2005) and the PAH TCRA, the identified PAH concentrations above the screening criterion in soil were removed. Post-TCRA, PAH concentrations were below the screening criterion (FWEC 2004). PAH-affected locations are discussed with the PAH Area evaluation.

RI sampling was performed at AOC 5 to assess whether possible releases from the sewage pump station have impacted soil and groundwater quality. Soil samples were analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. Groundwater collected from one boring (A05SB02) was analyzed only for VOCs and metals, due to insufficient yield. PAHs and metals (primarily arsenic, iron, and manganese) were reported at concentrations above PSCs at AOC 5.

J2.3.2 AOC 5 TIER 1 DATA EVALUATION

In soil at AOC 5, there are 28 Tier 1 COPCs, including 17 metals, 5 pesticides, 3 non-PAH SVOCs, and 3 VOCs. There were 12 samples for all analytes (except arsenic, which was based on 16 samples).

In groundwater at AOC 5, there are 15 Tier 1 COPCs, including 11 metals based on three samples and 4 VOCs based on two samples.

J2.3.3 AOC 5 TIER 1 RISK CHARACTERIZATION

For soil and groundwater data for the three exposure groups at AOC 5, the calculated cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 5×10^{-3} and 12

  Without metals below background: 4×10^{-3} and 10

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 1×10^{-4} and 6

  Without metals below background: 4×10^{-7} and 5

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 4×10^{-3} and 6

  Without metals below background: 4×10^{-3} and 6

For reasonable future use without metals below background, the Exposure Group 2 noncancer HI without iron and manganese is 1.

For residential use of groundwater without metals below background, the Exposure Group 3 noncancer HI is above 1 due to iron (HQ of 3) and manganese (HQ of 3).

J2.3.4 AOC 5 TIER 1 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation are representative of any potential health concerns at AOC 5. The results are consistent with the site history and previous investigations. This approximately 0.2-acre site is adequately characterized, with three investigations and a Tier 1 evaluation based on 12 to 16 soil samples and 2 to 3 groundwater samples for metals and organic chemicals.

As noted in Section J1.2.4, the health effects of iron are not considered additive with other chemicals.

The contribution of vapors from the four VOCs identified in groundwater to indoor air is negligible. The noncancer HIs based on the tap water PRGs are well below 1, and PRGs are higher than ESLs protective of indoor air.

The uncertainty associated with the omission of the dermal pathway for groundwater is low because exposure from the dermal pathway for the Tier 1 COPCs would not result in an increase in the cancer risk or HI for residential use of groundwater (Exposure Groups 1 and 3). Cancer risk and hazard values are reported in one significant figure, so small changes will not necessarily result in an overall increase. This finding is based on the ratio of dermal exposure to ingestion for each Tier 1 COPC shown in Table J2-15.

J2.3.5 AOC 5 TIER 1 CONCLUSIONS

For all three exposure groups, the total cancer risks are at (10^{-4}) or above the risk management range, and the noncancer HI values are above 1.

For exposure pathways for soil and VOCs in groundwater (Exposure Group 2), the cancer risk without metals below background is below the de minimis level of 10^{-6}, while the exposure pathways that include residential use of groundwater have cancer risks above the risk management range, due to arsenic in groundwater.

The noncancer HI values above 1 are a result of the cumulative HQs for iron and manganese in soil and groundwater. Also, as noted in Section J1.2.4, the health effects of iron are not considered additive with other chemicals.

The noncancer HI based on the maximum concentration of manganese likely overestimates the hazard. The maximum soil concentration of manganese of 3,780 mg/kg was reported in 1 of 12 samples at a 6.5-foot-bgs depth, which is in the native clay below the fill material. The next highest concentration of manganese of 805 mg/kg was reported at a 1-foot-bgs depth and is well below the PRG of 1,762 mg/kg.

In groundwater, the maximum concentration of arsenic of 31.2 µg/L is above the 95th percentile in background of 20.72 µg/L but below the maximum concentration of 40.7 µg/L. There is a possibility that arsenic concentrations in groundwater are consistent with background concentrations, but there are not sufficient data to conduct a more rigorous statistical comparison.

J2.4 AOC 6 Tier 1 Evaluation

The total cancer risk and noncancer hazard values are shown in Table J2-4.

J2.4.1 AOC 6 SITE DESCRIPTION AND BACKGROUND

AOC 6 is an approximately 0.2-acre area in the north-central portion of Transfer Parcel EDC-5 and consists of a parking area and grassy open spaces where buildings were formerly located. AOC 6 was part of a PCB removal without confirmation soil samples. Information on the exact location, area, depth of excavation, and volume of removed soil is not available. There was no visible evidence of the removal action at AOC 6 during a site visit by Bechtel Environmental, Inc., in August 2005.

AOC 6 is located completely within EBS Parcel 87, immediately southwest of the intersection of Seattle Road and Pan Am Way. Historical uses of EBS Parcel 87 included officers' quarters and housing (Building 85, demolished in 1968), an electrical substation (Building 553, still present and maintained by Alameda Power and Telecom), and a parking lot. Stains associated with vehicle parking are present in the parking area (BEI 2005). A portion of Building 85 was formerly located in AOC 6; Building 553 is entirely in AOC 6. The EBS reported that a transformer located on a fenced pad adjacent to the west side of Building 553 ruptured in 1986 due to overheating. An unknown quantity of oil containing PCBs sprayed from the transformer approximately 15 feet to the west onto grass, trees, and fencing (IT 2001a).

Two investigations conducted at AOC 6 were used to support this Tier 1 risk assessment. During the PAH TCRA, no PAH removals were conducted at EBS Parcel 87 or AOC 6; however, four soil borings (U33, U34, V33, and V34) were advanced and soil samples collected at four depth intervals (between 0 and 8 feet bgs) and analyzed for PAHs. B(a)P equivalent concentrations in soil samples (depths from 0 to 8 feet bgs) from each of these locations exceeded the PSC (620 µg/kg). Although PAH concentrations exceeded PSCs at locations near AOC 6, an adequate number of samples already exists to support the RI/FS for this area; therefore, no further samples were proposed for PAH

analysis. These locations were incorporated into the PAH Area evaluation and were not included in this Tier 1 risk assessment.

RI sampling at AOC 6 was conducted to assess whether PCBs remain in soil at concentrations above PSCs to the west side of Building 553. Soil samples were collected during the 2005 RI from six borings west of Building 553; two soil samples were collected from each boring and were analyzed for PCBs. Aroclor 1260 was the only PCB reported at concentrations above the detection limit and the PSC (residential PRG of 220 µg/kg) at a concentration of 430 µg/kg at 0.5 foot bgs from boring A06SB03.

J2.4.2 AOC 6 TIER 1 DATA EVALUATION

In soil at AOC 6, there is one Tier 1 COPC, a PCB (Aroclor 1260), identified in 3 of 12 samples. In accordance with the Work Plan (BEI 2006), groundwater samples were not collected.

J2.4.3 AOC 6 TIER 1 RISK CHARACTERIZATION

The total cancer risk of 5×10^{-6} at AOC 6 is based on exposure pathways for soil only (Exposure Group 2).

The total cancer risk for soil is within the risk management range. The cancer risk above 1×10^{-6} is associated with a PCB, Aroclor 1260, identified in 3 of 12 samples at concentrations of 430, 120, and 65 µg/kg. There are no COPCs with noncancer health effects guidelines; therefore, an HI was not calculated.

J2.4.4 AOC 6 TIER 1 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation are representative of any potential health concerns at AOC 6. The results are consistent with the site history and previous investigations. Twelve soil samples are considered adequate for this approximately 0.2-acre site.

J2.4.5 AOC 6 TIER 1 CONCLUSIONS

Because groundwater data were deemed unnecessary, only Exposure Group 2 results were calculated. For reasonable future uses, the cancer risk is 5×10^{-6}. The cancer risk above 10^{-6} is due to a PCB, Aroclor 1260, identified in 3 of 12 samples. In accordance with the Work Plan (BEI 2006), samples were not analyzed for metals.

J2.5 AOC 7 Tier 1 Evaluation

The total cancer risk and noncancer hazard values for AOC 7 are shown in Table J2-5. The cancer risk without metals with concentrations below background is also included in Table J2-5. No COPCs have noncancer health effects risk guidelines.

J2.5.1 AOC 7 SITE DESCRIPTION AND BACKGROUND

AOC 7 is an approximately 0.9-acre area in the central portion of Transfer Parcel EDC-5 and in the southwestern portion of EBS Parcel 98 just southeast of the intersection of

Pan Am Way and Pensacola Lane. AOC 7 contains portions of Building FH-9 and FH-12, and all of the Buildings FH-10, FH-11, and FH-278. Buildings FH-9, FH-10, FH-11, and FH-12 are currently occupied by tenants; Building FH-278 is a high-voltage electrical substation. AOC 7 also includes open space that is either landscaped or paved for vehicle parking.

The portion of Parcel 98 covered by AOC 7 may have historically been used as a location for family housing, temporary barracks, and open space for vehicle parking, storage activities associated with maintenance operations, drum storage, and recreation. It is not known which of these outdoor activities occurred specifically in AOC 7.

Three investigations conducted at AOC 7 were used to support this Tier 1 risk assessment. Samples were collected for PAH analyses as part of the Operable Unit (OU)-5 RI Addendum activities conducted in 2001 (IT 2001b) and the PAH TCRA soil removals samples in the West Housing Area. Soil collected at depths of 1 to 1.5 and 1.5 to 2 feet bgs had reported B(a)P equivalent concentrations above the PSC (620 µg/kg); however, these locations were incorporated into the PAH Area evaluation and were not included in this Tier 1 risk assessment.

Soil samples collected as part of the PAH TCRA at AOC 7 were also analyzed for one or more of the following analytes: VOCs, TPH, PAHs, pesticides, PCBs, and metals. Only results from soil samples collected at depths not excavated during the PAH TCRA were reviewed for this report. Aroclor 1254 concentrations of 320 and 300 µg/kg were reported above the PSCs (220 µg/kg) in soil samples from 1 to 1.5 and 1.5 to 2 feet bgs from borings CC27 and BB30, respectively.

The RI at AOC 7 was to address PAH and PCB concentrations reported in soil. Because sufficient data exist to support a risk evaluation and decisions on the necessity for remedial actions at AOC 7, no sampling was performed during the RI (BEI 2006).

J2.5.2 AOC 7 TIER 1 DATA EVALUATION

In soil at AOC 7, there are 13 Tier 1 COPCs, including 11 metals based on 2 samples (except arsenic, based on 18 samples) and 2 PCBs (Aroclor 1254 and Aroclor 1260) based on 18 samples. There are no COPCs with noncancer risk guidelines. In accordance with the Work Plan (BEI 2006), groundwater samples were not collected.

J2.5.3 AOC 7 TIER 1 RISK CHARACTERIZATION

At AOC 7, the cancer risks of 9×10^{-5} (total) and 4×10^{-6} (without metals below Alameda Point background) are based on exposure pathways for soil only (Exposure Group 2). Without metals below background, there are no COPCs with noncancer health effects guidelines; therefore, an HI was not calculated.

The cancer risk above 10^{-6} without metals below background is largely due to Aroclor 1254 reported in 2 of 18 samples.

J2.5.4 AOC 7 TIER 1 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation are representative of any potential health concerns at AOC 7. The results are consistent with the site history and previous investigations. Eighteen soil samples are considered adequate for this approximately 0.9-acre site.

J2.5.5 AOC 7 TIER 1 CONCLUSIONS

For AOC 7, total cancer risk and noncancer HI including metals below background are 9×10^{-5} and less than 1, respectively, for Exposure Group 2.

Because groundwater data were deemed unnecessary, only Exposure Group 2 results were calculated. For reasonable future use, the cancer risk without metals below background at AOC 7 is 4×10^{-6} due to a PCB, Aroclor 1254, reported in 2 of 18 samples. There are no COPCs with noncancer health effect guidelines when metals below background are eliminated.

J2.6 AOC 8 Tier 1 Evaluation

The total cancer risk values are shown in Table J2-6.

J2.6.1 AOC 8 SITE DESCRIPTION AND BACKGROUND

AOC 8 is an approximately 0.5-acre area in the central portion of Transfer Parcel EDC-5 known as the West Housing Area, in the northeastern portion of EBS Parcel 98. Building 550, a metal shed, is the only structure located in AOC 8; the remainder of the AOC is open space and includes portions of a backyard and the Alameda Point Garden.

Building 550 was part of a larger landscape maintenance facility in the West Housing Area. The landscape maintenance facility is a fenced area that formerly contained three large sheds (one wooden and two aluminum) and two buildings, Building 550 and Building 195 (located immediately south of AOC 8). Building 550 was used for grounds maintenance; Building 195 was used as a pesticide and fertilizer storage shed where small batches of pesticides and fertilizers were mixed. Oil, fuel, pesticides, herbicides, and fertilizers were stored in the maintenance facility, both indoors and in the surrounding open space. Various stains (some with strong hydrocarbon odors) were observed in the open space surrounding Building 550. Potentially hazardous wastes, including an abandoned 55-gallon drum covered with oil and a 30-gallon drum of waste oil, were also observed near the maintenance facility.

Three investigations conducted at AOC 8 were used to support this Tier 1 risk assessment. During the EBS, the area around Building 550 in AOC 8 was investigated to address the storage and use of potentially hazardous substances. Four soil samples were collected from 0 to 1 foot bgs and analyzed for TPH, pesticides, and PCBs. Aroclor 1254 was reported at concentrations above the PSC in one surface sample (sample 098-0006). No other chemicals were reported at concentrations above screening criteria.

During the 2002 PAH study and the PAH TCRA, soil samples were collected at nine boring locations from four depth intervals between 0 and 8 feet bgs and analyzed for PAHs. B(a)P equivalent concentrations were below the PSC (620 µg/kg). PAH discussion is included with the PAH Area evaluation.

At the adjacent area of the former Building 195 site (immediately south of AOC 8), concentrations of pesticides and PCBs were reported during the EBS; lead-based paint was also reported to be an issue. Building 195 and surrounding soil were removed as part of a one-time pesticide TCRA. Between February and March 2002, 203 cubic yards of soil was removed during a TCRA to a maximum depth of 2 feet bgs. The cleanup levels used during the TCRA were U.S. EPA 2002 PRGs (U.S. EPA 2002a) for residential soil for pesticides and PCBs, and 209 mg/kg for lead (derived using a site-specific application of the DTSC LeadSpread 7 model). The results of confirmation sampling reported PCBs and lead concentrations below their respective cleanup levels; pesticides were not reported at concentrations above detection limits. As a result, no additional action was recommended in the vicinity of Building 195 (Shaw 2004).

The RI sampling at AOC 8 addressed PCBs in soil. During the RI, two soil samples were collected from five borings around the location of EBS sample 098-0006 and analyzed for PCBs. The RI soil samples did not contain PCBs at concentrations above detection limits, thereby defining the lateral and vertical extent.

J2.6.2 AOC 8 TIER 1 DATA EVALUATION

In soil at AOC 8, there is one Tier 1 COPC, a PCB (Aroclor 1254), which was reported in 1 of 14 samples. Groundwater samples were not collected, in accordance with the Work Plan (BEI 2006).

J2.6.3 AOC 8 TIER 1 RISK CHARACTERIZATION

For soil, the total cancer risk of 3×10^{-6} at AOC 8 is based on exposure pathways for soil only (Exposure Group 2).

The total cancer risk is within the risk management range based on 1 of 14 samples with a reportable quantity of Aroclor 1254. An HI was not calculated because there are no noncancer health effects guidelines for Aroclor 1254, the only COPC identified.

J2.6.4 AOC 8 TIER 1 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation are representative of any potential health concerns at AOC 8. The results are consistent with the site history and previous investigations. Fourteen samples are considered adequate for this approximately 0.5-acre site. Due to the low solubility and low mobility in soil, PCBs typically do not impact groundwater quality. The cancer risk is within the risk management range for current and reasonable future uses.

J2.6.5 AOC 8 TIER 1 CONCLUSIONS

Because groundwater data were deemed unnecessary, only Exposure Group 2 results were calculated. For reasonable future use, the cancer risk is 3×10^{-6} due to Aroclor 1254 reported in 1 of 14 samples. There are no Tier 1 COPCs with noncancer health effect guidelines, and there are no metals data.

J2.7 AOC 9 Tier 1 Evaluation

The total cancer risk and noncancer hazard values are shown in Table J2-7 along with the cancer risk and hazard without metals at concentrations below background.

J2.7.1 AOC 9 SITE DESCRIPTION AND BACKGROUND

AOC 9 is an approximately 0.3-acre area in the west-central portion of Transfer Parcel EDC-5. AOC 9 is primarily inside EBS Parcel 80 and currently consists of a portion of the landscaped area around Building 17 and the entire width of West Midway Avenue located east of Todd Street. EBS Parcel 80 was historically used for officers' quarters and housing, including a mess hall and school (Building 17), and open space for vehicle parking, gardening, and composting. A grease trap was historically located immediately outside the southwestern corner of the building, but its location could not be verified (IT 2001a).

AOC 9 is adjacent to the northeastern boundary of IR Site 8, an area of known contamination from pesticides, metals, and PAHs in soil, and benzene and chlorinated hydrocarbons in groundwater.

Two investigations conducted at AOC 9 were used to support this Tier 1 risk assessment. During the PAH TCRA removal action at AOC 9, soil samples were collected from three soil borings (EE46, FF45, and FF46) at four depth intervals between 0 and 8 feet bgs and analyzed for PAHs. Selected samples from boring FF46 were also analyzed for pesticides and arsenic. No analytes were reported at concentrations above PSCs (FWEC 2004).

RI sampling at AOC 9 addressed a request by regulatory agencies to further assess whether pesticides were present in soil due to the area's proximity to IR Site 8 and to evaluate potential contaminants from a grease trap formerly located in AOC 9. Soil samples were analyzed for pesticides. The deeper two soil samples from the boring next to the grease trap were also analyzed for extractable-range TPH. Groundwater samples were also analyzed for extractable-range TPH. No analytes were reported at concentrations above PSCs.

J2.7.2 AOC 9 TIER 1 DATA EVALUATION

In soil at AOC 9, there are two Tier 1 COPCs, one metal (arsenic) based on 4 samples and a pesticide (endrin) based on 12 samples. Groundwater samples, other than for TPH analyses, were not collected (in accordance with the Work Plan [BEI 2006]).

J2.7.3 AOC 9 TIER 1 RISK CHARACTERIZATION

For soil at AOC 9, the total cancer risk of 9×10^{-5} and noncancer hazard value of 0.001 are based on exposure pathways for soil only (Exposure Group 2). Without metals below background, the noncancer hazard value is 0.001. There are no COPCs with risk-based guidelines for cancer when metals below background are eliminated, and so a cancer risk was not estimated.

The total cancer risk is within the risk management range and noncancer hazard value is below 1.

J2.7.4 AOC 9 TIER 1 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation are representative of any potential health concerns at AOC 9. The results are consistent with the site history and previous investigations. Twelve samples for pesticides are considered adequate for this approximately 0.3-acre site.

J2.7.5 AOC 9 TIER 1 CONCLUSIONS

For AOC 9, total cancer risk and noncancer HI including metals below background are 9×10^{-5} and less than 1, respectively, for Exposure Group 2.

Because groundwater data were deemed unnecessary, only Exposure Group 2 results were calculated. For reasonable future use without metals below background, the noncancer hazard is below 1. There are no COPCs with risk-based guidelines for cancer when metals below background are eliminated.

J2.8 AOC 13 Tier 1 Evaluation

The total cancer risk and noncancer hazard values for AOC 13 are shown in Table J2-8. The cancer risk and hazard without metals with concentrations below background are also included in Table J2-8.

J2.8.1 AOC 13 SITE DESCRIPTION AND BACKGROUND

AOC 13 is an approximately 1.1-acre area in the central portion of Transfer Parcel EDC-5 and along the western edge of EBS Parcel 103. The portion of EBS Parcel 103 included in AOC 13 contains most of family housing Building FH-813, all of FH-816, the southwestern tip of FH-814, and landscaped open space that is used for vehicle parking and recreation. FH-816 is currently occupied by tenants; FH-813 and FH-814 are unoccupied.

EBS Parcel 103 was historically used for barracks, public works storage, insect vector control, ready-issue storage, applied instruction, a combat training pool, and as a playing field. It is not known which of these uses occurred within the boundaries of AOC 13.

Three investigations conducted at AOC 13 were used to support this Tier 1 risk assessment. During the EBS, ten soil samples were collected for analysis for pesticides and PCBs. Reported concentrations of pesticides (4,4'-dichlorodiphenyltrichloroethane

[DDT], 4,4'-dichlorodiphenyldichloroethane [DDD], and/or dieldrin) exceeded the screening criteria in three samples.

The Navy conducted a PAH TCRA in portions of the West Housing Area and approximately one-half of one removal area was located along the eastern edge of AOC 13 (FWEC 2004). Samples were collected from 13 borings at depths between 0 and 8 feet bgs and were analyzed primarily for PAHs. Samples from one boring (SS21) were also analyzed for pesticides, PCBs, and arsenic. Results indicated that soil from boring QQ25 at a depth of 0.5 foot to 2 feet bgs had reported PAH concentrations above the PSC (620 µg/kg) (BEI 2005). PAH-affected locations were incorporated into the PAH Area evaluation and not included in this Tier 1 risk assessment. Concentrations of all other analytes were below screening criteria in all samples.

RI sampling at AOC 13 addressed concentrations of pesticides identified above PSCs in three soil samples during the EBS and reported PAH concentrations that exceeded the PSC in one boring near the location of EBS sample 103-0002. Two soil samples each were collected from seven RI borings around the pesticides exceedance and were analyzed for pesticides. One soil sample was also analyzed for PAHs. Results of RI samples were either below laboratory detection limits or PSCs.

J2.8.2 AOC 13 TIER 1 DATA EVALUATION

In soil at AOC 13, there are 16 Tier 1 COPCs, including 1 metal (arsenic) based on 4 samples and 15 pesticides based on 24 samples. Groundwater samples were not collected in accordance with the Work Plan (BEI 2006).

J2.8.3 AOC 13 TIER 1 RISK CHARACTERIZATION

At AOC 13, the cancer risks of 1×10^{-4} (total) and 6×10^{-6} (without metals below Alameda Point background) and the noncancer hazard values of 0.0007 (both total and without metals below Alameda Point background) are based on exposure pathways for soil only (Exposure Group 2). The COPCs are pesticides.

J2.8.4 AOC 13 TIER 1 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation are representative of any potential health concerns at AOC 13. The results are consistent with the site history and previous investigations. The site characterization is adequate, with 15 samples on this 1.1-acre site focused on the chemicals identified through earlier sampling.

J2.8.5 AOC 13 TIER 1 CONCLUSIONS

For AOC 13, total cancer risk and noncancer HI including metals below background is 1×10^{-4} and less than 1, respectively, for Exposure Group 2.

Because groundwater samples were deemed unnecessary, only Exposure Group 2 results were calculated. For reasonable future uses, the cancer risk without metals below

background is 6×10^{-6} due to the pesticides 4,4'-DDD, 4,4'-DDT, and dieldrin, each with a cancer risk of 2×10^{-6}. The noncancer HI is below 1.

J2.9 AOC 17 Tier 1 Evaluation

The total cancer risk and noncancer hazard values for AOC 17 are shown in Table J2-9. The cancer risk and hazard without metals with concentrations below background are also included in Table J2-9.

J2.9.1 AOC 17 SITE DESCRIPTION AND BACKGROUND

AOC 17 is an approximately 0.9-acre area on the western edge of Transfer Parcel EDC-5, and is in EBS Parcel 185. AOC 17 consists of a small portion of the western end of Building 9, paved open space used for vehicle parking, and portions of Saratoga Street and West Tower Avenue. Railroad tracks traverse the southern portion of the site. Building 9 and the open space in AOC 17 were historically used for materials storage, maintenance facility, aircraft storage area, and vehicle parking (BEI 2005).

AOC 17 is located adjacent to and east of IR Sites 5 and 12. IR Site 5 is an area of known TPH, PAH, and metals contamination in soil, and known xylene, chlorinated hydrocarbon, PAH, TPH, and cyanide contamination in groundwater. IR Site 12 was identified as having metals concentrations in soil that may be attributed to naturally occurring background conditions based on results of the RI for OU-2C (SulTech 2005b).

Three investigations conducted at AOC 17 were used to support this Tier 1 risk assessment. In 1991, soil and groundwater samples were collected during the Phases 2B and 3 investigation at an adjacent site (IR Site 6); some of the soil samples were collected within the boundaries of AOC 17. Soil samples were collected from 0 to 15.5 feet bgs at one location, and were analyzed for VOCs, total recoverable petroleum hydrocarbons (TRPH), SVOCs, pesticides, PCBs, and metals. B(a)P equivalent concentrations in soil exceeded the PSC in a surface sample from this boring collected from 0 to 0.5 foot bgs. Also, TRPH was reported at 20,500 mg/kg from this sample. PAH-affected locations were incorporated into the PAH Area evaluation and not included in this Tier 1 risk assessment. Concentrations of all other analytes were below screening criteria in all samples.

During the EBS, seven soil samples and two groundwater samples were collected in AOC 17 to investigate the industrial sewer lines (IT 2001a). Soil and groundwater samples were analyzed for VOCs, TPH, TRPH, SVOCs, pesticides, PCBs, herbicides, organotins, and metals. Arsenic and aluminum were present at concentrations above screening criteria in both groundwater samples. Chromium concentrations from groundwater sample also exceeded screening criteria. No other analytes were present at concentrations above PSC in soil or groundwater (BEI 2005).

RI sampling primarily addressed TPH, VOCs, and metals from historical site activities at adjacent IR Site 5 that may have impacted groundwater at AOC 17. Soil and grab groundwater samples were collected from three borings at AOC 17; soil samples were collected at three depth intervals (0 to 2, 2 to 4, and 4 to 8 feet bgs). All soil and groundwater samples were analyzed for VOCs, extractable-range TPH, metals, and

hexavalent chromium. Groundwater samples were also analyzed for TDS to provide an indication of groundwater potability. AOC 17 is within the central groundwater region of Alameda Point (TtEMI 2000). While acknowledged as unlikely in the Alameda Point groundwater beneficial use evaluation (TtEMI 2000), the groundwater in the central region is considered a Class II potential drinking water source based on TDS concentrations and groundwater yield. However, because AOC 17 includes a segment of Saratoga Street within its boundaries, it is unlikely that the groundwater beneath this AOC would be used as a drinking water source.

TPH (in soil), PAHs (in soil), and metals (in soil and groundwater) were reported above PSCs at AOC 17. PAHs are addressed in the PAH Area evaluation.

The metals that exceeded PSCs in soil and/or groundwater (arsenic, aluminum, chromium, iron, and nickel) include common elements of regional geology and appear to be within the ambient concentrations range at AOC 17.

J2.9.2 AOC 17 TIER 1 DATA EVALUATION

In soil at AOC 17, there are 21 Tier 1 COPCs, including 19 metals based on 18 to 20 samples, 1 non-PAH SVOC (di-n-butyl phthalate), and 1 VOC (methylene chloride) based on 16 samples.

In groundwater at AOC 17, there are 15 Tier 1 COPCs, including 13 metals based on six samples and 2 VOCs (carbon disulfide and toluene) based on three samples.

J2.9.3 AOC 17 TIER 1 RISK CHARACTERIZATION

For soil and groundwater data for the three exposure groups at AOC 17, the calculated cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 2×10^{-3} and 16

  Without metals below background: 2×10^{-6} and 13

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 7×10^{-5} and 3

  Without metals below background: 5×10^{-8} and 2

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 2×10^{-3} and 13

  Without metals below background: 2×10^{-6} and 11

For reasonable future use, the Exposure Group 2 noncancer hazard value without metals below background is below 1 without iron.

For residential use of groundwater, the Exposure Group 3 cancer risk without metals below background is due to chromium. The noncancer hazard value is due to aluminum

(HQ of 1), iron (HQ of 6), and vanadium (HQ of 3). These metals are associated with 2001 data from samples that were likely unfiltered, since they were either not reported at comparable concentrations in the RI or were not reported above detection limits.

J2.9.4 AOC 17 TIER 1 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation represent any potential health concerns at AOC 17. The results are consistent with the site history and previous investigations. This approximately 0.9-acre site is adequately characterized with three investigations and a Tier 1 evaluation based on 16 to 20 soil samples for metals and 3 to 6 groundwater samples.

The potential impact of vapors from the two VOCs reported in groundwater to indoor air is negligible. The noncancer HIs based on the tap water PRGs are well below 1, and the PRG is higher than the ESL for indoor air.

The uncertainty associated with the omission of the dermal pathway for groundwater is low because exposure from the dermal pathway for the Tier 1 COPCs would not result in an increase in the cancer risk or HI for residential use of groundwater (Exposure Groups 1 and 3). Cancer risk and hazard values are reported in one significant figure, so small changes will not necessarily result in an overall increase. This finding is based on the ratio of dermal exposure to ingestion for each Tier 1 COPC shown in Table J2-15.

J2.9.5 AOC 17 TIER 1 CONCLUSIONS

The total cancer risks for the exposure groups that include residential use of groundwater (Exposure Groups 1 and 3) are above the risk management range, but without metals below background are within the risk management range at 2×10^{-6}.

For exposure pathways for soil and VOCs in groundwater (Exposure Group 2), the cancer risk without metals below background is below the de minimis level of 10^{-6} for soil.

Also, as discussed in Section 4 of the main RI/FS Report, correlation analysis indicates that the concentrations of iron are naturally occurring and not due to a release resulting from Navy activities. The maximum concentration of iron in soil of 27,000 mg/kg is slightly below the maximum concentration in the background (27,900 mg/kg) but above the 95th percentile in background. Also, as noted in Section J1.2.4, the health effects of iron are not considered additive with other chemicals.

For residential use of groundwater, the cancer risk without metals below background is due to chromium, and the noncancer hazard is due largely to aluminum, iron, and vanadium. The risk associated with residential use of groundwater is probably overestimated. The higher concentrations of aluminum, chromium, and vanadium were reported in the same two EBS samples, which likely were unfiltered. The four groundwater samples collected during the RI were filtered, and the metals in these samples were either not detected or reported at low concentrations (one to two orders of magnitude lower than EBS results).

J2.10 AOC 18 Tier 1 Evaluation

The total cancer risk and noncancer hazard values for AOC 18 are shown in Table J2-10. The cancer risk and hazard value without metals with concentrations below background are also included in Table J2-10.

J2.10.1 AOC 18 SITE DESCRIPTION AND BACKGROUND

AOC 18 is an approximately 0.8-acre area on the southwestern edge of Transfer Parcel EDC-5, and is along the western edge of EBS Parcel 70. The portion of the parcel covered by AOC 18 consists entirely of open space adjacent to the southwestern corner of Building 39 (an engineering laboratory and maintenance hangar). At the time of the EBS site inspection, Building 39, located immediately east of AOC 18, was used for light aircraft maintenance and painting, and housed Navy helicopters, sleds, a Navy standard laboratory, and offices. The portion of EBS Parcel 70 located in AOC 18 was historically used as an aircraft hangar (Building 39) and open space.

In AOC 18, the hazardous materials storage area (NAS Generator Accumulation Point [GAP] 23) was located on a concrete area measuring 70 by 40 feet and located on the southwest side of Building 39; this GAP historically consisted of storage lockers surrounded by 55-gallon drums. Materials managed in this area may have included oil, solvent, paint-related materials, and rags.

Five investigations conducted at AOC 18 were used to support this Tier 1 risk assessment. During the EBS investigation, seven soil samples were collected and analyzed for VOCs or TPH to investigate the Solid Waste Management Unit (SWMU) NAS GAP 23 (IT 2001a). Reported concentrations did not exceed PSCs.

A corrective action data gap investigation was conducted at Alameda Point in 2001 to investigate removed fuel lines (TtEMI 2001). Two soil samples analyzed for VOCs, TPH, and lead were collected from a soil boring along the southern boundary of AOC 18. One groundwater sample was also collected from this location and analyzed for VOCs, TPH, and lead. Reported concentrations did not exceed screening criteria.

One soil boring was advanced in AOC 18 during the 2002 PAH study. Samples were collected from four depth intervals between 0 and 8 feet bgs and analyzed for PAHs. Concentrations of PAHs in all soil samples from this boring were below PSCs. PAH data are discussed with the PAH Areas.

The SWMU report included NAS GAP 23; no further sampling was recommended (SulTech 2005a).

The RI sampling plan for AOC 18 addressed the hazardous waste storage area west of Building 39 (NAS GAP 23). Samples were collected west of Building 39 to assess whether possible releases from storage of hazardous wastes in this area impacted soil or groundwater. Three soil samples were collected from each boring at 0 to 2, 2 to 4, and 4 to 8 feet bgs. Grab groundwater samples were collected from the two most downgradient borings. Soil and groundwater samples were analyzed for VOCs, TPH

(purgeable-range and extractable-range), SVOCs, pesticides, PCBs, and metals. Groundwater samples were also analyzed for TDS.

VOCs and metals were reported at low concentrations (relative to PSCs) in soil and grab groundwater samples collected at AOC 18. SVOCs and TPH were also reported in the groundwater samples. However, reported concentrations were below PSCs.

J2.10.2 AOC 18 TIER 1 DATA EVALUATION

There are 19 Tier 1 COPCs in soil at AOC 18, including 15 metals based on 12 samples, 1 non-PAH SVOC (di-n-butyl-phthalate) based on 12 samples, and 3 VOCs based on 16 samples.

There are nine Tier 1 COPCs in groundwater with six metals and three VOCs based on two and three samples, respectively.

J2.10.3 AOC 18 TIER 1 RISK CHARACTERIZATION

For soil and groundwater data for the three exposure groups at AOC 18, the calculated cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 8×10^{-5} and 1

  Without metals below background: 4×10^{-5} and 0.04

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 4×10^{-5} and 0.9

  Without metals below background: an HI of 0.0004; cancer risk was not estimated because there are no COPCs with risk-based guidelines for cancer

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 4×10^{-5} and 0.2

  Without metals below background: 4×10^{-5} and 0.04

For Exposure Groups 1 and 3, the cancer risk without metals below background is associated with naphthalene in groundwater.

J2.10.4 AOC 18 TIER 1 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation represent any potential health concerns at AOC 18. The results are consistent with the site history and previous investigations. This approximately 0.8-acre site is adequately characterized with data from three investigations and a Tier 1 evaluation based on 12 to 16 soil samples for metals and organic chemicals, and 2 to 3 groundwater samples.

The potential impact of vapors to indoor air for the three VOCs reported in groundwater is negligible. The cancer risk and noncancer HI based on the tap water PRGs are well

below 10^{-6} and 1, respectively, for cis-1,2-dichloroethene (DCE) and trichloroethene (TCE). For naphthalene, the ESL for naphthalene of 3,200 µg/L in groundwater based on protection of indoor air is well above the reported concentration of 3.6 µg/L.

Exposure from the dermal pathway for the Tier 1 COPCs would result in an increase in the cancer risk for residential use of groundwater (Exposure Groups 1 and 3) by a factor of two. This finding is based on the ratio of dermal exposure to ingestion for each Tier 1 COPC shown in Table J2-15.

J2.10.5 AOC 18 TIER 1 CONCLUSIONS

For all three exposure groups, the total cancer risks are within the risk management range, and noncancer HI values are at or below 1. Without metals below background, the cancer risks for Exposure Groups 1 and 3 are both 4×10^{-5} due to naphthalene in groundwater. For reasonable future use (Exposure Group 2), the cancer risk without metals below background was not estimated (as noted above).

J2.11 AOC 20 Tier 1 Evaluation

The total cancer risk and noncancer hazard values for AOC 20 are shown in Table J2-11. The cancer risk and hazard without metals with concentrations below background are also included in Table J2-11.

J2.11.1 AOC 20 SITE DESCRIPTION AND BACKGROUND

AOC 20 is an approximately 0.6-acre area in the southwestern tip of Transfer Parcel EDC-5 and includes two concrete helicopter pads and two aboveground oil/water separators (OWSs) (OWS 012A and OWS 012B) located along the northwestern edge of EBS Parcel 23F. No buildings were located on AOC 20. The former fuel line corrective action area (CAA)-B is located immediately south of AOC 20.

EBS Parcel 23F was historically used as a taxiway and parking apron. Chemicals stored in the area included synthetic oils, Freon, trichlorofluoroethane, paint, and hazardous wastes (IT 2001a).

Four investigations conducted at AOC 4 were used to support this Tier 1 risk assessment. During the EBS investigation, five soil samples were collected and analyzed for TPH and metals in AOC 20 from 0 to 2 feet bgs (IT 2001a). These locations were sampled to investigate OWS 012A and OWS 012B. Reported TPH and metals concentrations were below the PSCs.

Samples for PAHs were collected from one soil boring in AOC 20 during the 2002 PAH study (BEI 2005). Samples were collected from four depth intervals between 0 and 8 feet bgs and analyzed for PAHs. Concentrations of PAHs in all soil samples from this boring were below PSCs. PAHs are discussed with PAH Area evaluation.

The two OWSs in AOC 20 near Building 3 were included in the SWMU report, which recommended no further action (SulTech 2005a).

The RI sampling plan for AOC 20 addressed the two OWSs in EBS Parcel 23F (012A and 012B) although previous investigations did not identify TPH or metals at concentrations above the screening criteria. Soil and grab groundwater samples were collected from one boring adjacent to and on the assumed downgradient side of each OWS; three soil samples were collected from each boring (0 to 2, 2 to 4, and 4 to 8 feet bgs). Soil and groundwater samples were analyzed for VOCs, extractable-range TPH, and metals. Groundwater samples were also analyzed for TDS. TPH and arsenic were reported above PSCs in groundwater. Arsenic was reported in both groundwater samples collected at AOC 20 (at 11 and 26.9 µg/L). The higher arsenic concentration is co-located at A20SB02 with reported concentrations of diesel-range TPH (3,200 µg/L) and jet propellant grade 5–range TPH (2,600 µg/L). TPH was not reported above laboratory detection limits in the other sample or in the duplicate sample from A20SB02. Arsenic in groundwater is believed to be naturally occurring.

J2.11.2 AOC 20 TIER 1 DATA EVALUATION

There are 19 Tier 1 COPCs in soil at AOC 20, including 16 metals based on 7 to 11 samples and 3 VOCs based on 6 samples.

There are ten COPCs in groundwater including seven metals and three VOCs based on two to three samples.

J2.11.3 AOC 20 TIER 1 RISK CHARACTERIZATION

For soil and groundwater data for the three exposure groups at AOC 20, the calculated cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 4×10^{-3} and 2

  Without metals below background: 4×10^{-3} and 1

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 4×10^{-5} and 1

  Without metals below background: 3×10^{-8} and 0.4

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 4×10^{-3} and 0.8

  Without metals below background: 4×10^{-3} and 0.8

For residential use of groundwater, the Exposure Group 3 total cancer risk is due to arsenic in groundwater. One of two groundwater samples had a concentration of arsenic above the Alameda Point background 95th percentile but below the maximum in the background data set. The noncancer hazard value is below 1.

J2.11.4 AOC 20 TIER 1 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation represent any potential health concerns at AOC 20. The results are consistent with the site history and previous investigations. This approximately 0.6-acre site is adequately characterized with three investigations and a Tier 1 evaluation based on 7 to 11 soil samples for metals and organic chemicals, and 2 to 3 groundwater samples.

The potential impact of vapors to indoor air for the three VOCs reported in groundwater is negligible. The cancer risk and noncancer HI based on the tap water PRGs are well below 10^{-6} and 1, respectively, and the PRG is higher than the ESL for protection of indoor air.

The uncertainty associated with the omission of the dermal pathway for groundwater is low because exposure from the dermal pathway for the Tier 1 COPCs would not result in an increase in the cancer risk or HI for residential use of groundwater (Exposure Groups 1 and 3). Cancer risk and hazard values are reported in one significant figure, so small changes will not necessarily result in an overall increase. This finding is based on the ratio of dermal exposure to ingestion for each Tier 1 COPC shown in Table J2-15.

J2.11.5 AOC 20 TIER 1 CONCLUSIONS

The total cancer risks are above the risk management range for exposure pathways including residential use of groundwater (Exposure Groups 1 and 3). The cancer risk above the risk management range is due to arsenic in groundwater. The maximum concentration of arsenic of 26.9 µg/L is above the background 95th percentile of 20.72 µg/L but below the maximum in background of 40.7 µg/L. The other groundwater sample at AOC 20 had a concentration of arsenic of 11 µg/L.

For exposure pathways for soil and VOCs in groundwater (Exposure Group 2), the cancer risk and noncancer HI without metals below background are below 10^{-6} and 1, respectively.

J2.12 AOC 21 Tier 1 Evaluation

The total cancer risk and noncancer hazard values are shown in Table J2-12.

J2.12.1 AOC 21 SITE DESCRIPTION AND BACKGROUND

AOC 21 is an approximately 0.7-acre area in the southwestern portion of Transfer Parcel EDC-5 and is along the northwestern edge of EBS Parcel 23F. The portion of the parcel covered by AOC 21 is entirely paved open space. EBS Parcel 23F was historically used as a taxiway and parking apron. No buildings were located on AOC 21. Chemicals stored in the area included synthetic oils, Freon, trichlorofluoroethane, paint, and hazardous wastes (BEI 2005).

Three investigations conducted at AOC 4 were used to support this Tier 1 risk assessment. During the EBS investigation, six soil samples and four groundwater samples were collected and analyzed in AOC 21 (IT 2001a). Soil and groundwater samples were analyzed for VOCs, TPH, and SVOCs. Diesel-range TPH and gasoline-range TPH were

reported at concentrations above PSCs (TPH ESLs) in soil and groundwater samples from one boring. Diesel-range TPH in groundwater above the PSC was also reported at a second boring. These borings are located on the border or within CAA-B. Other reported concentrations in soil and groundwater were below the PSCs. TCE was reported in groundwater samples collected at the AOC, but not at concentrations above the PSCs. The nature and extent of TPH in this area will be handled under the Alameda Point TPH Program.

The corrective action data gap investigation included two soil samples and one groundwater sample collected from one soil boring (PA02-04) along the southern boundary of AOC 21 and analyzed for VOCs, TPH, and lead (TtEMI 2001). Reported concentrations were below the PSCs.

The RI sampling plan for AOC 21 addressed VOCs previously reported in groundwater at two locations. Three soil samples were collected from two borings at AOC 21 located on the assumed downgradient side of the EBS borings 023-0051 and 023-0054. Groundwater samples were also collected from each boring. Soil and groundwater samples were analyzed for VOCs. TCE was reported in groundwater samples from RI borings at concentrations below the PSC.

J2.12.2 AOC 21 TIER 1 DATA EVALUATION

There are six Tier 1 COPCs in soil at AOC 21, including two non-PAH SVOCs based on 6 samples and four VOCs based on 12 samples.

There are five Tier 1 COPCs in groundwater, all VOCs, based on seven to eight samples.

J2.12.3 AOC 21 TIER 1 RISK CHARACTERIZATION

For soil and groundwater data for the three exposure groups at AOC 21, the calculated cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 1×10^{-6} and 0.07

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 2×10^{-8} and 0.04

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 1×10^{-6} and 0.03

The total cancer risks are at or below 10^{-6} for soil and groundwater, and the noncancer HIs are below 1 for all three exposure groups.

J2.12.4 AOC 21 TIER 1 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation represent any potential health concerns at AOC 21. The results are consistent with the site history and

previous investigations. This approximately 0.7-acre site is adequately characterized with three investigations.

The potential impact of vapors to indoor air for the five VOCs reported in groundwater is negligible. The cancer risk and noncancer HI based on the tap water PRGs are 1×10^{-6} and 0.03, respectively, and the PRG is higher than the ESL protective of indoor air.

The uncertainty associated with the omission of the dermal pathway for groundwater is low because exposure from the dermal pathway for the Tier 1 COPCs would not result in an increase in the cancer risk or HI for residential use of groundwater (Exposure Groups 1 and 3). Cancer risk and hazard values are reported in one significant figure, so small changes will not necessarily result in an overall increase. This finding is based on the ratio of dermal exposure to ingestion for each Tier 1 COPC shown in Table J2-15.

J2.12.5 AOC 21 TIER 1 CONCLUSIONS

For all three exposure groups, the cancer risks are at or below 10^{-6} for soil and groundwater, and the noncancer HIs are below 1. In accordance with the Work Plan (BEI 2006), samples were not analyzed for metals.

J2.13 AOC 24 Tier 1 Evaluation

The total cancer risk and noncancer hazard values for AOC 24 are shown in Table J2-13. The cancer risk and hazard without metals with concentrations below background are also included in Table J2-13.

J2.13.1 AOC 24 SITE DESCRIPTION AND BACKGROUND

AOC 24 is an approximately 0.1-acre area in the southeastern portion of Transfer Parcel EDC-5, and is in EBS Parcel 197. The portion of the parcel coincident with AOC 24 includes paved open space along the southern edge of Building 118, in the eastern portion of the building. OWS 118 is located within AOC 24. IR Site 3 is immediately west and southwest of AOC 24 and is part of a larger area characterized by groundwater contamination (chlorinated hydrocarbons, TPH, and benzene) and soil contamination (metals, PAHs, and TPH). Based on 2004 groundwater elevations, it appears that AOC 24 is generally crossgradient of IR Site 3.

EBS Parcel 197 was historically used as the location of a Navy exchange (Building 118) and the open space was used for storage. Building 118 borders AOC 24 to the north. The northwestern areas of Building 118 are being evaluated as part of the adjacent IR Site 3. During the EBS inspection, storage of heavy-duty corrosive cleaners, liquid detergent, liquefied petroleum camping fuel, propane containers, toner, floor cleaner, and floor wax was observed inside the exchange. Minor quantities of gas, antifreeze, motor oil, and aerosol paint were stored in a metal box outside Building 118.

Two investigations conducted at AOC 24 were used to support this Tier 1 risk assessment. The OWS was identified as a target area during the EBS (IT 2001a). One subsurface soil sample (197-0002M) was collected and analyzed for VOCs, SVOCs,

metals, and TPH. None of these analytes were reported above their respective EBS screening criteria.

The RI sampling plan at AOC 24 addressed a request from regulatory agencies to evaluate OWS 118. Three soil samples (0 to 2, 2 to 4, and 4 to 8 feet bgs) and a grab groundwater sample were collected during the 2005 RI sampling from a boring adjacent to the OWS. Soil and groundwater samples from this boring were analyzed for VOCs, extractable-range TPH, and metals. Groundwater was also analyzed for TDS.

In the OWS 118 area, diesel-range TPH was reported in one groundwater sample at a concentration slightly above the drinking water ESL. Arsenic and iron were reported in soil at concentrations above the PSCs. Additionally, vanadium was reported in soil at A24SB01 at 5 to 6 feet bgs. Metals were not reported above PSCs in groundwater; however, iron and manganese were reported in the one groundwater sample and added to risk.

J2.13.2 AOC 24 TIER 1 DATA EVALUATION

There are 21 Tier 1 COPCs in soil at AOC 24, including 15 metals and 6 VOCs based on four samples.

There are eight Tier 1 COPCs in groundwater, including seven metals and one VOC (carbon disulfide) based on one sample.

J2.13.3 AOC 24 TIER 1 RISK CHARACTERIZATION

For soil and groundwater data for the three exposure groups at AOC 24, the calculated cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 9×10^{-4} and 11

  Without metals below background: 2×10^{-4} and 10

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 2×10^{-4} and 4

  Without metals below background: 2×10^{-4} and 3

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 7×10^{-4} and 7

  Without metals below background: 1×10^{-9} and 7

For reasonable future use, the Exposure Group 2 cancer risk without metals below background is due to arsenic in soil. The maximum concentration of arsenic of 11.2 mg/kg is slightly above the Alameda Point background 95th percentile of 9.14 mg/kg but below the maximum background concentration of 15.6 mg/kg. Without arsenic, the cancer risk

is below 10^{-6}. The HI for soil is below 1 without iron and not considering the effects of aluminum, manganese, and vanadium as additive.

For residential use of groundwater, the Exposure Group 3 noncancer hazard without metals below background is largely due to iron (HQ of 3) and manganese (HQ of 3).

J2.13.4 AOC 24 TIER 1 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation represent any potential health concerns at AOC 24. The results are consistent with the site history and previous investigations. This approximately 0.1-acre site is adequately characterized with two investigations.

The potential impact of vapors to indoor air for the one VOC reported in groundwater is negligible. The noncancer HI based on the tap water PRGs is well below 1, and the PRG is higher than the ESL for protection of indoor air.

The uncertainty associated with the omission of the dermal pathway for groundwater is low because exposure from the dermal pathway for the Tier 1 COPCs would not result in an increase in the cancer risk or HI for residential use of groundwater (Exposure Groups 1 and 3). Cancer risk and hazard values are reported in one significant figure, so small changes will not necessarily result in an overall increase. This finding is based on the ratio of dermal exposure to ingestion for each Tier 1 COPC shown in Table J2-15.

J2.13.5 AOC 24 TIER 1 CONCLUSIONS

For all three exposure groups, the total cancer risk for soil and groundwater and for soil alone are above the risk management range, and noncancer HI values are above 1.

In soil, the maximum concentration of arsenic of 11.2 mg/kg is slightly above the Alameda Point background 95th percentile of 9.14 mg/kg but below the maximum concentration of 15.6 mg/kg; the other three arsenic concentrations are below background. Therefore, it is likely that arsenic concentrations overall are consistent with background.

The HI of 3 in soil is largely due to iron with an HQ of 1 and the addition of HQ values for aluminum (0.3), manganese (0.2), and vanadium (0.8). The health effects of iron are not considered additive with other chemicals, as discussed in Section J1. The HI of 7 for residential use of groundwater is due to the addition of individual HQ values for iron (3) and manganese (3).

J2.14 AOC 25 Tier 1 Evaluation

The total cancer risk and noncancer hazard values for AOC 25 are shown in Table J2-14. The cancer risk and hazard without metals with concentrations below background are also included in Table J2-14.

J2.14.1 AOC 25 SITE DESCRIPTION AND BACKGROUND

AOC 25 is an approximately 2.7-acre area includes the southwestern portion of EBS Parcel 130 and all of EBS Parcel 132. The southern end of Building 90 and all of Building 503 are in AOC 25 in EBS Parcel 130. The southern portion of AOC 25 (EBS Parcel 132) consists of open space that is either paved for vehicle parking or landscaped. IR Site 3 and CAA-3C are immediately northwest and west of AOC 25 and are part of a larger area characterized by groundwater contamination (chlorinated hydrocarbons, TPH, and benzene) and soil contamination (metals, PAHs, and TPH). IR Site 4 is located immediately west and south of AOC 25 and is part of an area of known metals, TPH, and PAH contamination in soil and chlorinated hydrocarbons, PAH, benzene, and TPH contamination in groundwater.

EBS Parcel 130 was historically used as the location of gate houses, guard shacks, and an administration office. Cleaning solvents and general cleaning supplies were stored in the administration office and on asphalt under the outdoor stairs of the administration building. A 3-by-3-foot oily stain was observed inside one of the gate houses during the EBS. Minor stains associated with vehicle parking were also observed.

EBS Parcel 132 was historically used for agriculture.

Six investigations conducted at AOC 25 were used to support this Tier 1 risk assessment. During the EBS investigation, 17 soil samples were collected at AOC 25 to investigate reported stains, possible releases from nearby Building 360, railroad tracks, and sanitary sewer line. Soil samples analyses included TPH, SVOCs, pesticides/PCBs, oil and grease, metals, and lead. Reported motor oil–range TPH concentrations in soil sample 132-0004M were above the PSC; however, TPH was below the PSC in a duplicate sample. Reported arsenic concentrations in soil samples 130M-001M and 132-0006M were also above the PSC; however, the concentrations of arsenic in these samples were similar to the background concentrations used to evaluate metals in the EBS. Other reported analyte concentrations in soil were below PSCs.

During the OU-1 RI follow-on sampling conducted in 1994 (PRC Environmental and Montgomery 1996), one grab groundwater sample was collected in the northern portion of AOC 25. Groundwater was analyzed for VOCs and metals. Concentrations of cadmium and thallium reported in the groundwater sample exceeded screening criteria.

During the OU-1 and OU-2 data gap investigation specifically targeting Transfer Parcel EDC-5 (TtEMI 2002), one to three soil samples were collected from three borings between 0 and 5 feet bgs. One grab groundwater sample was also collected from each boring location. Soil and groundwater samples from S03-DGS-DP04 and S03-DGS-DP05 were analyzed for VOCs, SVOCs, and TPH; motor oil–range TPH was reported above PSCs in soil and groundwater samples collected from S03-DGS-DP05. Samples collected from S03-DGS-DP07 were analyzed only for organic lead and lead. Other reported analyte concentrations in soil and groundwater were below PSCs.

Two wells located in AOC 25 are part of the BGMP: well MBG-3 and well M03-11 (Shaw 2004). Four soil samples were collected from this location at four depth intervals between 0 and 8 feet bgs during well installation. Additionally, six groundwater samples

were collected from this well in 1998, 2002, 2003, and 2004 and analyzed for VOCs, TPH, SVOCs, pesticides, PCBs, and/or metals. Well M03-11 is located in the southwestern portion of AOC 25. Five groundwater samples were collected from this well in 2002, 2003, and 2004 and were analyzed for VOCs, TPH, SVOCs, and/or metals. TPH and arsenic were reported in groundwater at concentrations above PSCs in both wells. No other analytes in soil were reported at concentrations above PSCs.

During the 2002 PAH study, one soil boring was advanced in the southwestern portion of AOC 25 (BEI 2005). Concentrations of PAHs in soil samples from this boring were below the PSC. PAH results are discussed with the PAH Area evaluation.

During the RI, soil and grab groundwater samples were collected from three borings north of Building 503 and one boring in the southern portion of AOC 25 to evaluate the distribution of metals in soil and groundwater. In addition, three soil samples (0 to 2, 2 to 4, and 4 to 8 feet bgs) were collected from each boring near Building 503. TPH in groundwater was also evaluated in the grab groundwater sample from the southern portion of AOC 25 to identify any groundwater impacts in the vicinity of the stained area.

In soil, arsenic, iron, and lead were reported at concentrations above PSCs. In groundwater, concentrations of iron and manganese were reported in the RI borings at concentrations above the Alameda Point background 95th percentile concentrations.

J2.14.2 AOC 25 TIER 1 DATA EVALUATION

There are 27 Tier 1 COPCs in soil at AOC 25, including 18 metals based on 15 to 30 samples, 1 PCB based on 9 samples, 1 pesticide based on 11 samples, 2 SVOCs based on 7 samples, and 5 VOCs based on 6 to 8 samples.

There are 27 Tier 1 COPCs in groundwater, including 18 metals from 15 samples and 9 VOCs based on 11 to 14 samples.

J2.14.3 AOC 25 TIER 1 RISK CHARACTERIZATION

For soil and groundwater data for the three exposure groups at AOC 25, the calculated cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 3×10^{-3} and 35

  Without metals below background: 3×10^{-3} and 34

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 2×10^{-4} and 6

  Without metals below background: 1×10^{-6} and 5

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 3×10^{-3} and 29

  Without metals below background: 3×10^{-3} and 29

For reasonable future use, the Exposure Group 2 noncancer hazard without metals below background is below 1 without iron and without adding the health effects of metals with HQ values below 1 (aluminum, mercury, thallium, and vanadium). Cadmium is considered consistent with background because the maximum concentration of 1.8 mg/kg is only slightly above the Alameda Point background 95th percentile concentration of 1.72 mg/kg.

For residential use of groundwater, the Exposure Group 3 cancer risk without background is due to arsenic in groundwater, which is only marginally (1 µg/L) above the 95th percentile concentration and well below the maximum in background. Without arsenic, the cancer risk is below 10^{-6}.

The noncancer hazard value for groundwater is primarily due to thallium in a single sample (HI of 22) collected in 1994 and two metals, iron (HQ of 3) and manganese (HQ of 2). Thallium was not reported in any of the 2005 groundwater samples; the 1994 sample was likely not filtered.

J2.14.4 AOC 25 TIER 1 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation represent any potential health concerns at AOC 25. The results are consistent with the site history and previous investigations. This approximately 2.7-acre site is adequately characterized with six investigations and multiple samples for a full suite of analytes.

The potential impact of vapors to indoor air for the nine VOCs reported in groundwater is negligible. The cancer risk and noncancer HI based on the tap water PRGs or ESLs are well below 10^{-6} and 1, respectively, and the PRG is higher than the ESL for protection of indoor air. The uncertainty associated with the omission of the dermal pathway for groundwater is low because exposure from the dermal pathway for the Tier 1 COPCs would not result in an increase in the cancer risk or HI for residential use of groundwater (Exposure Groups 1 and 3). Cancer risk and hazard values are reported in one significant figure, so small changes will not necessarily result in an overall increase. This finding is based on the ratio of dermal exposure to ingestion for each Tier 1 COPC shown in Table J2-15.

J2.14.5 AOC 25 TIER 1 CONCLUSIONS

The total cancer risks for soil and groundwater are above the risk management range, and the noncancer HI values are above 1. However, the following information suggests the risk for groundwater is actually much lower.

- The majority of the cancer risk is associated with arsenic in groundwater at a maximum concentration of 27.1 µg/L, which is only slightly above the background 95th percentile of 20.72 µg/L and well below the maximum concentration in groundwater of 40.7 µg/L. Without arsenic, the cancer risk with residential use of groundwater is less than 10^{-6}.
- The majority of the noncancer risk for groundwater is due to thallium with an HI of 22, based on a single detection of thallium in 14 samples. Thallium was reported as not detected in the other 13 samples, and the highest detection limit

was 5.8 µg/L. A sample collected during the EBS in 1995 reported thallium at 51.8 µg/L. There is a strong probability that this sample was an unfiltered grab sample; therefore, the concentrations of metals may be an artifact of the sampling.

For exposures associated with soil and vapors from VOCs in groundwater (Exposure Group 2), the cancer risk without metals below background is 1×10^{-6}. The noncancer HI is 2 without iron and cadmium. As noted in Section J1.2.4, the health effects of iron are not considered additive with other metals. Cadmium, with an HI of 1, is probably not present at concentrations above background. The maximum concentration of 1.8 mg/kg is only slightly above the background 95th percentile of 1.7 mg/kg. The residual HI of 2 is based on the assumption that the health effects for aluminum (0.3), mercury (0.3), thallium (0.4), and vanadium (0.8) are additive; however, according to evidence presented in Section J1.2.4, the health effects of iron, mercury, thallium, and vanadium are not additive.

The maximum concentration of lead of 157 mg/kg is above the 95th percentile for Alameda Point background but below the site-specific PRG of 184 mg/kg including ingestion of homegrown produce and 322 mg/kg without ingestion of homegrown produce, as discussed in Section J1.2.3.

J3 AOC 1 HHRA

The following sections present the site description and background, data evaluation, exposure and toxicity assessment issues that differ from the general description in Section J1.3.3, and cancer and noncancer risk assessment results for AOC 1.

J3.1 AOC 1 Site Description and Background

AOC 1 is an approximately 0.5-acre area near the northwestern boundary of Transfer Parcel EDC-5 and located in the south-central portion of EBS Parcel 43. A small portion of Building 3 is in the eastern portion of AOC 1. The remainder of AOC 1 consists of a landscaped area in the south and two paved areas. There are a kitchen area in the eastern portion of the AOC and a loading dock area in the western portion of the AOC EBS Parcel 43 (and specifically Building 3). Chemical storage in these residential buildings was minimal, and only minor stains were observed indoors during the EBS. Two grease pits (OWSs) are present outdoors in the rear kitchen area portion of Building 3 (SulTech 2005a). The grease pits were part of the sanitary sewer system and are not known to have received any hazardous materials. A third OWS was located in AOC 1 in the loading dock area and was used to manage runoff from this area (SulTech 2005a). The materials collected in this OWS are unknown. All three OWSs were observed in 2002 to be inactive.

Three investigations were conducted at AOC 1. During the EBS, TPH constituents were reported in soil at concentrations below the screening criteria (IT 2001a). One soil boring (32EDC-5-2) was advanced in AOC 1 during the 2002 PAH study (BEI 2005). PAH concentrations in the samples collected did not exceed the soil screening criterion.

Soil and grab groundwater samples were collected during the RI from one boring adjacent to each OWS.

The COPCs identified in the RI/FS are VOCs and SVOCs. For risk assessment purposes, a reasonable maximum depth to groundwater at AOC 1 was judged to be 5 feet bgs. The chemicals identified in any sample are shown in Table J3-1.

J3.2 AOC 1 HHRA Data Evaluation

There are 17 COPCs in soil at AOC 1, including 9 VOCs and 8 SVOCs based on four samples for most COPCs (Table J3-2). There are 10 COPCs in groundwater, all VOCs based on three samples (Table J3-3).

J3.3 AOC 1 HHRA Exposure Assessment

All exposure pathways presented in Section J1.3.3 were considered at AOC 1 because there are both soil and groundwater data. The calculations for the EPC are presented in Attachment J3. EPCs for COPCs in soil and groundwater are presented in Tables J3-4 and J3-5, respectively.

J3.4 AOC 1 HHRA Toxicity Assessment

There is no deviation for AOC 1 from the information on the toxicity assessment presented in Section J1.3.3.

J3.5 AOC 1 HHRA Risk Characterization

This subsection presents the results of the U.S. EPA and Cal/EPA cancer risk and noncancer hazard value calculations. A summary of the risk characterization results is presented in Table J3-6 by exposure group and in Table J3-7 by exposure pathway. The U.S. EPA and Cal/EPA cancer risk drivers are shown in Tables J3-8 and J3-9, respectively. Noncancer risk drivers are shown in Table J3-10. The supporting calculations are presented in Attachment J3.

J3.5.1 AOC 1 HHRA CANCER RISK CHARACTERIZATION

The total U.S. EPA and Cal/EPA RME cancer risks (including background risks) at AOC 1 are 1×10^{-6} and 4×10^{-3}, respectively. Note that none of the VOCs in groundwater are considered carcinogens by U.S. EPA, so U.S. EPA cancer risk is not calculated for pathways associated only with groundwater. Additionally, none of the VOCs in soil are considered carcinogens by U.S. EPA, so U.S. EPA cancer risk is not calculated for pathways associated only with VOCs in soil. The total RME cancer risks rank-ordered by exposure pathway for U.S. EPA and Cal/EPA, respectively, are as follows:

- residential use of groundwater (no carcinogens and 4×10^{-3})
- direct contact with soil (1×10^{-6} and 2×10^{-6})
- inhalation of vapors in indoor air (no carcinogens and 5×10^{-5})

- ingestion of homegrown produce (1×10^{-7} and 2×10^{-7})
- inhalation of particulates and vapors in outdoor air (6×10^{-11} and 1×10^{-9})

Exposure pathways with cancer risks above the risk management range include residential use of groundwater (ingestion, inhalation and dermal contact while showering). The Cal/EPA primary cancer risk driver is associated with one sample of groundwater with 1,200 µg/L of naphthalene.

J3.5.2 AOC 1 HHRA NONCANCER HAZARD CHARACTERIZATION

The noncancer HI value at AOC 1 is 29 with residential use of groundwater or 2 without residential use of groundwater. All values above 1 are due to naphthalene in groundwater.

J3.6 AOC 1 HHRA Uncertainty Analysis

The four samples of soil and three samples of groundwater are considered adequate for this approximately 0.5-acre study area. The sample results, with the exception of the detection of naphthalene, are consistent with this site, which has no history of chemical use. The concentrations in indoor air are based on the maximum concentration of naphthalene in groundwater and soil parameters that result in the highest amount of vapor migration from all site-specific soil data.

J3.7 AOC 1 HHRA Conclusions

Soil samples were not analyzed for metals, in accordance with the Work Plan (BEI 2006). The U.S. EPA cancer risk for Exposure Group 1 is 1×10^{-6}. The U.S. EPA cancer risk for Exposure Group 3 could not be calculated because none of the COPCs in this exposure group are classified as carcinogens. The Cal/EPA cancer risk is the same for Exposure Groups 1 and 3, at 4×10^{-3}. Cal/EPA cancer risk is due primarily to ingestion of naphthalene in groundwater and inhalation of naphthalene vapors in indoor air. The noncancer HI value is 29 for Exposure Group 1 and 27 for Exposure Group 3, due to naphthalene.

For reasonable future use, Exposure Group 2 U.S. EPA and Cal/EPA cancer risks are 1×10^{-6} and 5×10^{-5}, respectively. Cal/EPA cancer risk is due to naphthalene vapors from groundwater to indoor air. The noncancer HI is 2.

J4 AOC 3 HHRA

The following sections present the site description and background, data evaluation, exposure and toxicity assessment issues that differ from the general description in Section J2, and cancer and noncancer risk assessment results for AOC 3.

J4.1 AOC 3 Site Description and Background

AOC 3 is an approximately 0.4-acre picnic and recreation area near the northwestern corner of Transfer Parcel EDC-5 that is located entirely in the northeastern corner of EBS

Parcel 91. Former Buildings 104 and 416 were entirely in AOC 3; former Building 274 was partially in AOC 3. Currently, there is a structure in the eastern portion of AOC 3 that houses restrooms for the surrounding picnic and recreation areas.

EBS Parcel 91 was historically used as a golf course, clubhouse and youth center (Building 104), general recreation area, nursery building and lath house (Building 274), and for miscellaneous storage (Building 416).

Three soil investigations have been conducted at AOC 3. During the EBS, two surface soil samples were collected in AOC 3 because of likely storage, mixing, or use of pesticides in that area (IT 2001a). The samples were analyzed for pesticides and PCBs. PCBs were not reported above detection limits. The pesticide dieldrin was reported in a soil sample at a concentration above the screening criterion. However, the extent of pesticide contamination was not determined during the EBS investigation.

Four samples were collected from one soil boring during the 2002 PAH study (BEI 2005). PAH concentrations reported in the samples did not exceed the screening criterion.

For this RI/FS Report, soil samples were collected from six borings around the EBS sampling location; two soil samples were collected per boring (0 to 2 and 2 to 4 feet bgs); a third soil sample was collected from the three borings closest to the original EBS boring location with the elevated pesticide concentration. Locations were targeted outside the footprints of previous buildings because historical pesticide handling and usage would likely have taken place outdoors. All soil samples were analyzed for pesticides.

A reasonable maximum depth to groundwater at AOC 3 was judged to be 5 feet bgs. The chemicals identified in any sample are shown in Table J4-1.

J4.2 AOC 3 HHRA Data Evaluation

There are 24 COPCs in soil at AOC 3, including 9 VOCs and 8 SVOCs (including PAHs) based on 4 samples, and 7 pesticides based on 13 samples (Table J4-2). Groundwater samples were collected at AOC 3; however, in accordance with the Work Plan (BEI 2006), the groundwater samples were not analyzed because pesticides were not reported in deeper soil samples.

J4.3 AOC 3 HHRA Exposure Assessment

All exposure pathways presented in Section J1.3.3 were considered at AOC 3 except those associated with groundwater data. The calculations for the EPC are presented in Attachment J4. EPCs for COPCs are presented in Table J4-3.

J4.4 AOC 3 HHRA Toxicity Assessment

There is no deviation for AOC 3 from the information on the toxicity assessment presented in Section J1.3.4.

J4.5 AOC 3 HHRA Risk Characterization

This subsection presents the results of the U.S. EPA and Cal/EPA cancer risk and noncancer hazard value calculations. A summary of the risk characterization results is presented in Table J4-4 by exposure group and in Table J4-5 by exposure pathway. The U.S. EPA and Cal/EPA cancer risk drivers are shown in Tables J4-6 and J4-7, respectively. Noncancer risk drivers are shown in Table J4-8. The supporting calculations are presented Attachment J4.

J4.5.1 AOC 3 HHRA CANCER RISK CHARACTERIZATION

The total U.S. EPA and Cal/EPA RME cancer risks are both 3×10^{-3}. The total RME cancer risks rank-ordered by exposure pathway for U.S. EPA and Cal/EPA, respectively, are as follows:

- ingestion of homegrown produce (3×10^{-3} for both)
- direct contact with soil (8×10^{-5} and 7×10^{-5})
- inhalation of vapors in indoor air (no carcinogens and 1×10^{-7})
- inhalation of particulates and vapors in outdoor air (4×10^{-9} and 6×10^{-9})

The U.S. EPA and Cal/EPA cancer risks are above the risk management range due to uptake of heptachlor into homegrown produce. Heptachlor and the other pesticides were reported in only 1 of 13 samples. Without the homegrown produce pathway, the U.S. EPA and Cal/EPA cancer risks are within the risk management range at 8×10^{-5} and 7×10^{-5}, respectively.

J4.5.2 AOC 3 HHRA NONCANCER HAZARD CHARACTERIZATION

The noncancer HI value of 3 for soil is associated with ingestion of homegrown produce and heptachlor. Without this pathway, the HI value is below 1.

J4.6 AOC 3 HHRA Uncertainty Analysis

The data from 13 samples are considered adequate for this approximately 0.4-acre site. The identification of the pesticide heptachlor as a COPC is consistent with the former plant nursery with likely storage and mixing of pesticides that was located at AOC 3.

J4.7 AOC 3 HHRA Conclusions

There are no data for groundwater; therefore, only risk values for Exposure Group 2 were calculated. For reasonable future use, the U.S. EPA and Cal/EPA cancer risks for Exposure Group 2 are 3×10^{-3} with and without PAHs. The noncancer HI is 3. The cancer risk is associated largely with uptake of the pesticide heptachlor by homegrown produce. In accordance with the Work Plan (BEI 2006), soil samples were not analyzed for metals.

J5 AOC 11/EBS PARCELS 78–79 HHRA

The following subsections present the site description and background, data evaluation, exposure and toxicity assessment issues that differ from the general description in Section J2, and cancer and noncancer risk assessment results for AOC 11/EBS Parcels 78–79.

J5.1 AOC 11/EBS Parcels 78–79 Site Description and Background

The site descriptions and backgrounds for AOC 11/EBS Parcels 78–79 are presented separately.

J5.1.1 AOC 11 SITE BACKGROUND

AOC 11 is an approximately 2-acre area that has boundaries identical to those of EBS Parcel 77. AOC 11 currently consists of the concrete foundation of former Building 101, landscaped open space, and paved vehicle parking. AOC 11 is located immediately east of IR Site 8 (an area of known contamination from pesticides, metals, and PAHs in soil, and benzene and chlorinated hydrocarbons in groundwater).

Building 101 was historically used as a heating plant and for public works maintenance storage, administration, and academic instruction. Past uses may also have included ammunition storage (IT 2001a).

One groundwater sample collected along the western boundary of AOC 11 as part of the follow-on sampling conducted at IR Site 8 in 1998 for the OU-1 RI Report was analyzed for benzene, toluene, ethylbenzene, and xylenes. These VOCs in the groundwater sample were reported at concentrations below the screening criteria (TtEMI 2002).

Samples were collected from four depth intervals at one soil boring in AOC 11 during the 2002 PAH study (BEI 2005). Concentrations of PAHs were below the screening criterion.

The RI/FS sampling plan for AOC 11 addressed chemical storage at EBS Parcel 77 and stains observed at Building 101 during the EBS. Soil and grab groundwater samples were collected beneath and around Building 101. Three soil samples were collected from each of four borings at AOC 11. Grab groundwater samples were collected from the two most downgradient soil borings. Soil and groundwater samples were analyzed for VOCs, SVOCs, pesticides, PCBs, and metals.

J5.1.2 EBS PARCELS 78–79 SITE BACKGROUND

EBS Parcels 78–79 were identified as data gap areas in response to a request from the Alameda Point Collaborative to U.S. EPA. EBS Parcel 78 is an approximately 1.5-acre area. Four buildings (Buildings 73A, 73B, 131, and 607) were historically located in EBS Parcel 78. Activities in the buildings included navigational training, arts and crafts, and a hobby shop for ceramics and woodworking. All chemicals were stored indoors; no stains were noted during the EBS. The open space consisted of paved and grassy areas.

Currently, two buildings are located in EBS Parcel 78. Building 607 houses the Alameda Point Collaborative. A modular building for Alameda Head Start (an active child care facility) is located where former Building 73B used to stand.

EBS Parcel 79 is an approximately 1.7-acre area. Two structures (Structures 36A and 624) and Building 624, a communications center, were historically located in EBS Parcel 79. Structure 36A was a 150-foot radio tower that was removed in November 2002 (Shaw 2003); a new antenna structure is now in place at this location. Structure 624 is still present, but its current use is unknown. The remainder of the parcel is currently an asphalt-paved parking area and a playground.

During the EBS, no chemical storage was observed at EBS Parcel 79; only minor stains associated with vehicle parking were observed and no potential release areas were identified.

One soil boring (32EDC-5-70) was installed in EBS Parcel 79 during the 2002 PAH study (BEI 2005). Samples were collected from four depth intervals between 0 and 8 feet bgs and analyzed for PAHs. PAH concentrations did not exceed the soil screening criterion.

A soil removal action was conducted by the Navy between November 2002 and July 2003 for lead from lead-based paint using a site-specific cleanup goal of 199 mg/kg for lead (Shaw 2003). The results of confirmation sampling indicated that lead concentrations were below the removal action objective.

The RI/FS sampling design was developed to address issues raised by the Alameda Point Collaborative regarding EBS Parcels 78–79. Soil and grab groundwater samples were collected at four locations in EBS Parcel 78 and at four locations in EBS Parcel 79. Sampling locations were adjusted to locations outside existing buildings or structures, although no release to soil or groundwater is known to have occurred. A groundwater sample was collected from each boring. All soil and groundwater samples were analyzed for VOCs, TPH, SVOCs, pesticides, PCBs, and metals.

A reasonable maximum depth to groundwater of 9 feet was used for the combined study areas. The chemicals identified in any sample are shown in Table J5-1.

J5.2 AOC 11/EBS Parcels 78–79 HHRA Data Evaluation

There are 53 COPCs in soil at AOC 11/EBS Parcels 78–79, including 18 VOCs based on 35 to 53 samples, 10 SVOCs based on 44 to 52 samples, 4 pesticides based on 35 to 44 samples, and 21 metals based on 35 to 53 samples (except hexavalent chromium based on 9 samples and molybdenum based on 18 samples) (Table J5-2).

There are 31 COPCs in groundwater, including 9 VOCs based on nine or ten samples, 14 PCBs/pesticides based on ten samples, and 8 metals based on ten samples (Table J5-3).

Antimony, arsenic, beryllium, mercury, molybdenum, selenium, silver, and thallium have concentrations in soil below the Alameda Point background 95th percentile. In groundwater, concentrations of barium, beryllium, and vanadium are below the Alameda Point background 95th percentile. Additional statistical analysis indicated that concentrations of cadmium in soil and those for arsenic, iron, and manganese in groundwater are below background (Appendix H).

J5.3 AOC 11/EBS Parcels 78–79 HHRA Exposure Assessment

All exposure pathways presented in Section J1.3.3 were considered at AOC 11/EBS Parcels 78–79 because there are both soil and groundwater data. The calculations for the EPCs are presented in Attachment J5. EPCs for COPCs in soil and groundwater are presented in Tables J5-4 and J5-5, respectively.

J5.4 AOC 11/EBS Parcels 78–79 HHRA Toxicity Assessment

There is no deviation for AOC 11/EBS Parcels 78–79 from the information on the toxicity assessment presented in Section J1.3.4.

J5.5 AOC 11/EBS Parcels 78–79 HHRA Risk Characterization

This subsection presents the results of the U.S. EPA and Cal/EPA cancer risk and noncancer hazard value calculations and the evaluation of lead. A summary of the risk characterization results is presented in Table J5-6 by exposure group and in Table J5-7 by exposure pathway. The U.S. EPA and Cal/EPA cancer risk drivers are shown in Tables J5-8 and J5-9, respectively. Noncancer risk drivers are shown in Table J5-10. The supporting calculations are presented in Attachment J5.

J5.5.1 AOC 11/EBS PARCELS 78–79 HHRA CANCER RISK CHARACTERIZATION

The total U.S. EPA and Cal/EPA RME cancer risks (including background) at AOC 11/EBS Parcels 78–79 are 3×10^{-3} and 8×10^{-3}, respectively. The total RME cancer risks rank-ordered by exposure pathway for U.S. EPA and Cal/EPA, respectively, are as follows:

- residential use of groundwater (3×10^{-3} and 8×10^{-3})
- direct contact with soil (9×10^{-6} and 5×10^{-5})
- ingestion of homegrown produce (5×10^{-6} and 3×10^{-5})
- inhalation of vapors in indoor air from soil and groundwater (3×10^{-6} and 5×10^{-7})
- inhalation of particulates and vapors in outdoor air (2×10^{-7} and 3×10^{-7})

For residential use of groundwater, the cancer risks without metals below background are above the risk management range. The cancer risk drivers for residential use of groundwater, in descending order, are as follows:

- PCBs (Aroclor 1260) reported in one of ten samples. PCBs are rarely found in groundwater because these chemicals are immobilized in soil. This suggests that this reported value is an artifact of the sampling.
- Pesticides reported in one of ten samples. These pesticides are not generally found in groundwater except at locations where pesticides are used heavily, such as farming areas in pesticide-mixing zones. This suggests that these reported values are an artifact of the sampling.
- VOCs reported with varying frequency in the groundwater samples.

For current and reasonable future use exposure pathways via soil and vapors from groundwater to indoor air and without metals below background, the cancer risk drivers, in descending order, are as follows.

- U.S. EPA cancer risk of 4×10^{-6} is associated with TCE in groundwater to indoor air.
- U.S. EPA and Cal/EPA cancer risks associated with PAHs are 1×10^{-6} and 2×10^{-6}, respectively.

The U.S. EPA and Cal/EPA current and reasonable future use cancer risks without PAHs, arsenic, and cadmium are 4×10^{-6} and 1×10^{-6}, respectively. The U.S. EPA cancer risk above 1×10^{-6} is due to TCE in groundwater at the maximum concentration reported in three of nine samples.

J5.5.2 AOC 11/EBS PARCELS 78–79 HHRA NONCANCER HAZARD CHARACTERIZATION

The noncancer HI value at AOC 11/EBS Parcels 78–79 is 233 for all exposure pathways. The risk drivers are PCBs in groundwater. As noted earlier, PCBs are rarely found in groundwater because these chemicals are immobilized in soil. This suggests that this reported value is anomalous or an artifact of the sampling.

For current and reasonable future use exposure pathways via soil and vapors from groundwater to indoor air without PAHs or metals below background, the HI is 2; however, the majority of the risk is associated with iron. As discussed in Section J1.2.4, health effects for iron and manganese are not considered additive with other chemicals.

The maximum concentration of lead in soil of 150 mg/kg is equal to the generic lead PRG of 150 mg/kg and below the site-specific PRGs of 184 mg/kg including ingestion of homegrown produce and 322 mg/kg without ingestion of homegrown produce. Lead was not reported above detection limits in groundwater.

J5.6 AOC 11/EBS Parcels 78–79 HHRA Uncertainty Analysis

There is a high level of confidence that the risks estimated for AOC 11/EBS Parcels 78–79 are not underestimated. The data are considered adequate for this 5.2-acre site. There are 35 to 53 samples for most parameters in soil and 9 or 10 samples of groundwater.

J5.7 AOC 11/EBS Parcels 78–79 HHRA Conclusions

For AOC 11/EBS Parcels 78–79, the U.S. EPA and Cal/EPA total cancer risks including metals below background are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 3×10^{-3} and 8×10^{-3}, respectively

  Without metals below background: 2×10^{-3} and 5×10^{-3}, respectively

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 2×10^{-5} and 8×10^{-5}, respectively

  Without metals below background: 5×10^{-6} and 3×10^{-6}, respectively

  Without metals below background and PAHs in soil: 4×10^{-6} and 1×10^{-6}, respectively

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 3×10^{-3} and 8×10^{-3}, respectively

  Without metals below background: 2×10^{-3} and 5×10^{-3}, respectively

The noncancer HIs including metals below background are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 233

  Without metals below background: 222

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 2

  Without metals below background: 2

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 231

  Without metals below background: 220

For Exposure Groups 1 and 3, the majority of the cancer and noncancer risk is associated with ingestion of PCBs in groundwater based on the reported concentration of PCBs in one possibly anomalous sample out of ten groundwater samples.

For Exposure Group 2, the majority of the cancer risk is due to the potential vapor migration of TCE in groundwater to indoor air. The noncancer HI without iron is 1.

The EPC for lead of 27.8 mg/kg in soil is below site-specific PRGs of 184 and 322 mg/kg with and without homegrown produce, respectively.

J6 AOC 23 HHRA

The following subsections present the site description and background, data evaluation, exposure and toxicity assessment issues that differ from the general description in Section J2, and cancer and noncancer risk assessment results for AOC 23.

J6.1 AOC 23 Site Description and Background

AOC 23 is an approximately 15.2-acre area in the south-central portion of Transfer Parcel EDC-5. AOC 23 was established to address soil and groundwater contaminants in areas

previously used for chemical storage or handling at eight EBS parcels (EBS Parcels 71, 72, 110, 121, 123, 124, 125, and 126). This subsection provides area-specific descriptions of the eight EBS parcels and discusses the focus of the RI/FS sampling efforts.

J6.1.1 EBS PARCEL 71

EBS Parcel 71 is in the northwestern portion of AOC 23 and is subdivided into two parcels: EBS Parcel 71 and EBS Parcel 71A. One building (Building 544) is present on EBS Parcel 71, which also includes the locations of former Buildings 45A and 45B. A washdown area known as WD-041B was located in the north portion of EBS Parcel 71. EBS Parcel 71 is adjacent to IR Site 6, where chlorinated hydrocarbons have been reported in groundwater and PAHs have been reported in soil. EBS Parcel 71 was historically used as a general storage shed (Building 45B) and as a liquid oxygen/nitrogen facility (Building 544).

The results of several previous investigations indicated that additional soil and grab groundwater samples were necessary to be collected to both confirm the presence and determine the extent of contaminants previously identified above screening criteria. The potential contaminants included VOCs, SVOCs, PAHs, TPH (purgeable-range and extractable-range), PCBs, pesticides, and metals.

J6.1.2 EBS PARCEL 72

EBS Parcel 72 is in the western portion of AOC 23. Two buildings (Buildings 77 and 77A) were historically located on EBS Parcel 72, but only Building 77 remains. This parcel is adjacent to and hydraulically downgradient from IR Site 6. Building 77 at EBS Parcel 72 was historically used as a heating plant, an air cargo terminal, and an electrical distribution shelter. An old storage building (Building 77A) was historically located in the northwestern corner of the parcel.

Although there are no potential releases known to be associated with historical activities at the parcel, chlorinated hydrocarbons are known to be present in groundwater at adjacent IR Site 6. The most recent data collected during the basewide monitoring program (ITSI 2005) indicate that groundwater contamination at IR Site 6 (groundwater impacted with TPH and chlorinated VOCs, primarily cis-1,2-DCE and vinyl chloride) likely extends to EBS Parcel 72. The rationale for the RI/FS sampling was to assess the on-site impact, if any, due to the off-site migration of VOCs from IR Site 6.

J6.1.3 EBS PARCEL 110

EBS Parcel 110 is in the northeastern portion of AOC 23. Two buildings (Buildings 271 and 590) were historically located on EBS Parcel 110. Presently, only Building 271 remains. Railroad tracks traverse the parcel from the northwestern corner to the southern portion of the site. EBS Parcel 110 was historically used as a hazardous/flammable storehouse (Building 271) and an industrial waste pump station (Building 590).

Previous investigation of EBS Parcel 110 included the EBS (IT 2001a) and the 2002 PAH study (BEI 2005). These investigations did not identify the presence of VOCs, SVOCs, PCBs, pesticides, herbicides, metals, and TPH (purgeable-range and

extractable-range) in soil at concentrations exceeding screening criteria. However, no samples were collected within the stained areas around Building 271, the pump station was not targeted for sampling, and groundwater was not assessed. Therefore, the RI/FS was designed to collect additional soil and grab groundwater samples to assess the potential impact from chemical storage at Building 271 and in the adjacent storage yard, and impact from possible releases from the industrial waste pump station.

J6.1.4 EBS PARCEL 121

EBS Parcel 121 is in the eastern portion of AOC 23. A portion of former Building 79-2 was the only structure historically present on EBS Parcel 121. IR Site 3, an area with known groundwater contamination (chlorinated hydrocarbons, TPH, and benzene) and soil contamination (metals, PAHs, and TPH) is located immediately south of EBS Parcel 121 and is separated from EBS Parcel 121 on the east by Building 564. EBS Parcel 121 was historically used for open space storage and a garden shop, which was later demolished and converted to a parking lot.

Soil and groundwater sampling was not conducted during the EBS; however, staining in the vehicle parking lot and potentially impacted runoff from the neighboring junkyard area were noted. Therefore, the RI/FS sampling program was designed to provide more coverage in this portion of AOC 23. Soil and groundwater samples collected from the RI/FS borings were analyzed for VOCs, TPH (purgeable-range and extractable-range), SVOCs, pesticides, PCBs, and metals.

J6.1.5 EBS PARCEL 123

EBS Parcel 123 is in the east-central portion of AOC 23. Historically, six buildings were located on EBS Parcel 123: Buildings 67, 79-2, 98, 263, 393, and 412 (Building 412 was observed to be numbered "411" during a site walk in August 2005). Presently, five of these buildings remain (Buildings 67, 98, 263, 393, and 412). Five SWMUs are located on this parcel: SWMU AOC 098 and OWS 067 in the southern portion of the site, NAS GAPs 15 and 29 in the northern portion of the site, and Underground Storage Tank (UST)(R)-11. The UST (known alternatively as Tank 393) was historically located between West Trident Avenue and Building 393. IR Site 3 is located immediately south of EBS Parcel 123 and is part of a larger area characterized by groundwater contamination (chlorinated hydrocarbons, TPH, and benzene) and soil contamination (metals, PAHs, and TPH). Railroad tracks run north-to-south and north-to-southeast across the west-central portion of the parcel.

EBS Parcel 123 was historically used as barracks, an aircraft ground support equipment shop, a switching substation, a field maintenance shop, a hazardous/flammable storehouse, an electrical substation, an industrial waste pump station, and for painting and sandblasting operations.

The RI/FS was designed to both confirm the presence and determine the extent of PCBs in soil and arsenic in soil and groundwater, which were the only constituents detected above the screening criteria. In addition, the RI/FS sampling provided additional data for locations where soil and/or groundwater data was not previously collected; some of this

data gap sampling was requested by regulatory agencies. These additional soil and/or grab groundwater samples were analyzed for each EBS Parcel 123 subarea's specific constituent of concern, which may include: VOCs, SVOCs, TPH (purgeable-range and extractable-range), pesticides, PCBs, and metals.

J6.1.6 EBS PARCEL 124

EBS Parcel 124 is in the central portion of AOC 23. Four buildings were historically located on EBS Parcel 124: Buildings 13, 59, 262, and 444. Only Building 13 is currently present on the site and is in the same location as the three former building sites. EBS Parcel 124 was historically used for lumber storage (Buildings 262 and 444), as a hazardous/flammable storehouse (Building 13), and for public works maintenance storage (Building 13). In general, hazardous wastes were stored in the southern half of Building 13, and hazardous materials were stored in the northern half. A portion of the parcel was used for sorting trash and junkyard material (salvage and reuse).

None of the soil samples collected as part of the EBS had constituent concentrations exceeding the screening criteria (IT 2001a). In addition, the 2002 PAH study did not report concentrations exceeding the screening criteria. Grab groundwater samples were not collected as part of these two investigations, and therefore the RI/FS was designed to address this data gap. The RI/FS soil and groundwater samples were analyzed for VOCs, SVOCs, TPH (purgeable-range and extractable-range), pesticides, PCBs, and metals.

J6.1.7 EBS PARCEL 125

EBS Parcel 125 is in the southern portion of AOC 23. Building 66 is presently located on this parcel. A hazardous waste storage area (Naval Aviation Depot [NADEP] GAP 43) was historically at the southern end of Building 66. EBS Parcel 125 was historically used for nozzle testing and overhauling, pneumatic/hydraulic accessory testing, plant services for aircraft overhauling, an engineering laboratory, and air and engine aircraft overhauling.

Previous analytical results indicated that only TPH in soil was present above the screening criteria. In addition, the investigations concluded that groundwater contamination (including benzene, vinyl chloride, and TPH) was migrating onto EBS Parcel 125 from adjacent areas (IR Sites 4, 11, and 21).

The laboratory analyses included in the above investigations were somewhat limited. In addition, no investigation specifically targeted the NADEP GAP 43 area. Therefore, the RI/FS sampling consisted of the collection of both soil and grab groundwater for analysis of VOCs, SVOCs, TPH (purgeable-range and extractable-range), pesticides, PCBs, and metals.

J6.1.8 EBS PARCEL 126

EBS Parcel 126 is in the southern portion of AOC 23. Three buildings were historically located on EBS Parcel 126 (Buildings 99, 399, and 411). Two of these buildings still remain (Buildings 399 and 411). EBS Parcel 126 is adjacent to IR Sites 3 and 21 to the east. EBS Parcel 126 was historically used for NADEP and compressor support and as an electrical substation. Both signage and sampling indicated that the transformers were

filled with non-PCB-containing oil; however, prior to the promulgation of the Toxic Substances Control Act of 1976, most oil-containing transformers contained PCBs.

The results of previous investigations reported soil concentrations of TPH as motor oil and as diesel, arsenic, iron, and thallium exceeding the screening criteria. In addition, although no constituents were reported in groundwater at concentrations above screening criteria, sampling performed on the adjacent EBS Parcel 125 indicated the presence of shallow groundwater contamination (benzene and vinyl chloride) that could potentially migrate onto EBS Parcel 126 from adjacent IR Sites 4, 11, and 21.

The above investigation did not include groundwater metals analysis. Therefore, the RI/FS sampling was conducted to assess the extent of the metals previously reported in soil and determine if these metals also impacted the underlying groundwater. In addition, the RI/FS was designed to assess the potential migration of VOCs in groundwater to EBS Parcel 126. No further samples were collected to investigate TPH because the Navy will address the sampling under the Alameda Point TPH Program's investigation of the adjacent site, CAA-3A.

A reasonable maximum depth to groundwater of 6 feet was used for the combined study area. The chemicals identified in any sample are shown in Table J6-1.

J6.2 Data Evaluation

There are 73 COPCs in soil at AOC 23, including 32 VOCs based on 90 to 149 samples, 14 SVOCs based on 84 to 126 samples, 8 PCBs/pesticides based on 84 to 106 samples, and 19 metals based on 104 to 149 samples (Table J6-2).

There are 57 COPCs in groundwater, including 28 VOCs based on 36 to 60 samples (except total xylenes based on 15 samples), 8 SVOCs based on 41 samples (except 1,4-dioxane based on 1 sample), 2 PCBs based on 34 samples, and 19 metals based on 38 to 42 samples (except molybdenum based on 4 samples) (Table J6-3).

Antimony, cadmium, selenium, and silver have concentrations in soil below the Alameda Point background 95th percentile. Additional statistical tests found aluminum, arsenic, cadmium, chromium, manganese, and vanadium in soil to be below background also (Appendix H). In groundwater, concentrations of aluminum, barium, copper, lead, and thallium are below the Alameda Point background 95th percentile. Additional statistical analysis showed that concentrations of arsenic in groundwater are below background (Appendix H).

J6.3 AOC 23 HHRA Exposure Assessment

All exposure pathways presented in Section J1.3.3 were considered at AOC 23 because there are both soil and groundwater data. The calculations for the EPC are presented in Attachment J6. EPCs for COPCs in soil and groundwater are presented in Tables J6-4 and J6-5, respectively.

J6.4 AOC 23 HHRA Toxicity Assessment

There is no deviation for AOC 23 from the information on the toxicity assessment presented in Section J1.3.4.

J6.5 AOC 23 HHRA Risk Characterization

This subsection presents the results of the U.S. EPA and Cal/EPA cancer risk and noncancer hazard value calculations and the evaluation of lead. A summary of the risk characterization results is presented in Table J6-6 by exposure group and in Table J6-7 by exposure pathway. The U.S. EPA and Cal/EPA cancer risk drivers are shown in Tables J6-8 and J6-9, respectively. Noncancer risk drivers are shown in Table J6-10. The supporting calculations are presented in Attachment J6.

J6.5.1 AOC 23 HHRA CANCER RISK CHARACTERIZATION

The total U.S. EPA and Cal/EPA RME cancer risks (including background) at AOC 23 are 2×10^{-2} and 3×10^{-2}, respectively. The total RME cancer risks rank-ordered by exposure pathway for U.S. EPA and Cal/EPA, respectively, are as follows:

- residential use of groundwater (2×10^{-2} and 3×10^{-2})
- direct contact with soil (1×10^{-5} and 8×10^{-5})
- ingestion of homegrown produce (2×10^{-5} and 7×10^{-5})
- inhalation of vapors in indoor air (4×10^{-6} and 1×10^{-5})
- inhalation of particulates and vapors in outdoor air (4×10^{-7} and 9×10^{-7})

For residential use of groundwater, the cancer risks are above the risk management range. In descending order, the risk drivers in groundwater are as follows:

- PAHs based on one or two reported values in 41 samples. The PAHs belong to a higher-molecular-weight group; these chemicals are rarely found in groundwater because they are immobilized in soil. This suggests that these reported values are anomalous, likely due to suspended soil in the sample.
- PCBs (Aroclor 1260 and Aroclor 1016) each reported once in 34 samples. PCBs are also rarely found in groundwater because these chemicals are immobilized in soil. This suggests that these reported values are anomalous, likely due to suspended soil in the sample.
- VOCs reported with varying frequency in the groundwater samples.

For current and reasonable future use exposure pathways via soil and vapors from groundwater to indoor air and without metals below background, the cancer risk drivers, in descending order, are as follows.

- PCBs in soil (Aroclor 1254 and Aroclor 1260) were reported in 2 and 8 of 106 samples, respectively, and the cancer risk above 10^{-6} is associated with ingestion of homegrown produce.
- Carbazole, an SVOC, was only reported in 1 of 84 soil samples.

- PAHs in soil have a risk of less than 1×10^{-5}, which is within the risk management range set for PAHs at Alameda Point.
- VOCs in groundwater including TCE and vinyl chloride.

Without PAHs or metals below background, the U.S. EPA and Cal/EPA cancer risks are 1×10^{-5} and 3×10^{-5}, largely associated with homegrown produce.

J6.5.2 AOC 23 HHRA NONCANCER HAZARD CHARACTERIZATION

For residential use of groundwater, the noncancer HI value at AOC 23 is 405, due to PCBs in one sample. The HI is 3 for current and reasonable future use pathways. Without iron and the metals below background (arsenic and cadmium), the cumulative HI is 1.

The maximum concentration of lead in soil of 135 mg/kg is below the generic lead PRG of 150 mg/kg as well as the site-specific PRGs of 184 mg/kg including ingestion of homegrown produce and 322 mg/kg without ingestion of homegrown produce. The maximum concentration of lead in groundwater of 1.2 µg/L is below the Alameda Point background 95th percentile of 11.45 µg/L.

J6.6 AOC 23 HHRA Uncertainty Analysis

The data are considered adequate for this approximately 15.2-acre site, with 84 to 149 soil samples and 34 to 60 groundwater samples for most COPCs.

J6.7 AOC 23 HHRA Conclusions

For AOC 23, the U.S. EPA and Cal/EPA total cancer risks including metals below background are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 2×10^{-2} and 3×10^{-2}, respectively

  Without metals below background: 2×10^{-2} and 3×10^{-2}, respectively

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 3×10^{-5} and 2×10^{-4}, respectively

  Without metals below background: 2×10^{-5} and 5×10^{-5}, respectively

  Without metals below background and PAHs in soil: 1×10^{-5} and 3×10^{-5}, respectively

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 2×10^{-2} and 3×10^{-2}, respectively

  Without metals below background: 2×10^{-2} and 3×10^{-2}, respectively

The noncancer hazard values including metals below background are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 408

  Without metals below background: 401

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 3

  Without metals below background: 2

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 405

  Without metals below background: 399

The risk drivers are PCBs and PAHs in one sample of groundwater. The hazard values without metals below background are due to PCBs in one groundwater sample.

For current and reasonable future use (Exposure Group 2), the noncancer HI without iron is 1.

The maximum concentration of lead in soil of 135 mg/kg is below the site-specific PRGs of 184 and 322 mg/kg with and without homegrown produce, respectively.

J7 EBS PARCEL 205 HHRA

The following subsections present the site description and background, data evaluation, exposure and toxicity assessment issues that differ from the general description in Section J2, and cancer and noncancer risk assessment results for EBS Parcel 205.

J7.1 EBS Parcel 205 Site Description and Background

EBS Parcel 205 is an approximately 0.1-acre data gap area along the southeastern border of Transfer Parcel EDC-5. Four buildings were historically located on the parcel: Buildings 507, 508, 523, and 605. Currently, only the concrete pads of these buildings remain.

EBS Parcel 205 was used as part of a flight test area for aircraft. Buildings at EBS Parcel 205 were used for storage of various items, including personal equipment, electrical parts, tools, and batteries.

Results from two investigations were used in the RI/FS Report: the EBS (IT 2001a) and the 2002 PAH study at Alameda Point (BEI 2005). Soil samples collected during these investigations did not report concentrations of TPH, PAHs, or metals above the screening criteria. The EBS identified NADEP GAP 73 as located at Building 523. However, conflicting information reported NADEP GAP 73 as located north of Building 507. Therefore, the RI/FS sampling program included the collection of both soil and groundwater samples to determine whether NADEP GAP 73 impacted the subsurface at

its second reported location. The RI/FS samples were analyzed for VOCs, TPH (purgeable-range and extractable-range), and metals.

A reasonable maximum depth to groundwater at EBS Parcel 205 was judged to be 3 feet. The chemicals identified in any sample are shown in Table J7-1.

J7.2 EBS Parcel 205 Data Evaluation

There are 29 COPCs in soil in EBS Parcel 205, including 8 VOCs and 7 SVOCs based on 12 samples, and 14 metals based on 3 samples (Table J7-2). There are 15 COPCs in groundwater, including 9 VOCs and 6 metals based on 2 samples (Table J7-3).

None of the metals reported in soil or groundwater had concentrations above the Alameda Point background 95th percentile.

J7.3 EBS Parcel 205 Exposure Assessment

All exposure pathways presented in Section J13.3 were considered at EBS Parcel 205 because there are both soil and groundwater data. The calculations for the EPC are presented in Attachment J7. EPCs for COPCs in soil and groundwater are presented in Tables J7-4 and J7-5, respectively.

J7.4 EBS Parcel 205 Toxicity Assessment

There is no deviation for EBS Parcel 205 from the information on the toxicity assessment presented in Section J1.3.4.

J7.5 EBS Parcel 205 Risk Characterization

This subsection presents the results of the U.S. EPA and Cal/EPA cancer risk and noncancer hazard value calculations and the evaluation of lead. A summary of the risk characterization results is presented in Table J7-6 by exposure group and in Table J7-7 by exposure pathway. The U.S. EPA and Cal/EPA cancer risk drivers are shown in Tables J7-8 and J7-9, respectively. Noncancer risk drivers are shown in Table J7-10. The supporting calculations are presented in Attachment J7.

J7.5.1 EBS PARCEL 205 CANCER RISK CHARACTERIZATION

The total for both U.S. EPA and Cal/EPA RME cancer risks (including background) is 4×10^{-4} and 2×10^{-3}. The total RME cancer risks rank-ordered by exposure pathway for U.S. EPA and Cal/EPA, respectively, are as follows:

- residential use of groundwater (3×10^{-4} and 2×10^{-3})
- inhalation of vapors in indoor air (2×10^{-5} and 3×10^{-5})
- direct contact with soil (1×10^{-5} and 7×10^{-5})
- ingestion of homegrown produce (7×10^{-6} and 4×10^{-5})
- inhalation of particulates and vapors in outdoor air (2×10^{-7} and 3×10^{-7})

For residential use of groundwater, the cancer risk is above the risk management range. The cancer risks for all exposure pathways without metals below background are 8×10^{-5} and 6×10^{-5} due to vapor migration into indoor air.

For reasonable future use exposure via soil and vapors from groundwater, the cancer risks without metals below background are 2×10^{-5} and 3×10^{-5} due to vapor migration into indoor air.

J7.5.2 EBS PARCEL 205 NONCANCER AND LEAD RISK CHARACTERIZATION

For residential use of groundwater, the noncancer HI value is 4. Without the metals below background concentrations, the HI is 0.9.

For reasonable future use exposure via soil and vapors from groundwater, HI is 1; without metals below background, the HI is 0.07.

The maximum concentration of lead in soil of 8.8 mg/kg is below the background 95th percentile of 37.7 mg/kg, below the generic lead PRG of 150 mg/kg and below the site-specific PRGs for lead of 184 mg/kg with the ingestion of homegrown produce and 322 mg/kg without that pathway. Lead was not reported in groundwater.

J7.6 EBS Parcel 205 Uncertainty Analysis

The data are considered adequate for this approximately 0.1-acre site.

J7.7 EBS Parcel 205 Conclusions

For EBS Parcel 205, the U.S. EPA and Cal/EPA total cancer risks including metals below background are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 4×10^{-4} and 2×10^{-3}, respectively

  Without metals below background: 8×10^{-5} and 6×10^{-5}, respectively

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 4×10^{-5} and 1×10^{-4}, respectively

  Without metals below background: 2×10^{-5} and 3×10^{-5}, respectively

  Without metals below background and PAHs in soil: 2×10^{-5} and 3×10^{-5}, respectively

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 3×10^{-4} and 2×10^{-3}, respectively

  Without metals below background: 8×10^{-5} and 6×10^{-5}, respectively

The noncancer hazard values including metals below background are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 6

  Without metals below background: less than 1

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: at or less than 1

  Without metals below background: less than 1

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 4

  Without metals below background: less than 1

The cancer risk drivers without metals below background are VOCs in groundwater. Noncancer hazard values without metals below background are below 1.

For reasonable future use (Exposure Group 2), the U.S. EPA and Cal/EPA cancer risks without metals below background are largely due to vapor migration into indoor air.

J8 LEAD EVALUATIONS

Two study areas, AOCs 10 and 12, were evaluated for lead only. The risk assessment process for lead consists of comparing the EPC for lead with the site-specific PRGs of 184 mg/kg for the exposure pathway that includes ingestion of homegrown produce and 322 mg/kg without the homegrown produce pathway. The following subsections include the site description and background, and the risk evaluation, which is a discussion of the samples that were combined into the EPC and a comparison of the site-specific PRGs with the EPC.

J8.1 AOC 10 Lead Evaluation

AOC 10 is an approximately 2-acre area along the west-central edge of EBS Parcel 98 in the West Housing Area. The two buildings located on-site are currently occupied by tenants. A radio antenna tower (Structure 036B) was historically located on-site that had been used as a communications antenna since its construction in 1953. The footings for the tower were removed in October 2001.

The concentrations of lead in 18 soil samples collected from several locations around the radio antenna tower (Structure 36B) in AOC 10 resulted in a soil removal action (TtEMI 2002). A lead non-time-critical removal action (NTCRA) was conducted by the Navy between November 2002 and July 2003 (Shaw 2003). Soil was removed to 1 to 2 feet bgs in AOC 10. Confirmation soil samples were collected near former Structure 36B and analyzed for lead, total chromium, and hexavalent chromium.

Results of the confirmation sampling conducted as part of the NTCRA indicated that the metals concentrations were below the removal action objective calculated for lead.

However, analytical results for soil samples collected on the south side of the excavation during previous sampling indicate the presence of lead at concentrations above the removal action objective. The soil containing these elevated lead concentrations was not removed due to the presence of hardscape cover in these areas.

The RI/FS for AOC 10 addressed the remaining lead concentrations in soil outside the removal area. Soil samples were collected from five borings at AOC 10; three soil samples were collected from each boring (0 to 2, 2 to 4, and 4 to 8 feet bgs). All soil samples were analyzed for lead.

A reasonable maximum depth to groundwater at AOC 10 was judged to be 9 feet. Lead is the only COPC (Table J8-1).

Two sets of data were compiled for AOC 10:

- 133 samples – a set including the area that was excavated in the past and the new sampling locations under the hardscape
- 15 samples – a set from an area under the hardscape that had concentrations close to or above the original removal action objective of 199 mg/kg (Table J8-1, Figure J-2)

The EPCs are 105 mg/kg for the sitewide data and 385 mg/kg for the area of higher impact (Table J8-2). The concentrations in the former are below the site-specific PRGs of 184 and 322 mg/kg with and without the homegrown produce pathway, respectively. The concentrations in the area of higher impact are above both site-specific PRGs.

J8.2 AOC 12 Lead Evaluation

AOC 12 is an approximately 0.86-acre area. The northern portion of AOC 12 consists of portions of EBS Parcels 105, 106, and 107 and was formerly occupied by one 200,000-gallon water tower (Structure 33). This area currently consists of grassy open space and paved areas that were historically used for vehicle parking and also contained sidewalks and landscaping.

The southern portion of AOC 12 is located in a portion of EBS Parcel 107 and consists of open space. A second water tower of unknown size was historically located in this area (Structure 61); however, no evidence of that structure currently exists.

There are water towers in both the northern and southern areas (Structures 33 and 61, respectively). The water tank (Structure 61) in the southern portion of AOC 12 was removed in January 1994 and the water tank (Structure 33) in the northern portion of AOC 12, including its concrete footings, was removed in December 2002 (Shaw 2003). Old railroad tracks run north-south through the middle of AOC 12.

A lead NTCRA was conducted by the Navy between November 2002 and July 2003 (Shaw 2003). During this NTCRA, soil was removed to 2 to 3 feet bgs around former Structure 33 in the northern portion of AOC 12 and to 1 to 2 feet bgs around former Structure 61 in the southern portion of AOC 12. Three smaller areas were also excavated adjacent to but outside of AOC 12 at EBS Parcel 105. Confirmation soil samples were

analyzed for metals; selected samples were also analyzed for VOCs, SVOCs, TPH, pesticides, and PCBs. Confirmation sampling indicated that most of the metals concentrations were below the removal action objective calculated for lead of 199 mg/kg except for lead concentrations in two confirmation samples collected in locations in the former Structure 61 excavation (Grid 6 Tower 61 and Grid 7 Tower 61). Soil with elevated lead concentrations was not removed due to the presence of hardscape cover in some areas.

The RI/FS sampling plan for AOC 12 addressed lead concentrations in soil outside the NTCRA areas. Soil samples were collected from 14 borings at AOC 12 with three soil samples from each boring (0 to 2, 2 to 4, and 4 to 8 feet bgs) for analysis for lead.

A reasonable maximum depth to groundwater at AOC 12 was judged to be 6 feet. Lead is the only COPC (Table J8-3).

Two sets of data were compiled for AOC 12:

- 226 samples – a set including the area that was excavated in the past and the new sampling locations under the hardscape
- 36 samples – a set from an area under the hardscape that had concentrations close to or above the original removal action objective of 199 mg/kg (Table J8-3, Figure J-2).

The EPCs are 77.5 mg/kg for the sitewide data and 267 mg/kg for the area of higher impact (Table J8-4). The concentrations in the former are below the site-specific PRGs of 184 and 322 mg/kg with and without the homegrown produce pathway, respectively. The concentrations in the area of higher impact are above site-specific PRGs.

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APPENDIX J – REMEDIAL INVESTIGATION HUMAN-HEALTH RISK ASSESSMENT

TABLES

Table J1-1
Selection of Exposure Pathways

Scenario Time Frame	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Soil	Vadose zone soil	Outdoor/Indoor	Residential	Child/Adult	Ingestion of soil	Quantitative	Potentially complete
						Dermal contact with soil	Quantitative	Potentially complete
						Inhalation of volatiles in indoor air	Quantitative	Potentially complete
						Inhalation of volatiles in outdoor air	Quantitative	Potentially complete
						Inhalation of particulates in outdoor air	Quantitative	Potentially complete
						Ingestion of homegrown produce	Quantitative	Potentially complete
Current/Future	Groundwater	Groundwater	Outdoor/Indoor	Residential	Child/Adult	Ingestion of groundwater	Quantitative	Regulatory requirement
						Inhalation of vapors while showering	Quantitative	Regulatory requirement
						Dermal contact while showering	Quantitative	Regulatory requirement
						Inhalation of volatiles in indoor air	Quantitative	Potentially complete

Table J1-2
Reasonable Maximum Exposure Values Used for Daily Intake

Equation Parameter		Units	Residential Child[a]		Residential Adult[b]		Intake Equation
Ingestion of Soil							
Concentration in soil	C_S	mg/kg	Chemical specific		Chemical specific		$(C_S \times CF \times IRS \times EF \times ED) / (BW \times AT)$
Conversion factor	CF	kg/mg	1.00E-06	U.S. EPA 2004a	1.00E-06	U.S. EPA 2004a	
Intake rate	IRS	mg/day	200	U.S. EPA 2004a	100	U.S. EPA 2004a	
Exposure frequency	EF	days/year	350	U.S. EPA 2004a	350	U.S. EPA 2004a	
Exposure duration	ED	years	6	U.S. EPA 2004a	24	U.S. EPA 2004a	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	8,760	U.S. EPA 2004a	
Dermal Contact with Soil							
Concentration in soil	C_S	mg/kg	Chemical specific		Chemical specific		$(C_S \times CF \times AF \times SA \times DAF \times EF \times ED) / (BW \times AT)$
Conversion factor	CF	kg/mg	1.00E-06	U.S. EPA 2004a	1.00E-06	U.S. EPA 2004a	
Adherence factor	AF	mg/cm²	0.2	U.S. EPA 2004a U.S. EPA 2004c	0.07	U.S. EPA 2004a U.S. EPA 2004c	
Exposed skin area	SA	cm²/day	2,800	U.S. EPA 2004a U.S. EPA 2004c	5,700	U.S. EPA 2004a U.S. EPA 2004c	
Dermal absorption factor	DAF	unitless	Chemical specific	DTSC 1994 U.S. EPA 2004a	Chemical specific	DTSC 1994 U.S. EPA 2004a	
Exposure frequency	EF	days/year	350	U.S. EPA 2004a	350	U.S. EPA 2004a	
Exposure duration	ED	years	6	U.S. EPA 2004a	24	U.S. EPA 2004a	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	8,760	U.S. EPA 2004a	
Ingestion of Homegrown Produce							
Concentration in soil	C_S	mg/kg	Chemical specific		Chemical specific		$(C_S \times UF \times IRS \times EF \times ED) / (BW \times AT)$
Uptake factor	UF	—	Chemical specific	See Table J1-5	Chemical specific	See Table J1-5	
Intake rate	IRS	kg/day	0.0174	U.S. EPA 1997	0.0812	U.S. EPA 1997	
Exposure frequency	EF	days/year	70	Site Specific	70	Site Specific	
Exposure duration	ED	years	6	U.S. EPA 2004a	24	U.S. EPA 2004a	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	8,760	U.S. EPA 2004a	

Table J1-2
Reasonable Maximum Exposure Values Used for Daily Intake

Equation Parameter		Units	Residential Child[a]		Residential Adult[b]		Intake Equation
Inhalation of Vapors in Indoor Air Originating from Soil and Groundwater							
Concentration in indoor air based on concentration in soil and groundwater	C_A	mg/m³	Chemical specific	U.S. EPA 2004b	Chemical specific	U.S. EPA 2004b	$(C_A \times IRA \times ET \times EF \times ED) / (BW \times AT)$
Intake rate	IRA	m³/hour	0.42	U.S. EPA 2004a	0.83	U.S. EPA 2004a	
Exposure time	ET	hours/day	24	U.S. EPA 2004a	24	U.S. EPA 2004a	
Exposure frequency	EF	days/year	350	U.S. EPA 2004a	350	U.S. EPA 2004a	
Exposure duration	ED	years	6	U.S. EPA 2004a	24	U.S. EPA 2004a	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	8,760	U.S. EPA 2004a	
Inhalation of Vapors in Outdoor Air Originating from Soil							
Concentration in soil	C_S	mg/kg	Chemical specific		Chemical specific		$(C_S \times IRA \times ET \times EF \times ED) / (VF \times BW \times AT)$
Intake rate	IRA	m³/hour	0.42	U.S. EPA 2004a	0.83	U.S. EPA 2004a	
Volatilization factor	VF	m³/kg	Chemical specific	U.S. EPA 2004a	Chemical specific	U.S. EPA 2004a	
Exposure time	ET	hours/day	24	U.S. EPA 2004a	24	U.S. EPA 2004a	
Exposure frequency	EF	days/year	350	U.S. EPA 2004a	350	U.S. EPA 2004a	
Exposure duration	ED	years	6	U.S. EPA 2004a	24	U.S. EPA 2004a	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	8,760	U.S. EPA 2004a	
Inhalation of Soil Particulates in Outdoor Air							
Concentration in soil	C_S	mg/kg	Chemical specific		Chemical specific		$(C_S \times IRA \times ET \times EF \times ED) / (PEF \times BW \times AT)$
Intake rate	IRA	m³/hour	0.42	U.S. EPA 2004a	0.83	U.S. EPA 2004a	
Particulate emission factor	PEF	m³/kg	1.316E+09	U.S. EPA 2004a	1.316E+09	U.S. EPA 2004a	
Exposure time	ET	hours/day	24	U.S. EPA 2004a	24	U.S. EPA 2004a	
Exposure frequency	EF	days/year	350	U.S. EPA 2004a	350	U.S. EPA 2004a	
Exposure duration	ED	years	6	U.S. EPA 2004a	24	U.S. EPA 2004a	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	8,760	U.S. EPA 2004a	

Table J1-2
Reasonable Maximum Exposure Values Used for Daily Intake

Equation Parameter		Units	Residential Child[a]		Residential Adult[b]		Intake Equation
Ingestion of Groundwater							
Concentration in Groundwater	C_{GW}	mg/L	Chemical specific		Chemical specific		$(C_{GW} \times IRW \times EF \times ED) / (BW \times AT)$
Intake rate	IRW	L/day	1	U.S. EPA 2004a	2	U.S. EPA 2004a	
Exposure frequency	EF	days/year	350	U.S. EPA 2004a	350	U.S. EPA 2004a	
Exposure duration	ED	years	6	U.S. EPA 2004a	24	U.S. EPA 2004a	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	8,760	U.S. EPA 2004a	
Inhalation of Groundwater Vapors while Showering							
Concentration in Groundwater	C_{GW}	mg/L	Chemical specific		Chemical specific		$(C_{GW} \times IRA \times VF \times ET \times EF \times ED) / (BW \times AT)$
Intake Rate	IRA	m^3/hour	0.42	U.S. EPA 2004a	0.83	U.S. EPA 2004a	
Volatilization Factor	VF	L/m^3	0.5	U.S. EPA 2004a	0.5	U.S. EPA 2004a	
Exposure time	ET	hours/day	1	U.S. EPA 2004c	0.58	U.S. EPA 2004c	
Exposure frequency	EF	days/year	350	U.S. EPA 2004a	350	U.S. EPA 2004a	
Exposure duration	ED	years	6	U.S. EPA 2004a	24	U.S. EPA 2004a	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	8,760	U.S. EPA 2004a	
Dermal Contact with Groundwater while Showering							
Concentration in Groundwater	C_{GW}	mg/cm^3	Chemical specific		Chemical specific		(DAevent x SA x EF x ED) / (BW x AT)
Absorbed dose per event per area of skin exposed	DA_{event}	mg/cm^2-even	Chemical specific	U.S. EPA 2004c	Chemical specific	U.S. EPA 2004c	Where for Organics:
Event duration	t_{event}	hours/event	1	U.S. EPA 2004c	0.58	U.S. EPA 2004c	If tevent > t*,
Time to reach steady state	t*	hours	Chemical specific	U.S. EPA 2004c	Chemical specific	U.S. EPA 2004c	$DA_{event} = FA \times K_p \times C_w \times \left[\frac{t_{event}}{1+B} + 2\tau\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$
Skin permeability constant for compounds in water	Kp	cm/hour	Chemical specific	U.S. EPA 2004c	Chemical specific	U.S. EPA 2004c	
Lag time per event	τ	hours/event	Chemical specific	U.S. EPA 2004c	Chemical specific	U.S. EPA 2004c	
Dimensionless ratio of the permeability of the stratum corneum relative to the permeability across the viable epidermis, = Kp*SQRT(molecular weight) / 2.6	B	cm/hour	Chemical specific	U.S. EPA 2004c	Chemical specific	U.S. EPA 2004c	
Fraction absorbed	FA	---	Chemical specific	U.S. EPA 2004c	Chemical specific	U.S. EPA 2004c	and
Exposed skin area	SA	cm^2/day	6,600	U.S. EPA 2004c	18,000	U.S. EPA 2004c	If tevent < t*,
Exposure frequency	EF	days/year	350	U.S. EPA 2004a	350	U.S. EPA 2004a	$DA_{event} = 2FA \times K_p \times C_w \times \sqrt{\frac{6\tau \times t_{event}}{\pi}}$
Exposure duration	ED	years	6	U.S. EPA 2004a	24	U.S. EPA 2004a	
Body weight	BW	kg	15	U.S. EPA 2004a	70	U.S. EPA 2004a	
Averaging time (cancer)	AT_C	days	25,550	U.S. EPA 2004a	25,550	U.S. EPA 2004a	Where for Metals: $DA_{event} = K_p \times C_w \times t_{event}$
Averaging time (noncancer)	AT_{NC}	days	2,190	U.S. EPA 2004a	8,760	U.S. EPA 2004a	

Table J1-2
Reasonable Maximum Exposure Values Used for Daily Intake

Notes:

[a] residential child age is 0 to 6 years

[b] residental carcinogenic exposure was assumed for a total of 30 years; 6 years as a child and 24 years as an adult; residential noncarcinogenic exposure was assumed for a total of 6 years as a child

Acronyms/Abbreviations:

cm/hour – centimeters per hour
cm^2/day – square centimeters per day
days/year – days per year
DTSC – (California Environmental Protection Agency) Department of Toxic Substances Control
hours/day – hours per day
hours/event – hours per event
kg – kilograms
kg/day – kilograms per day
kg/mg – kilograms per milligram
L/day – liters per day
L/m^3 – liters per cubic meter
m^3/hour – cubic meters per hour
m^3/kg – cubic meters per kilogram
mg/cm^2-event – milligrams per square centimeter per event
mg/cm^2 – milligrams per square centimeter
mg/cm^3 – milligrams per cubic centimeter
mg/day – milligrams per day
mg/kg – milligrams per kilogram
mg/L – milligrams per liter
mg/m^3 – milligrams per cubic meter
U.S. EPA – United States Environmental Protection Agency

References:

DTSC 1994. Preliminary Endangerment Assessment Guidance Manual. January.
U.S. EPA 1997. Exposure Factors Handbook. August.
U.S. EPA 2004a. Region 9 Preliminary Remediation Goals. October.
U.S. EPA 2004b. Software Implementation of Johnson and Ettinger Model. Version 3.0. February.
U.S. EPA 2004c. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005. July.

Table J1-3
Chemical-Specific Values Used to Evaluate the Dermal Contact With Soil Exposure Pathway

CAS Number	Chemical	ABSORPTION FACTORS FOR SOIL		
		DTSC	U.S. EPA	Most Conservative
Volatile Organic Compounds				
83-32-9	acenaphthene	0.15	—*	0.15
208-96-8	acenaphthylene	0.15	—	0.15
67-64-1	acetone	0.1	—	0.1
120-12-7	anthracene	0.15	—	0.15
71-43-2	benzene	0.1	—	0.1
191-24-2	benzo(g,h,i)perylene	0.15	—	0.15
78-93-3	2-butanone	0.1	—	0.1
135-98-8	sec-butylbenzene	0.1	—	0.1
75-15-0	carbon disulfide	0.1	—	0.1
108-90-7	chlorobenzene	0.1	—	0.1
67-66-3	chloroform	0.1	—	0.1
132-64-9	dibenzofuran	0.03	—	0.03
95-50-1	1,2-dichlorobenzene	0.1	—	0.1
75-35-4	1,1-dichloroethene	0.1	—	0.1
156-59-2	cis-1,2-dichloroethene	0.1	—	0.1
156-60-5	trans-1,2-dichloroethene	0.1	—	0.1
86-73-7	fluorene	0.15	—	0.15
98-82-8	isopropylbenzene	0.1	—	0.1
99-87-6	p-isopropyltoluene	0.1	—	0.1
1634-04-4	methyl tert-butyl ether	0.1	—	0.1
75-09-2	methylene chloride	0.1	—	0.1
91-57-6	2-methylnaphthalene	0.15	—	0.15
91-20-3	naphthalene	0.15	—	0.15
85-01-8	phenanthrene	0.15	—	0.15
103-65-1	n-propylbenzene	0.1	—	0.1
129-00-0	pyrene	0.15	—	0.15
127-18-4	tetrachloroethene	0.1	—	0.1
108-88-3	toluene	0.1	—	0.1
79-01-6	trichloroethene	0.1	—	0.1
108-67-8	1,3,5-trimethylbenzene	0.1	—	0.1
75-01-4c	vinyl chloride (child)	0.1	—	0.1
75-01-4a	vinyl chloride (adult)	0.1	—	0.1
7816-60-0	m-, p-xylene	0.1	0.1	0.1
Semivolatile Organic Compounds				
56-55-3	benz(a)anthracene	0.15	0.13	0.15
205-99-2	benzo(b)fluoranthene	0.15	0.13	0.15
207-08-9	benzo(k)fluoranthene	0.15	0.13	0.15
50-32-8	benzo(a)pyrene	0.15	0.13	0.15
117-81-7	bis(2-ethylhexyl)phthalate	0.1	0.1	0.1
75-25-2	bromoform	0.1	0.1	0.1
86-74-8	carbazole	0.1	0.1	0.1
218-01-9	chrysene	0.15	0.13	0.15
53-70-3	dibenz(a,h)anthracene	0.15	0.13	0.15
84-74-2	di-n-butyl phthalate	0.1	0.1	0.1
206-44-0	fluoranthene	0.15	0.13	0.15
193-39-5	indeno(1,2,3-cd)pyrene	0.15	0.13	0.15
87-86-5	pentachlorophenol	0.25	0.25	0.25
108-95-2	phenol	0.1	0.1	0.1

Table J1-3
Chemical-Specific Values Used to Evaluate the Dermal Contact With Soil Exposure Pathway

CAS Number	Chemical	ABSORPTION FACTORS FOR SOIL		
		DTSC	U.S. EPA	Most Conservative
Pesticides/Polychlorinated Biphenyls				
11097-69-1	Aroclor 1254	0.15	0.14	0.15
11096-82-5	Aroclor 1260	0.15	0.14	0.15
319-84-6	alpha-BHC	0.05	0.04	0.05
5103-71-9	alpha-chlordane	0.05	0.04	0.05
5566-34-7	gamma-chlordane	0.05	0.04	0.05
72-54-8	4,4'-DDD	0.05	0.03	0.05
72-55-9	4,4'-DDE	0.05	0.03	0.05
50-29-3	4,4'-DDT	0.05	0.03	0.05
60-57-1	dieldrin	0.05	0.1	0.1
33213-65-9	endosulfan II	0.05	0.1	0.1
76-44-8	heptachlor	0.05	0.1	0.1
1024-57-3	heptachlor epoxide	0.05	0.1	0.1
Metals				
7429-90-5	aluminum	0.01	—	0.01
7440-36-0	antimony	0.01	—	0.01
7440-38-2	arsenic	0.03	0.03	0.03
7440-39-3	barium	0.01	—	0.01
7440-41-7	beryllium	0.01	—	0.01
7440-43-9	cadmium	0.001	0.001	0.001
7440-47-3	chromium	0.01	—	0.01
18540-29-9	chromium, hexavalent	0	—	0
7440-48-4	cobalt	0.01	—	0.01
7440-50-8	copper	0.01	—	0.01
7439-89-6	iron	0.01	—	0.01
7439-92-1	lead	0.01	—	0.01
7439-96-5	manganese	0.01	—	0.01
7439-97-6	mercury	0.01	—	0.01
7439-98-7	molybdenum	0.01	—	0.01
7440-02-0	nickel	0.01	—	0.01
7782-49-2	selenium	0.01	—	0.01
7440-22-4	silver	0.01	—	0.01
7440-28-0	thallium	0.01	—	0.01
7440-62-2	vanadium	0.01	—	0.01
7440-66-6	zinc	0.01	—	0.01

Note:
* not considered for the dermal pathway

Acronyms/Abbreviations:
BHC – benzene hexachloride
CAS – Chemical Abstract Services
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
DTSC – (California Environmental Protection Agency) Department of Toxic Substances Control
U.S. EPA – United States Environmental Protection Agency

References:
DTSC 1994. Preliminary Endangerment Assessment Guidance Manual. January.
U.S. EPA 2004. Region 9 Preliminary Remediation Goals. October.

Table J1-4
Chemical-Specific Values Used to Evalute the
Dermal Contact With Groundwater Exposure Pathway

CAS Number	Chemical	MW	t hour/event	t* hour	Kp cm/hour
Volatile Organic Compounds					
83-32-9	acenaphthene	154.21	0.76	6	1.33E-01
208-96-8	acenaphthylene	152.20	0.74	6	1.41E-01
120-12-7	anthracene	178.24	1.1	5.6	2.25E-01
71-43-2	benzene	78.11	0.26	0.63	2.07E-02
191-24-2	benzo(g,h,i)perylene	276.34	4.2	20	2.00E+00
78-93-3	2-butanone	72.11	0.24	0.58	1.11E-03
98-06-6	tert-butylbenzene	134.22	0.58	4	2.40E-01
75-15-0	carbon disulfide	76.13	0.25	0.61	1.56E-02
95-50-1	1,2-dichlorobenzene	147.00	0.69	3.4	6.59E-02
541-73-1	1,3-dichlorobenzene	147.00	0.69	3.8	7.75E-02
75-34-3	1,1-dichloroethane	98.96	0.35	0.84	8.86E-03
107-06-2	1,2-dichloroethane	98.96	0.35	0.84	5.34E-03
156-59-2	cis-1,2-dichloroethene	96.94	0.34	0.82	1.49E-02
156-60-5	trans-1,2-dichloroethene	96.94	0.34	0.82	1.49E-02
100-41-4	ethylbenzene	106.17	0.39	1.3	7.39E-02
86-73-7	fluorene	166.22	0.9	5.6	1.71E-01
98-82-8	isopropylbenzene	120.20	0.47	3	1.40E-01
99-87-6	p-isopropyltoluene	134.22	0.58	4.2	2.36E-01
1634-04-4	methyl tert-butyl ether	88.15	0.3	0.72	2.57E-03
91-57-6	2-methylnaphthalene	142.20	0.64	4.9	1.42E-01
91-20-3	naphthalene	128.18	0.53	2.2	6.94E-02
85-01-8	phenanthrene	178.24	1.1	5.6	2.29E-01
129-00-0	pyrene	202.26	1.5	7.3	3.24E-01
127-18-4	tetrachloroethene	165.83	0.9	4.3	4.81E-02
108-88-3	toluene	92.14	0.32	0.77	4.53E-02
120-82-1	1,2,4-trichlorobenzene	181.45	1.1	9.5	1.07E-01
79-01-6	trichloroethene	131.39	0.55	1.3	1.57E-02
95-63-6	1,2,4-trimethylbenzene	120.20	0.47	2.9	1.33E-01
108-67-8	1,3,5-trimethylbenzene	120.20	0.47	2.3	9.44E-02
75-01-4c	vinyl chloride (child)	62.50	0.21	0.51	1.13E-02
75-01-4a	vinyl chloride (adult)	62.50	0.21	0.51	1.13E-02
7816-60-0	m,p-xylene	106.17	0.39	1.2	7.04E-02
95-47-6	o-xylene	106.17	0.39	1.2	7.04E-02
1330-20-7	total xylenes	106.17	0.39	1.2	7.04E-02
Semivolatile Organic Compounds					
56-55-3	benz(a)anthracene	228.30	2.2	10	9.48E-01
205-99-2	benzo(b)fluoranthene	252.32	3	14	6.99E-01
50-32-8	benzo(a)pyrene	252.32	3	14	1.24E+00
85-68-7	butyl benzyl phthalate	312.37	7	35	5.41E-02
218-01-9	chrysene	228.30	2.2	10	1.03E+00
123-91-1	1,4-dioxane	88.11	0.3	0.72	3.56E-04
206-44-0	fluoranthene	202.26	1.5	7.2	5.13E-01
193-39-5	indeno(1,2,3-cd)pyrene	276.34	4.2	20	2.23E+00
Pesticides/Polychlorinated Biphenyls					
12674-11-2	Aroclor-1016	257.55	3.3	15	5.00E-01
11096-82-5	Aroclor-1260	395.33	23	110	5.48E+00
319-84-6	alpha-BHC	290.83	5.2	34	2.79E-02
58-89-9	gamma-BHC (lindane)	290.83	5.2	34	2.79E-02

Table J1-4
Chemical-Specific Values Used to Evalute the
Dermal Contact With Groundwater Exposure Pathway

CAS Number	Chemical	MW	t hour/event	t* hour	Kp cm/hour
5103-71-9	alpha-chlordane	409.78	28	130	1.57E-01
5566-34-7	gamma-chlordane	409.78	28	130	5.63E-01
72-55-9	4,4'-DDE	318.03	7.6	36	9.16E-01
50-29-3	4,4'-DDT	354.49	13	60	1.06E+00
60-57-1	dieldrin	380.91	18	88	4.50E-02
959-98-8	endosulfan I	406.92	27	200	3.29E-03
33213-65-9	endosulfan II	406.92	27	200	3.29E-03
1031-07-8	endosulfan sulfate	422.92	33	210	1.99E-03
7421-93-4	endrin aldehyde	380.91	18	90	2.33E-02
76-44-8	heptachlor	373.32	17	78	2.16E-01
1024-57-3	heptachlor epoxide	389.32	21	100	2.76E-02
Metals					
7429-90-5	aluminum	30.01	NA	NA	2.14E-03
7440-38-2	arsenic	77.95	NA	NA	1.93E-03
7440-39-3	barium	137.33	NA	NA	4.03E-04
7440-41-7	beryllium	9.01	NA	NA	6.60E-04
7440-43-9	cadmium	112.41	NA	NA	3.50E-04
7440-47-3	chromium	52.00	NA	NA	1.33E-03
7440-48-4	cobalt	58.93	NA	NA	1.21E-03
7440-50-8	copper	63.55	NA	NA	3.07E-04
7439-89-6	iron	55.85	NA	NA	2.47E-04
7439-92-1	lead	207.20	NA	NA	3.42E-04
7439-96-5	manganese	54.94	NA	NA	1.28E-03
7439-97-6	mercury	200.59	NA	NA	3.14E-04
7439-98-7	molybdenum	95.94	NA	NA	7.20E-04
7440-02-0	nickel	58.69	NA	NA	3.29E-04
7782-49-2	selenium	80.98	NA	NA	9.03E-04
7440-22-4	silver	107.87	NA	NA	9.03E-04
7440-28-0	thallium	204.38	NA	NA	9.03E-04
7440-62-2	vanadium	50.94	NA	NA	1.35E-03
7440-66-6	zinc	67.41	NA	NA	3.42E-04

Source:
U.S. EPA Dermwin v1.42; downloaded from http://www.epa.gov/opptintr/exposure/docs/episuite.htm

Acronyms/Abbreviations:
CAS – Chemical Abstract Services
cm/hour – centimeters per hour
τ – lag time per event
t* – time to reach steady state
Kp – skin permeability constant for chemicals in water
MW – molecular weight
NA – not applicable
U.S. EPA – United States Environmental Protection Agency

Table J1-5
Uptake Factors Used to Evaluate the Ingestion of Homegrown Produce Exposure Pathway

$$\text{Uptake Factor (DTSC 1993, unitless)} = \frac{0.03 \times Kow^{0.77} + 0.82}{Koc \times foc}$$

where:

Kow = octonal/water partition coefficient (chemical-specific)
Koc = organic carbon partition coefficient (chemical-specific)
foc = fraction of organic carbon in upper two feet of soil (0.0018, site specific)

CAS Number	Chemical	Volatility[a]	Log Kow[b]	Kow	Koc[c]	Uptake Factor	Source
Volatile Organic Compounds							
83-32-9	acenaphthene	1	—[d]	—	—	—	Not applicable for volatile compounds
208-96-8	acenaphthylene	1	—	—	—	—	Not applicable for volatile compounds
67-64-1	acetone	1	—	—	—	—	Not applicable for volatile compounds
120-12-7	anthracene	1	—	—	—	—	Not applicable for volatile compounds
71-43-2	benzene	1	—	—	—	—	Not applicable for volatile compounds
191-24-2	benzo(g,h,i)perylene	1	—	—	—	—	Not applicable for volatile compounds
78-93-3	2-butanone	1	—	—	—	—	Not applicable for volatile compounds
135-98-8	sec-butylbenzene	1	—	—	—	—	Not applicable for volatile compounds
75-15-0	carbon disulfide	1	—	—	—	—	Not applicable for volatile compounds
108-90-7	chlorobenzene	1	—	—	—	—	Not applicable for volatile compounds
67-66-3	chloroform	1	—	—	—	—	Not applicable for volatile compounds
132-64-9	dibenzofuran	1	—	—	—	—	Not applicable for volatile compounds
95-50-1	1,2-dichlorobenzene	1	—	—	—	—	Not applicable for volatile compounds
75-35-4	1,1-dichloroethene	1	—	—	—	—	Not applicable for volatile compounds
156-59-2	cis-1,2-dichloroethene	1	—	—	—	—	Not applicable for volatile compounds
156-60-5	trans-1,2-dichloroethene	1	—	—	—	—	Not applicable for volatile compounds
86-73-7	fluorene	1	—	—	—	—	Not applicable for volatile compounds
98-82-8	isopropylbenzene	1	—	—	—	—	Not applicable for volatile compounds
99-87-6	p-isopropyltoluene	1	—	—	—	—	Not applicable for volatile compounds
1634-04-4	methyl tert-butyl ether	1	—	—	—	—	Not applicable for volatile compounds
75-09-2	methylene chloride	1	—	—	—	—	Not applicable for volatile compounds
91-57-6	2-methylnaphthalene	1	—	—	—	—	Not applicable for volatile compounds
91-20-3	naphthalene	1	—	—	—	—	Not applicable for volatile compounds
85-01-8	phenanthrene	1	—	—	—	—	Not applicable for volatile compounds
103-65-1	n-propylbenzene	1	—	—	—	—	Not applicable for volatile compounds
129-00-0	pyrene	1	—	—	—	—	Not applicable for volatile compounds
127-18-4	tetrachloroethene	1	—	—	—	—	Not applicable for volatile compounds
108-88-3	toluene	1	—	—	—	—	Not applicable for volatile compounds
79-01-6	trichloroethene	1	—	—	—	—	Not applicable for volatile compounds
108-67-8	1,3,5-trimethylbenzene	1	—	—	—	—	Not applicable for volatile compounds
75-01-4c	vinyl chloride (child)	1	—	—	—	—	Not applicable for volatile compounds

Table J1-5
Uptake Factors Used to Evaluate the Ingestion of Homegrown Produce Exposure Pathway

CAS Number	Chemical	Volatility[a]	Log Kow[b]	Kow	Koc[c]	Uptake Factor	Source
75-01-4a	vinyl chloride (adult)	1	—	—	—	—	Not applicable for volatile compounds
7816-60-0	m-, p-xylene	1	—	—	—	—	Not applicable for volatile compounds
Semivolatile Organic Compounds							
56-55-3	benz(a)anthracene	0	—	—	—	2.06E-03	Samsφe-Petersen et al. 2002 (B[a]P as a surrogate)
205-99-2	benzo(b)fluoranthene	0	—	—	—	2.06E-03	Samsφe-Petersen et al. 2002 (B[a]P as a surrogate)
207-08-9	benzo(k)fluoranthene	0	—	—	—	2.06E-03	Samsφe-Petersen et al. 2002 (B[a]P as a surrogate)
50-32-8	benzo(a)pyrene	0	—	—	—	2.06E-03	Samsφe-Petersen et al. 2002
117-81-7	bis(2-ethylhexyl)phthalate	0	7.60	3.98E+07	2.96E+07	4.01E-01	DTSC 1993
75-25-2	bromoform	0	2.40	2.51E+02	2.29E+02	7.12E+00	DTSC 1993
86-74-8	carbazole	0	3.72	5.25E+03	4.54E+03	2.79E+00	DTSC 1993
218-01-9	chrysene	0	—	—	—	2.06E-03	Samsφe-Petersen et al. 2002 (B[a]P as a surrogate)
53-70-3	dibenz(a,h)anthracene	0	—	—	—	2.06E-03	Samsφe-Petersen et al. 2002 (B[a]P as a surrogate)
84-74-2	di-n-butyl phthalate	0	4.50	3.16E+04	2.65E+04	1.85E+00	DTSC 1993
206-44-0	fluoranthene	0	—	—	—	4.79E-03	Samsφe-Petersen et al. 2002
193-39-5	indeno(1,2,3-cd)pyrene	0	—	—	—	2.94E-03	Samsφe-Petersen et al. 2002
87-86-5	pentachlorophenol	0	—	—	—	—	Ionizing chemicals not available
108-95-2	phenol	0	—	—	—	—	Ionizing chemicals not available
Pesticides/Polychlorinated Biphenyls							
11097-69-1	Aroclor 1254	0	6.79	6.17E+06	4.73E+06	5.96E-01	DTSC 1993
11096-82-5	Aroclor 1260	0	8.27	1.86E+08	1.35E+08	2.88E-01	DTSC 1993
319-84-6	alpha-BHC	0	4.14	1.38E+04	1.17E+04	2.23E+00	DTSC 1993
5103-71-9	alpha-chlordane	0	6.22	1.66E+06	1.30E+06	7.89E-01	DTSC 1993
5566-34-7	gamma-chlordane	0	7.00	1.00E+07	7.61E+06	5.38E-01	DTSC 1993
72-54-8	4,4'-DDD	0	6.02	1.05E+06	8.28E+05	8.70E-01	DTSC 1993
72-55-9	4,4'-DDE	0	6.51	3.24E+06	2.51E+06	6.84E-01	DTSC 1993
50-29-3	4,4'-DDT	0	6.91	8.13E+06	6.21E+06	5.62E-01	DTSC 1993
60-57-1	dieldrin	0	5.20	1.58E+05	1.29E+05	1.30E+00	DTSC 1993
33213-65-9	endosulfan II	0	3.83	6.76E+03	5.82E+03	2.62E+00	DTSC 1993
76-44-8	heptachlor	0	6.10	1.26E+06	9.92E+05	8.37E-01	DTSC 1993
1024-57-3	heptachlor epoxide	0	4.98	9.55E+04	7.86E+04	1.45E+00	DTSC 1993
Metals							
7429-90-5	aluminum	0	—	—	—	—	U.S. EPA 1996
7440-36-0	antimony	0	—	—	—	—	U.S. EPA 1996
7440-38-2	arsenic	0	—	—	—	1.14E-02	U.S. EPA 1996
7440-39-3	barium	0	—	—	—	—	U.S. EPA 1996
7440-41-7	beryllium	0	—	—	—	—	U.S. EPA 1996
7440-43-9	cadmium	0	—	—	—	1.44E-01	U.S. EPA 1996
7440-47-3	chromium	0	—	—	—	—	U.S. EPA 1996
18540-29-9	chromium, hexavalent	0	—	—	—	—	U.S. EPA 1996
7440-48-4	cobalt	0	—	—	—	—	U.S. EPA 1996
7440-50-8	copper	0	—	—	—	—	U.S. EPA 1996

Table J1-5
Uptake Factors Used to Evaluate the Ingestion of Homegrown Produce Exposure Pathway

CAS Number	Chemical	Volatility[a]	Log Kow[b]	Kow	Koc[c]	Uptake Factor	Source
7439-89-6	iron	0	—	—	—	—	U.S. EPA 1996
7439-92-1	lead	0	—	—	—	—	U.S. EPA 1996
7439-96-5	manganese	0	—	—	—	—	U.S. EPA 1996
7439-97-6	mercury	0	—	—	—	1.76E-02	U.S. EPA 1996
7439-98-7	molybdenum	0	—	—	—	—	U.S. EPA 1996
7440-02-0	nickel	0	—	—	—	1.86E-02	U.S. EPA 1996
7782-49-2	selenium	0	—	—	—	1.83E-02	U.S. EPA 1996
7440-22-4	silver	0	—	—	—	—	U.S. EPA 1996
7440-28-0	thallium	0	—	—	—	—	U.S. EPA 1996
7440-62-2	vanadium	0	—	—	—	—	U.S. EPA 1996
7440-66-6	zinc	0	—	—	—	7.43E-02	U.S. EPA 1996

Notes:

[a] 1=volatile, 0=nonvolatile

[b] Log Kow from U.S. EPA EPI SUITE V3.1, Dermwin Program V1.42, 2000 http://www.epa.gov/oppt/exposure/docs/episuitedl.htm

[c] Koc from the U.S.EPA 1996 formula: LogKoc = 0.00028 + (0.983 x logKow)

[d] not applicable

Acronyms/Abbreviations:

CAS – Chemical Abstract Services
B[a]P – benzo(a)pyrene
BHC – benzene hexachloride
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
DTSC – (California Environmental Protection Agency) Department of Toxic Substances Control
s – surrogate used
U.S. EPA – United States Environmental Protection Agency

References:

DTSC 1993. Parameter Values and Ranges for CalTOX, California Department of Toxic Substances Control. July.

Samsøe-Petersen, L., E.K. Larsen, P.B. Larsen, and P. Bruun. 2002. Uptake of trace elements and PAHs by fruit and vegetables from contaminated soils. *Environmental Science and Technology 36*(14). June 12.
The average value for each PAH was ca

U.S. EPA 1996. Soil Screening Guidance: Technical Background Document. May.
The average geometric mean value for each metal was calculated from the values provided on Table G-2 of Appendix G. Data are unavailable for other metals.

Table J1-6
Selection of Site-Specific Johnson and Ettinger Model Parameters

AOC	Sample ID	Test Chemical	Concentration in Soil (µg/kg)	Concentration in Indoor Air (µg/m³)	Cancer Risk	Concentration in Groundwater (µg/L)	Concentration in Indoor Air (µg/m³)	Cancer Risk
AOC 02	C077S026	Benzene	10.00	0.0283	8 E-07	10.00	0.055	2 E-06
AOC 02	C077S028	Benzene	10.00	0.0292	8 E-07	10.00	0.090	3 E-06
AOC 11	**C077S178**	**Benzene**	**10.00**	**0.0256**	**7 E-07**	**10.00**	**0.469**	**1 E-05**
AOC 11	C077S179	Benzene	10.00	0.0269	8 E-07	10.00	0.056	2 E-06
AOC 15	C077S265	Benzene	10.00	0.0129	4 E-07	10.00	0.004	1 E-07
AOC 15	C077S266	Benzene	10.00	0.0062	2 E-07	10.00	0.004	1 E-07
AOC 17	C077S281	Benzene	10.00	0.0280	8 E-07	10.00	0.226	7 E-06
AOC 17	C077S282	Benzene	10.00	0.0267	8 E-07	10.00	0.339	1 E-05
AOC 18	C077S308	Benzene	10.00	0.0270	8 E-07	10.00	0.349	1 E-05
AOC 18	C077S311	Benzene	10.00	0.0251	7 E-07	10.00	0.468	1 E-05
AOC 23	C077S395	Benzene	10.00	0.0267	8 E-07	10.00	0.250	7 E-06
AOC 23	C077S443	Benzene	10.00	0.0268	8 E-07	10.00	0.290	8 E-06

Acronyms/Abbreviations:
- AOC – area of concern
- µg/kg – micrograms per kilogram
- µg/L – micrograms per liger
- µg/m³ – micrograms per cubic meter

Table J1-7
Toxicity Values[a]

CAS Number	Chemical	Cancer Class	U.S. EPA				Cal/EPA				U.S. EPA			
			CSFo $(mg/kg\text{-}day)^{-1}$		CSFi $(mg/kg\text{-}day)^{-1}$		CSFo $(mg/kg\text{-}day)^{-1}$		CSFi $(mg/kg\text{-}day)^{-1}$		RfDo (mg/kg-day)		RfDi (mg/kg-day)	
Volatile Organic Compounds														
83-32-9	acenaphthene	NA	—		—		—		—		6.00E-02	I	6.00E-02	R
208-96-8	acenaphthylene	D	—		—		—		—		6.00E-02	S	6.00E-02	S
67-64-1	acetone	NP	—		—		—		—		9.00E-01	I	9.00E-01	R
120-12-7	anthracene	D	—		—		—		—		3.00E-01	I	3.00E-01	R
71-43-2	benzene	A	5.50E-02	I	2.73E-02	I	1.00E-01	C	1.00E-01	C	4.00E-03	I	8.57E-03	I
191-24-2	benzo(g,h,i)perylene	D	—		—		—		—		3.00E-02	S	3.00E-02	S
78-93-3	2-butanone	NP	—		—		—		—		6.00E-01	I	1.43E+00	I
135-98-8	sec-butylbenzene	Not in IRIS	—		—		—		—		4.00E-02	N	4.00E-02	R
98-06-6	tert-butylbenzene	Not in IRIS	—		—		—		—		4.00E-02	N	4.00E-02	R
75-15-0	carbon disulfide	NA	—		—		—		—		1.00E-01	I	2.00E-01	I
108-90-7	chlorobenzene	D	—		—		—		—		2.00E-02	I	1.70E-02	N
67-66-3	chloroform	B2	—		8.05E-02	I	3.10E-02	C	1.90E-02	C	1.00E-02	I	1.40E-02	N
132-64-9	dibenzofuran	D	—		—		—		—		2.00E-03	N	2.00E-03	R
95-50-1	1,2-dichlorobenzene	D	—		—		—		—		9.00E-02	I	5.70E-02	H
541-73-1	1,3-dichlorobenzene	D	—		—		—		—		3.00E-02	N	3.00E-02	R
75-34-3	1,1-dichloroethane	C	—		—		5.70E-03	C	5.70E-03	C	1.00E-01	H	1.40E-01	H
107-06-2	1,2-dichloroethane	B2	9.10E-02	I	9.10E-02	I	4.70E-02	C	7.20E-02	C	2.00E-02	N	1.40E-03	N
75-35-4	1,1-dichloroethene	C	—		—		—		—		5.00E-02	I	5.71E-02	I
156-59-2	cis-1,2-dichloroethene	D	—		—		—		—		1.00E-02	P	1.00E-02	R
156-60-5	trans-1,2-dichloroethene	NA	—		—		—		—		2.00E-02	I	2.00E-02	R
100-41-4	ethylbenzene	D	—		—		—		—		1.00E-01	I	2.86E-01	I
86-73-7	fluorene	D	—		—		—		—		4.00E-02	I	4.00E-02	R
98-82-8	isopropylbenzene	D	—		—		—		—		1.00E-01	I	1.14E-01	I
99-87-6	p-isopropyltoluene	D	—		—		—		—		1.00E-01	S	1.14E-01	S
1634-04-4	methyl tert-butyl ether	NA	1.80E-03	C	9.10E-04	C	1.80E-03	C	9.10E-04	C	8.57E-01	R	8.57E-01	I
75-09-2	methylene chloride	B2	7.50E-03	I	1.65E-03	I	1.40E-02	C	3.50E-03	C	6.00E-02	I	8.60E-01	H
91-57-6	2-methylnaphthalene	NP	—		—		—		—		4.00E-03	I	8.57E-04	S
91-20-3	naphthalene	C	—		—		1.20E-01	C	1.20E-01	C	2.00E-02	I	8.57E-04	I
85-01-8	phenanthrene	D	—		—		—		—		3.00E-01	S	3.00E-01	S
103-65-1	n-propylbenzene	Not in IRIS	—		—		—		—		4.00E-02	N	4.00E-02	R
129-00-0	pyrene	D	—		—		—		—		3.00E-02	I	3.00E-02	R
127-18-4	tetrachloroethene	NA	5.40E-01	C	2.10E-02	C	5.40E-01	C	2.10E-02	C	1.00E-02	I	1.00E-02	C

Table J1-7
Toxicity Values[a]

CAS Number	Chemical	Cancer Class	U.S. EPA CSFo (mg/kg-day)$^{-1}$		U.S. EPA CSFi (mg/kg-day)$^{-1}$		Cal/EPA CSFo (mg/kg-day)$^{-1}$		Cal/EPA CSFi (mg/kg-day)$^{-1}$		U.S. EPA RfDo (mg/kg-day)		U.S. EPA RfDi (mg/kg-day)	
108-88-3	toluene	D	—		—		—		—		8.00E-02	I	1.43E+00	I
120-82-1	1,2,4-trichlorobenzene	D	—		—		—		—		1.00E-02	I	1.00E-03	P
79-01-6	trichloroethene	NA	4.00E-01	N	4.00E-01	N	1.30E-02	C	7.00E-03	C	3.00E-04	N	1.00E-02	N
95-63-6	1,2,4-trimethylbenzene	Not in IRIS	—		—		—		—		5.00E-02	P	1.70E-03	P
108-67-8	1,3,5-trimethylbenzene	Not in IRIS	—		—		—		—		5.00E-02	P	1.70E-03	P
75-01-4c	vinyl chloride (child)	A	1.50E+00	I	3.08E-02	I	2.70E-01	C	2.70E-01	C	3.00E-03	I	2.86E-02	I
75-01-4a	vinyl chloride (adult)	A	7.20E-01	I	1.54E-02	I	2.70E-01	C	2.70E-01	C	3.00E-03	I	2.86E-02	I
7816-60-0	m,p-xylene	NP	—		—		—		—		2.00E-01	S	2.86E-02	S
95-47-6	o-xylene	NP	—		—		—		—		2.00E-01	S	2.86E-02	S
1330-20-7	total xylenes	NP	—		—		—		—		2.00E-01	S	2.86E-02	S
Semivolatile Organic Compounds														
56-55-3	benz(a)anthracene	B2	7.30E-01	N	7.30E-01	R	1.20E+00	C	3.90E-01	C	3.00E-01	S	3.00E-01	S
205-99-2	benzo(b)fluoranthene	B2	7.30E-01	N	7.30E-01	R	1.20E+00	C	3.90E-01	C	4.00E-02	S	4.00E-02	S
207-08-9	benzo(k)fluoranthene	B2	7.30E-02	N	7.30E-02	R	1.20E+00	C	3.90E-01	C	4.00E-02	S	4.00E-02	S
50-32-8	benzo(a)pyrene	B2	7.30E+00	I	7.30E+00	R	1.20E+01	C	3.90E+00	C	3.00E-02	S	3.00E-02	S
117-81-7	bis(2-ethylhexyl)phthalate	B2	1.40E-02	I	1.40E-02	R	3.00E-03	C	8.40E-03	C	2.00E-02	I	2.00E-02	R
75-25-2	bromoform	B2	7.90E-03	I	3.85E-03	I	—		—		2.00E-02	I	2.00E-02	R
85-68-7	butyl benzyl phthalate	C	—		—		—		—		2.00E-01	I	2.00E-01	R
86-74-8	carbazole	Not in IRIS	2.00E-02	H	2.00E-02	R	—		—		2.50E-02	S	2.50E-02	S
218-01-9	chrysene	B2	7.30E-03	N	7.30E-03	R	1.20E-01	C	3.90E-02	C	3.00E-01	S	3.00E-01	S
53-70-3	dibenz(a,h)anthracene	B2	7.30E+00	N	7.30E+00	R	4.10E+00	C	4.10E+00	C	3.00E-01	S	3.00E-01	S
84-74-2	di-n-butyl phthalate	D	—		—		—		—		1.00E-01	I	1.00E-01	R
123-91-1	1,4-dioxane	B2	1.10E-02	I	1.10E-02	R	2.70E-02	C	2.70E-02	C	—		—	
206-44-0	fluoranthene	D	—		—		—		—		4.00E-02	I	4.00E-02	R
193-39-5	indeno(1,2,3-cd)pyrene	B2	7.30E-01	N	7.30E-01	R	1.20E+00	C	3.90E-01	C	4.00E-02	S	4.00E-02	S
87-86-5	pentachlorophenol	B2	1.20E-01	I	1.20E-01	R	8.10E-02	C	1.80E-02	C	3.00E-02	I	3.00E-02	R
108-95-2	phenol	D	—		—		—		—		3.00E-01	I	3.00E-01	R
Pesticides/Polychlorinated Biphenyls														
12674-11-2	Aroclor 1016	B2	7.00E-02	I	7.00E-02	I	5.00E+00	C	2.00E+00	C	7.00E-05	I	7.00E-05	R
11097-69-1	Aroclor 1254	B2	2.00E+00	I	2.00E+00	I	5.00E+00	C	2.00E+00	C	2.00E-05	I	2.00E-05	R
11096-82-5	Aroclor 1260	B2	2.00E+00	I	2.00E+00	I	5.00E+00	C	2.00E+00	C	2.00E-05	I	2.00E-05	R
319-84-6	alpha-BHC	B2	6.30E+00	I	6.30E+00	I	2.70E+00	C	2.70E+00	C	5.00E-04	N	5.00E-04	R
58-89-9	gamma-BHC (lindane)	NA	1.30E+00	H	1.30E+00	R	1.10E+00	C	1.10E+00	C	3.00E-04	I	3.00E-04	R

Table J1-7
Toxicity Values[a]

CAS Number	Chemical	Cancer Class	U.S. EPA				Cal/EPA				U.S. EPA			
			CSFo (mg/kg-day)$^{-1}$		CSFi (mg/kg-day)$^{-1}$		CSFo (mg/kg-day)$^{-1}$		CSFi (mg/kg-day)$^{-1}$		RfDo (mg/kg-day)		RfDi (mg/kg-day)	
5103-71-9	alpha-chlordane	Not in IRIS	3.50E-01	S	3.50E-01	S	1.30E+00	S	1.20E+00	S	5.00E-04	S	2.00E-04	S
5566-34-7	gamma-chlordane	Not in IRIS	3.50E-01	S	3.50E-01	S	1.30E+00	S	1.20E+00	S	5.00E-04	S	2.00E-04	S
72-54-8	4,4'-DDD	B2	2.40E-01	I	2.40E-01	R	2.40E-01	C	2.40E-01	C	5.00E-04	S	5.00E-04	S
72-55-9	4,4'-DDE	B2	3.40E-01	I	3.40E-01	R	3.40E-01	C	3.40E-01	C	5.00E-04	S	5.00E-04	S
50-29-3	4,4'-DDT	B2	3.40E-01	I	3.40E-01	I	3.40E-01	C	3.40E-01	C	5.00E-04	I	5.00E-04	R
60-57-1	dieldrin	B2	1.60E+01	I	1.60E+01	I	1.60E+01	C	1.60E+01	C	5.00E-05	I	5.00E-05	R
959-98-8	endosulfan I	Not in IRIS	—		—		—		—		6.00E-03	S	6.00E-03	S
33213-65-9	endosulfan II	Not in IRIS	—		—		—		—		6.00E-03	S	6.00E-03	S
1031-07-8	endosulfan sulfate	Not in IRIS	—		—		—		—		6.00E-03	S	6.00E-03	S
7421-93-4	endrin aldehyde	Not in IRIS	—		—		—		—		3.00E-04	S	3.00E-04	S
76-44-8	heptachlor	B2	4.50E+00	I	4.60E+00	I	4.10E+00	C	4.10E+00	C	5.00E-04	I	5.00E-04	R
1024-57-3	heptachlor epoxide	B2	9.10E+00	I	9.10E+00	I	5.50E+00	C	5.50E+00	C	1.30E-05	I	1.30E-05	R
Metals														
7429-90-5	aluminum	Not in IRIS	—		—		—		—		1.00E+00	P	1.40E-03	P
7440-36-0	antimony	NA	—		—		—		—		4.00E-04	I	—	
7440-38-2	arsenic	A	1.50E+00	I	1.51E+01	I	9.45E+00	C	1.20E+01	C	3.00E-04	I	—	
7440-39-3	barium	D	—		—		—		—		2.00E-01	I	1.40E-04	H
7440-41-7	beryllium	B1	—		8.40E+00	I	—		8.40E+00	C	2.00E-03	I	5.71E-06	I
7440-43-9	cadmium	B1	—		6.30E+00	I	3.80E-01	C	1.50E+01	C	5.00E-04	I	—	
7440-47-3	chromium[b]	A	—		4.20E+01	I	—		7.40E+01	C	3.00E-03	S	2.29E-06	S
18540-29-9	hexavalent chromium	A	—		2.90E+02	I	—		5.10E+02	C	3.00E-03	I	2.29E-06	I
7440-48-4	cobalt	Not in IRIS	—		9.80E+00	P	—		—		2.00E-02	P	5.70E-06	P
7440-50-8	copper	D	—		—		—		—		4.00E-02	H	—	
7439-89-6	iron	Not in IRIS	—		—		—		—		3.00E-01	N	—	
7439-92-1	lead	B2	—		—		—		—		—		—	
7439-96-5	manganese[c]	D	—		—		—		—		2.40E-02	I	1.43E-05	I
7439-97-6	mercury	C	—		—		—		—		3.00E-04	I	—	
7439-98-7	molybdenum	NA	—		—		—		—		5.00E-03	I	—	
7440-02-0	nickel	A	—		8.40E-01	I	—		9.10E-01	C	2.00E-02	I	—	
7782-49-2	selenium	D	—		—		—		—		5.00E-03	I	—	
7440-22-4	silver	D	—		—		—		—		5.00E-03	I	—	
7440-28-0	thallium	D	—		—		—		—		6.60E-05	S	—	

Table J1-7
Toxicity Values[a]

CAS Number	Chemical	Cancer Class	U.S. EPA				Cal/EPA				U.S. EPA			
			CSFo $(mg/kg\text{-}day)^{-1}$		CSFi $(mg/kg\text{-}day)^{-1}$		CSFo $(mg/kg\text{-}day)^{-1}$		CSFi $(mg/kg\text{-}day)^{-1}$		RfDo (mg/kg-day)		RfDi (mg/kg-day)	
7440-62-2	vanadium	Not in IRIS	—		—		—		—		1.00E-03	N	—	
7440-66-6	zinc	D	—		—		—		—		3.00E-01	I	—	

Note:

[a] a dash indicates that a toxicity value is not available

[b] the Cal/EPA inhalation slope factor for total chromium was calculated per U.S. EPA guidance

[c] IRIS values modified per U.S. EPA guidance

Acronyms/Abbreviations:

BHC – benzene hexachloride
Cal/EPA – California Environmental Protection Agency
CAS – chemical abstract services number
CSFi – inhalation cancer slope factor
CSFo – oral cancer slope factor
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
HEAST – Health Effects Assessment Summary Table
IRIS – Integrated Risk Information System
$(mg/kg\text{-}day)^{-1}$ – kilogram-day per milligrams
mg/kg-day – milligrams per kilogram-day
NCEA – National Center for Environmental Assessment
PPRTV – Provisional Peer Reviewed Toxicity Values
RfDi – inhalation reference dose
RfDo – oral reference dose
U.S. EPA – United States Environmental Protection Agency

Reference:

C – California website source, http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H – HEAST as listed in U.S. EPA 2004. Region 9 Preliminary Remediation Goals. October.
I – IRIS, http://www.epa.gov/iris/subst/index.html
N – NCEA as listed in U.S. EPA 2004. Region 9 Preliminary Remediation Goals. October.
P – PPRTV as listed in U.S. EPA 2004. Region 9 Preliminary Remediation Goals. October.
R – route-to-route extrapolation as listed in U.S. EPA 2004. Region 9 Preliminary Remediation Goals. October.
S – values based on a surrogate chemical (see Table I5-2)

Cancer class:

A – human carcinogen
B1 – probable human carcinogen with limited human data
B2 – probable human carcinogen with sufficient evidence in animals and inadequate or no evidence in humans
C – possible human carcinogen
D – not classifiable as to human carcinogenicity
NA – not assessed
NP – not applicable (not assessed using the 1986 U.S. EPA cancer guidelines)

Table J1-8
Surrogate Chemicals for COPCs Without Toxicity Criteria

COPC	CSF Surrogate	CSF Surrogate Basis	RfD Surrogate	RfD Surrogate Basis
Volatile Organic Compounds				
acenaphthylene	NA	NA	acenaphthene	Chemical similarity
benzo(g,h,i)perylene	NA	NA	pyrene	Chemical similarity
p-isopropyltoluene	NA	NA	cumene (isopropylbenzene)	Chemical similarity
2-methylnaphathalene	NA	NA	naphthalene (inhalation only)	Chemical similarity
phenanthrene	NA	NA	anthracene	Chemical similarity
m-, p-xylene	NA	NA	xylenes	Chemical similarity
o-xylene	NA	NA	xylenes	Chemical similarity
Semivolatile Organic Compounds				
benz(a)anthracene	NA	NA	anthracene	Chemical similarity
benzo(b)fluoranthene	NA	NA	fluoranthene	Chemical similarity
benzo(k)fluoranthene	NA	NA	fluoranthene	Chemical similarity
benzo(a)pyrene	NA	NA	pyrene	Chemical similarity
carbazole	NA	NA	diphenylamine	Chemical similarity
chrysene	NA	NA	anthracene	Chemical similarity
dibenz(a,h)anthracene	NA	NA	anthracene	Chemical similarity
indeno(1,2,3-cd)pyrene	NA	NA	fluoranthene	Chemical similarity
Pesticides/Polycyclic Aromatic Hydrocarbons				
alpha-chlordane	NA	NA	chlordane (technical)	Chemical similarity
gamma-chlordane	NA	NA	chlordane (technical)	Chemical similarity
4,4'-DDD	NA	NA	4,4'-DDT	Chemical similarity
4,4'-DDE	NA	NA	4,4'-DDT	Chemical similarity
endosulfan I	NA	NA	endosulfan	Chemical similarity
endosulfan II	NA	NA	endosulfan	Chemical similarity
endosulfan sulfate	NA	NA	endosulfan	Chemical similarity
endrin aldehyde	NA	NA	endrin	Chemical similarity
Metals				
chromium	NA	NA	hexavalent chromium	Chemical similarity
thallium	NA	NA	thallium sulfate	Chemical similarity

Acronyms/Abbreviations:

COPC – chemical of potential concern
CSF – cancer slope factor
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
NA – not applicable
RfD – reference dose

Table J2-1
Tier 1 Evaluation
AOC 2

Parameter Code	Analyte Name	Frequency of Detection	Minimum Result	Maximum Result	Location of Maximum	Units	RISK GUIDELINE Value	RISK GUIDELINE Source	RISK GUIDELINE End Point	Q95 Background	Background Evaluation	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND[a] Hazard Quotient	WITHOUT BACKGROUND[a] Cancer Risk
Soil															
METALS	aluminum	14/14	3,660	13,000	C077S031	mg/kg	76,142	PRG	nc	13,960	below	0.2	—	—	—
METALS	arsenic	12/14	1.4	8.7	C077S026	mg/kg	0.062	PRG	ca	9.1	below	—	1E-04	—	—
METALS	barium	14/14	12.5	84	C077S025	mg/kg	5,200	CHHSL	nc	93.7	below	0.02	—	—	—
METALS	beryllium	12/17	0.11	0.27	C077S022	mg/kg	150	CHHSL	nc	1.3	below	0.002	—	—	—
METALS	cadmium	6/17	0.05	0.13	C077S022	mg/kg	2	CHHSL	nc	1.7	below	0.08	—	—	—
METALS	chromium	14/17	22.1	46	C077S031	mg/kg	211	PRG	ca	54.8	below	—	2E-07	—	—
METALS	cobalt	14/14	3.4	259	C077S024	mg/kg	660	CHHSL	ca	14.3	above	—	4E-07	—	4E-07
METALS	copper	15/17	4.3	29	061S-005M	mg/kg	3,000	CHHSL	nc	39.1	below	0.01	—	—	—
METALS	iron	14/14	7,720	20,900	C077S031	mg/kg	23,463	PRG	nc	22,280	below	0.9	—	—	—
METALS	lead[b]	14/17	3.1	38	061S-004M	mg/kg	150	PRG	nc	37.7	above	0.3	—	—	—
METALS	manganese	14/14	90.9	375	C077S022	mg/kg	1,762	PRG	nc	383	below	0.2	—	—	—
METALS	mercury	1/17	0.18	0.18	C077S021	mg/kg	18	CHHSL	nc	0.5	below	0.01	—	—	—
METALS	nickel	17/17	20.3	72	061S-004M	mg/kg	1,564	PRG	nc	55.7	above	0.05	—	0.05	—
METALS	thallium	2/14	2.4	2.6	061-0002	mg/kg	5	CHHSL	nc	0.5	above	0.5	—	0.5	—
METALS	vanadium	14/14	15.3	42.4	C077S031	mg/kg	78	PRG	nc	47.3	below	0.5	—	—	—
METALS	zinc	17/17	16.9	76	061S-005M	mg/kg	23,000	CHHSL	nc	67.5	above	0.003	—	0.003	—
PEST/PCB	4,4'-DDD	1/15	1.8	1.8	C077S023	µg/kg	2,300	CHHSL	ca	—	—	—	8E-10	—	8E-10
PEST/PCB	4,4'-DDE	2/15	0.97	6.2	C077S021	µg/kg	1,600	CHHSL	ca	—	—	—	4E-09	—	4E-09
PEST/PCB	alpha-chlordane	1/15	3.2	3.2	C077S021	µg/kg	430	CHHSL	ca	—	—	—	7E-09	—	7E-09
PEST/PCB	Aroclor-1260	4/17	41	670	C077S031	µg/kg	89	CHHSL	ca	—	—	—	8E-06	—	8E-06
PEST/PCB	dieldrin	1/15	26	26	C077S029	µg/kg	30	PRG	ca	—	—	—	9E-07	—	9E-07
PEST/PCB	endrin aldehyde	1/15	2.8	2.8	C077S028	µg/kg	18,331	PRG	nc	—	—	0.0002	—	0.0002	—
PEST/PCB	gamma-chlordane	1/15	3.9	3.9	C077S021	µg/kg	430	CHHSL	ca	—	—	—	9E-09	—	9E-09
SVOC	2,4-dinitrotoluene	1/17	42	42	061S-004	µg/kg	122,206	PRG	nc	—	—	0.0003	—	0.0003	—
SVOC	2-chlorophenol	1/17	52	52	061S-004	µg/kg	63,398	PRG	nc	—	—	0.0008	—	0.0008	—
SVOC	4-chloro-3-methylphenol	1/17	68	68	061S-004	µg/kg	3,055,155	PRG	nc	—	—	0.00002	—	0.00002	—
SVOC	4-nitrophenol	1/17	120	120	061S-004	µg/kg	122,206	PRG	nc	—	—	0.001	—	0.001	—
SVOC	bis(2-ethylhexyl)phthalate	3/17	42	330	C077S024	µg/kg	34,741	PRG	ca	—	—	—	9E-09	—	9E-09
SVOC	diethyl phthalate	1/17	27	27	061S-004	µg/kg	48,882,478	PRG	nc	—	—	0.0000006	—	0.0000006	—
SVOC	di-n-butyl phthalate	6/17	55	130	C077S025	µg/kg	6,110,310	PRG	nc	—	—	0.00002	—	0.00002	—
SVOC	n-nitroso-di-n-propylamine	1/17	46	46	061S-004	µg/kg	69	PRG	ca	—	—	—	7E-07	—	7E-07
SVOC	pentachlorophenol	1/17	75	75	061S-004	µg/kg	2,979	PRG	ca	—	—	—	3E-08	—	3E-08
SVOC	1,2,4-trichlorobenzene	1/5	25	25	061S-004	µg/kg	380	ESL	nc	—	—	0.07	—	0.07	—
VOC	2-butanone	8/12	1.2	5	C077S027	µg/kg	490,000	ESL	nc	—	—	0.00001	—	0.00001	—
VOC	acetone	3/12	5.5	42	C077S027	µg/kg	1,400,000	ESL	nc	—	—	0.00003	—	0.00003	—
VOC	carbon disulfide	10/12	1.6	11	C077S022	µg/kg	355,340	PRG	nc	—	—	0.00003	—	0.00003	—
											Soil Total	**3**	**2E-04**	**0.6**	**9E-06**
Groundwater															
METALS	arsenic	2/2	15.9	16.3	C077G011	µg/L	0.0071	PRG	ca	20.7	below	—	2E-03	—	—
METALS	barium	2/2	137	261	C077G011	µg/L	2,555	PRG	nc	570	below	0.1	—	—	—
METALS	beryllium	1/2	0.26	0.26	C077G013	µg/L	73	PRG	nc	2.5	below	0.004	—	—	—
METALS	cadmium	1/2	1.6	1.6	C077G011	µg/L	18	PRG	nc	NA	—	0.09	—	0.09	—
METALS	chromium	2/2	3.5	5.4	C077G013	µg/L	109	PRG	ca	12.5	below	—	5E-08	—	—
METALS	iron	2/2	462	782	C077G011	µg/L	10,950	PRG	nc	6,586	below	0.07	—	—	—
METALS	manganese	2/2	1,280	2,950	C077G011	µg/L	876	PRG	nc	1741	above	3	—	3	—

Table J2-1
Tier 1 Evaluation
AOC 2

Parameter Code	Analyte Name	Frequency of Detection	Minimum Result	Maximum Result	Location of Maximum	Units	RISK GUIDELINE Value	RISK GUIDELINE Source	RISK GUIDELINE End Point	Q95 Background	Background Evaluation	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND[a] Hazard Quotient	WITHOUT BACKGROUND[a] Cancer Risk
METALS	mercury	3/5	0.00125	0.00173	C077G013	µg/L	11	PRG	nc	NA	—	0.0002	—	0.0002	—
METALS	selenium	2/2	17.8	19.1	C077G011	µg/L	182	PRG	nc	8.6	above	0.1	—	0.1	—
METALS	vanadium	1/2	3.7	3.7	C077G013	µg/L	36	PRG	nc	26.3	below	0.1	—	—	—
SVOC	pyrene	1/3	0.29	0.29	C077G011	µg/L	140	ESL	nc	—	—	0.002	—	0.002	—
VOC	cis-1,2-dichloroethene	1/2	0.17	0.17	C077G011	µg/L	61	PRG	nc	—	—	0.003	—	0.003	—
VOC	methyl tert-butyl ether	1/2	0.24	0.24	C077G011	µg/L	6	PRG	ca	—	—	—	4E-08	—	4E-08
											Groundwater Total	**4**	**2E-03**	**4**	**4E-08**
											Total	**7**	**2E-03**	**4**	**1E-05**

Notes:
[a] the cancer risk and noncancer hazards were calculated without metals with concentrations below background concentrations
[b] the noncancer value for lead is not additive with noncancer values for other chemicals; however, the total risk does include the value for lead

Acronyms/Abbreviations:
AOC – area of concern
ca – PRG with a cancer endpoint
Cal/EPA – California Environmental Protection Agency
CHHSL – California Human Health Screening Level
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
ESL – environmental screening level
µg/kg – micrograms per kilogram
µg/L – micrograms per liter
mg/kg – milligrams per kilogram
NA – not available
nc – PRG with a noncancer endpoint
PEST/PCB – pesticide/polychlorinated biphenyl
PRG – preliminary remediation goal
Q95 – 95th quantile in Alameda Point pink background data set (TtEMI 2004)
SVOC – semivolatile organic compound
U.S. EPA – United States Environmental Protection Agency
VOC – *volatile organic compound*

Sources:
CHHSL – residential human health screening level for soil; Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties, Cal/EPA, January 2005
ESL – residential soil and groundwater screening levels for evaluation of potential vapor intrusion concerns; Screening for Environmental Concerns at Sites With Contaminated Soil and Groundwater, San Francisco Regional Water Quality Control Board, February 2005
PRG – residential soil and tap water preliminary remediation goals, U.S. EPA, October 2004

Table J2-2
Tier 1 Evaluation
AOC 4

Parameter Code	Analyte Name	Frequency of Detection	Minimum Result	Maximum Result	Location of Maximum	Units	RISK GUIDELINE Value	RISK GUIDELINE Source	RISK GUIDELINE End Point	Q95 Background	Background Evaluation	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND[a] Hazard Quotient	WITHOUT BACKGROUND[a] Cancer Risk
Soil															
METALS	aluminum	4/4	6,180	19,000	M-BG1-003	mg/kg	76,142	PRG	nc	13,960	above	0.2	—	0.2	—
METALS	arsenic	11/11	1.48	5.4	004-WHA-6112	mg/kg	0.062	PRG	ca	9.1	below	—	9E-05	—	—
METALS	barium	4/4	33.9	54.5	M-BG1-000	mg/kg	5,200	CHHSL	nc	93.7	below	0.01	—	—	—
METALS	beryllium	2/4	0.591	0.792	M-BG1-002	mg/kg	150	CHHSL	nc	1.3	below	0.01	—	—	—
METALS	chromium	4/4	26.7	66.7	M-BG1-003	mg/kg	211	PRG	ca	54.8	above	—	3E-07	—	3E-07
METALS	cobalt	3/4	5.81	9.62	M-BG1-003	mg/kg	660	CHHSL	ca	14.3	below	—	1E-08	—	—
METALS	copper	4/4	5.6	25.7	M-BG1-003	mg/kg	3,000	CHHSL	nc	39.1	below	0.01	—	—	—
METALS	iron	4/4	9,270	27,900	M-BG1-003	mg/kg	23,463	PRG	nc	22,280	above	1	—	1	—
METALS	lead[b]	4/4	3.39	20	M-BG1-000	mg/kg	150	PRG	nc	37.7	below	0.1	—	—	—
METALS	manganese	4/4	99.5	330	M-BG1-000	mg/kg	1,762	PRG	nc	383	below	0.2	—	—	—
METALS	nickel	4/4	19	53.5	M-BG1-003	mg/kg	1,564	PRG	nc	55.7	below	0.03	—	—	—
METALS	vanadium	4/4	20.3	51.1	M-BG1-003	mg/kg	78	PRG	nc	47.3	above	0.7	—	0.7	—
METALS	zinc	4/4	20.7	61.8	M-BG1-003	mg/kg	23,000	CHHSL	nc	67.5	below	0.003	—	—	—
PEST/PCB	Aroclor-1260	3/11	8	9	004-WHA-6042	µg/kg	89	CHHSL	ca	—	—	—	1E-07	—	1E-07
VOC	tetrachloroethene	1/4	5.5	5.5	M-BG1-000	µg/kg	87	ESL	ca	—	—	—	6E-08	—	6E-08
											Soil Total	**2**	**9E-05**	**2**	**5E-07**
Groundwater															
METALS	aluminum	1/3	888	888	108-SBG-009	µg/L	36,499	PRG	nc	1,070	below	0.02	—	—	—
METALS	arsenic	2/3	10.5	11.3	108-SBG-009	µg/L	0.007	PRG	ca	20.7	below	—	2E-03	—	—
METALS	barium	3/3	416	735	108-SBG-009	µg/L	2,555	PRG	nc	570	above	0.3	—	0.3	—
METALS	cadmium	1/3	0.48	0.48	108-SBG-009	µg/L	18	PRG	nc	NA	—	0.03	—	0.03	—
METALS	chromium	1/3	1.8	1.8	108-SBG-009	µg/L	109	PRG	ca	12.5	below	—	2E-08	—	—
METALS	cobalt	2/3	1.8	3.1	108-SBG-013	µg/L	730	PRG	ca	NA	—	—	4E-09	—	4E-09
METALS	copper	1/3	2.1	2.1	108-SBG-009	µg/L	1,460	PRG	nc	24.0	below	0.001	—	—	—
METALS	iron	3/3	6,030	7,070	108-SBG-009	µg/L	10,950	PRG	nc	6,586	above	0.6	—	0.6	—
METALS	manganese	3/3	1,470	1,740	108-SBG-009	µg/L	876	PRG	nc	1,741	below	2	—	—	—
METALS	mercury	1/3	0.14	0.14	108-SBG-013	µg/L	11	PRG	nc	NA	—	0.01	—	0.01	—
METALS	nickel	1/3	4.8	4.8	108-SBG-009	µg/L	730	PRG	nc	NA	—	0.007	—	0.007	—
METALS	zinc	2/3	12	113	108-SBG-009	µg/L	10,950	PRG	nc	36.4	above	0.01	—	0.01	—
SVOC	pyrene	1/1	2	2	108-SBG-013	µg/L	140	ESL	nc	—	—	0.01	—	0.01	—
											Groundwater Total	**3**	**2E-03**	**1**	**4E-09**
											Total	**5**	**2E-03**	**3**	**5E-07**

Notes:

[a] the cancer risk and noncancer hazards were calculated without metals with concentrations below background concentrations

[b] the noncancer value for lead is not additive with noncancer values for other chemicals; however, the total risk does include the value for lead

Acronyms/Abbreviations:

AOC – area of concern
ca – PRG with a cancer endpoint
Cal/EPA – California Environmental Protection Agency
CHHSL – California Human Health Screening Level
ESL – environmental screening level
µg/kg – micrograms per kilogram
µg/L – micrograms per liter
mg/kg – milligrams per kilogram
NA – not available
nc – PRG with a noncancer endpoint
PEST/PCB – pesticide/polychlorinated biphenyl
PRG – preliminary remediation goal
Q95 – 95th quantile in Alameda Point pink background data set (TtEMI 2004)
SVOC – semivolatile organic compound
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Sources:

CHHSL – residential human health screening level for soil; Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties, Cal/EPA, January 2005
ESL – residential soil and groundwater screening levels for evaluation of potential vapor intrusion concerns; Screening for Environmental Concerns at Sites With Contaminated Soil and Groundwater, San Francisco Regional Water Quality Control Board, February 2005
PRG – residential soil and tap water preliminary remediation goals, U.S. EPA, October 2004

Table J2-3
Tier 1 Evaluation
AOC 5

Parameter Code	Analyte Name	Frequency of Detection	Minimum Result	Maximum Result	Location of Maximum	Units	RISK GUIDELINE Value	RISK GUIDELINE Source	RISK GUIDELINE End Point	Q95 Background	Background Evaluation	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND[a] Hazard Quotient	WITHOUT BACKGROUND[a] Cancer Risk
Soil															
METALS	aluminum	12/12	6,200	13,000	C077S074	mg/kg	76,142	PRG	nc	13,960	below	0.2	—	—	—
METALS	arsenic	16/16	1.1	8.5	C077S074	mg/kg	0.062	PRG	ca	9.1	below	—	1E-04	—	—
METALS	barium	12/12	28.4	112	C077S073	mg/kg	5,200	CHHSL	nc	93.7	above	0.02	—	0.02	—
METALS	beryllium	12/12	0.12	0.31	C077S072	mg/kg	150	CHHSL	nc	1.3	below	0.002	—	—	—
METALS	cadmium	10/12	0.05	0.53	C077S079	mg/kg	2	CHHSL	nc	1.7	below	0.3	—	—	—
METALS	chromium	12/12	23.9	86.8	C077S079	mg/kg	211	PRG	ca	54.8	above	—	4E-07	—	4E-07
METALS	cobalt	12/12	5.5	13.7	C077S079	mg/kg	660	CHHSL	ca	14.3	below	—	2E-08	—	—
METALS	copper	12/12	7.2	126	C077S074	mg/kg	3,000	CHHSL	nc	39.1	above	0.04	—	0.04	—
METALS	iron	12/12	14,100	38,200	C077S074	mg/kg	23,463	PRG	nc	22,280	above	2	—	2	—
METALS	lead[b]	12/12	1.6	40.9	C077S071	mg/kg	150	PRG	nc	37.7	above	0.3	—	—	—
METALS	manganese	12/12	147	3,780	C077S079	mg/kg	1,762	PRG	nc	383	above	2	—	2	—
METALS	mercury	9/12	0.03	0.14	C077S072	mg/kg	18	CHHSL	nc	0.5	below	0.008	—	—	—
METALS	nickel	12/12	23.4	84.4	C077S079	mg/kg	1,564	PRG	nc	55.7	above	0.05	—	0.05	—
METALS	selenium	7/12	0.42	3.6	C077S079	mg/kg	380	CHHSL	nc	1.8	above	0.009	—	0.009	—
METALS	silver	8/12	0.04	0.2	C077S077	mg/kg	380	CHHSL	nc	2.2	below	0.0005	—	—	—
METALS	vanadium	12/12	29.9	69.1	C077S074	mg/kg	78	PRG	nc	47.3	above	0.9	—	0.9	—
METALS	zinc	12/12	23.1	78.6	C077S076	mg/kg	23,000	CHHSL	nc	67.5	above	0.003	—	0.003	—
PEST/PCB	4,4'-DDD	2/12	8	9.3	C077S076	µg/kg	2,300	CHHSL	ca	—	—	—	4E-09	—	4E-09
PEST/PCB	4,4'-DDE	3/12	1.5	10	C077S075	µg/kg	1,600	CHHSL	ca	—	—	—	6E-09	—	6E-09
PEST/PCB	4,4'-DDT	1/12	1.8	1.8	C077S074	µg/kg	1,600	CHHSL	ca	—	—	—	1E-09	—	1E-09
PEST/PCB	alpha-chlordane	3/12	1.5	5.2	C077S081	µg/kg	430	CHHSL	ca	—	—	—	1E-08	—	1E-08
PEST/PCB	gamma-chlordane	4/12	1.5	4.5	C077S081	µg/kg	430	CHHSL	ca	—	—	—	1E-08	—	1E-08
SVOC	bis(2-ethylhexyl)phthalate	1/12	72	72	C077S075	µg/kg	34,741	PRG	ca	—	—	—	2E-09	—	2E-09
SVOC	butyl benzyl phthalate	1/12	150	150	C077S080	µg/kg	12,220,619	PRG	nc	—	—	0.00001	—	0.00001	—
SVOC	di-n-butyl phthalate	8/12	100	490	C077S079	µg/kg	6,110,310	PRG	nc	—	—	0.00008	—	0.00008	—
VOC	2-butanone	7/12	1.2	4.3	C077S081	µg/kg	490,000	ESL	nc	—	—	0.000009	—	0.000009	—
VOC	4-methyl-2-pentanone	2/12	2.5	3	C077S080	µg/kg	120,000	ESL	nc	—	—	0.00003	—	0.00003	—
VOC	carbon disulfide	7/12	1.4	12	C077S080	µg/kg	355,340	PRG	nc	—	—	0.00003	—	0.00003	—
											Soil Total	**6**	**1E-04**	**5**	**4E-07**
Groundwater															
METALS	arsenic	3/3	5.8	31.2	C077G031	µg/L	0.007	PRG	ca	20.7	above	—	4E-03	—	4E-03
METALS	barium	3/3	20.1	109	C077G033	µg/L	2,555	PRG	nc	570	below	0.04	—	—	—
METALS	cadmium	2/3	0.65	0.7	C077G031	µg/L	18	PRG	nc	NA	—	0.04	—	0.04	—
METALS	chromium	3/3	2.1	6.4	C077G031	µg/L	109	PRG	ca	12.5	below	—	6E-08	—	—
METALS	cobalt	1/3	3.5	3.5	C077G033	µg/L	730	PRG	ca	NA	—	—	5E-09	—	5E-09
METALS	copper	1/3	1.7	1.7	C077G033	µg/L	1,460	PRG	nc	24.0	below	0.001	—	—	—
METALS	iron	3/3	60.3	28,500	C077G031	µg/L	10,950	PRG	nc	6,586	above	3	—	3	—
METALS	manganese	3/3	956	2,470	C077G031	µg/L	876	PRG	nc	1741	above	3	—	3	—
METALS	nickel	1/3	6.8	6.8	C077G033	µg/L	730	PRG	nc	NA	—	0.009	—	0.009	—
METALS	selenium	3/3	13.2	21.6	C077G033	µg/L	182	PRG	nc	8.6	above	0.1	—	0.1	—
METALS	vanadium	3/3	2.2	20.6	C077G033	µg/L	36	PRG	nc	26.3	below	0.6	—	—	—
VOC	2-butanone	1/2	1.3	1.3	C077G033	µg/L	6,968	PRG	nc	—	—	0.0002	—	0.0002	—
VOC	acetone	2/2	2.4	9.9	C077G033	µg/L	5,475	PRG	nc	—	—	0.002	—	0.002	—
VOC	carbon disulfide	1/2	1.2	1.2	C077G033	µg/L	1,043	PRG	nc	—	—	0.001	—	0.001	—
VOC	toluene	1/2	0.21	0.21	C077G033	µg/L	723	PRG	sat	—	—	0.0003	—	0.0003	—
											Groundwater Total	**6**	**4E-03**	**6**	**4E-03**
											Total	**12**	**5E-03**	**10**	**4E-03**

Table J2-3
Tier 1 Evaluation
AOC 5

Notes:

[a] the cancer risk and noncancer hazards were calculated without metals with concentrations below background concentrations

[b] the noncancer value for lead is not additive with noncancer values for other chemicals; however, the total risk does include the value for lead

Acronyms/Abbreviations:

AOC – area of concern
ca – PRG with a cancer endpoint
Cal/EPA – California Environmental Protection Agency
CHHSL – California Human Health Screening Level
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
ESL – environmental screening level
µg/kg – micrograms per kilogram
µg/L – micrograms per liter
mg/kg – milligrams per kilogram
NA – not available
nc – PRG with a noncancer endpoint
PEST/PCB – pesticide/polychlorinated biphenyl
PRG – preliminary remediation goal
Q95 – 95th quantile in Alameda Point pink background data set (TtEMI 2004)
sat – saturation limit
SVOC – semivolatile organic compound
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Sources:

CHHSL – residential human health screening level for soil; Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties, Cal/EPA, January 2005
ESL – residential soil and groundwater screening levels for evaluation of potential vapor intrusion concerns; Screening for Environmental Concerns at Sites With Contaminated Soil and Groundwater, San Francisco Regional Water Quality Control Board, February 2005
PRG – residential soil and tap water preliminary remediation goals, U.S. EPA, October 2004

Table J2-4
Tier 1 Evaluation
AOC 6

Parameter Code	Analyte Name	Frequency of Detection	Minimum Result	Maximum Result	Location of Maximum	Units	RISK GUIDELINE Value	RISK GUIDELINE Source	RISK GUIDELINE End Point	Q95 Background	Background Evaluation	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND[a] Hazard Quotient	WITHOUT BACKGROUND[a] Cancer Risk
Soil[b]															
PEST/PCB	Aroclor-1260	3/12	65	430	C077S095	µg/kg	89	CHHSL	ca	—	—	—	5E-06	—	5E-06
											Soil Total	**0**	**5E-06**	**0**	**5E-06**

Notes:
[a] *the cancer risk and noncancer hazards were calculated without metals with concentrations below background concentrations*
[b] soil only site, no groundwater data

Acronyms/Abbreviations:
AOC – area of concern
ca – PRG with a cancer endpoint
Cal/EPA – California Environmental Protection Agency
CHHSL – California Human Health Screening Level
µg/kg – micrograms per kilogram
PEST/PCB – pesticide/polychlorinated biphenyl
Q95 – *95th quantile in Alameda Point pink background data set (TtEMI 2004)*

Source:
CHHSL – residential human health screening level for soil; Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties, Cal/EPA, January 2005

Table J2-5
Tier 1 Evaluation
AOC 7

Parameter Code	Analyte Name	Frequency of Detection	Minimum Result	Maximum Result	Location of Maximum	Units	RISK GUIDELINE Value	RISK GUIDELINE Source	RISK GUIDELINE End Point	Q95 Background	Background Evaluation	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND[a] Hazard Quotient	WITHOUT BACKGROUND[a] Cancer Risk
Soil[b]															
METALS	antimony	1/2	0.30	0.30	0040-WHA-488	mg/kg	30	CHHSL	nc	9.5	below	0.01	—	—	—
METALS	arsenic	18/18	1.6	5.1	0040-WHA-6030	mg/kg	0.062	PRG	ca	9.1	below	—	8E-05	—	—
METALS	barium	2/2	23.9	25.2	0040-WHA-489	mg/kg	5,200	CHHSL	nc	93.7	below	0.005	—	—	—
METALS	chromium	2/2	25.8	28.3	0040-WHA-489	mg/kg	211	PRG	ca	54.8	below	—	1E-07	—	—
METALS	cobalt	2/2	4.1	4.2	0040-WHA-489	mg/kg	660	CHHSL	ca	14.3	below	—	6E-09	—	—
METALS	copper	2/2	5.7	8	0040-WHA-489	mg/kg	3,000	CHHSL	nc	39.1	below	0.003	—	—	—
METALS	lead[c]	2/2	1.6	22	0040-WHA-489	mg/kg	150	PRG	nc	37.7	below	0.1	—	—	—
METALS	mercury	2/2	0.034	0.034	0040-WHA-488	mg/kg	18	CHHSL	nc	0.5	below	0.002	—	—	—
METALS	nickel	2/2	23.3	23.6	0040-WHA-488	mg/kg	1,564	PRG	nc	55.7	below	0.02	—	—	—
METALS	vanadium	2/2	16.6	17.9	0040-WHA-489	mg/kg	78	PRG	nc	47.3	below	0.2	—	—	—
METALS	zinc	2/2	15	18	0040-WHA-489	mg/kg	23,000	CHHSL	nc	67.5	below	0.0008	—	—	—
PEST/PCB	Aroclor-1254	2/18	300	320	004-WHA-489	µg/kg	89	CHHSL	ca	—	—	—	4E-06	—	4E-06
PEST/PCB	Aroclor-1260	10/18	3	58	0040-WHA-6030	µg/kg	89	CHHSL	ca	—	—	—	7E-07	—	7E-07
											Soil Total	**0.4**	**9E-05**	**0**	**4E-06**

Notes:

[a] the cancer risk and noncancer hazards were calculated without metals with concentrations below background concentrations

[b] soil only site, no groundwater data

[c] the noncancer value for lead is not additive with noncancer values for other chemicals; however, the total risk does include the value for lead

Acronyms/Abbreviations:

AOC – area of concern
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Cal/EPA – California Environmental Protection Agency
CHHSL – California Human Health Screening Level
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
nc – PRG with a noncancer endpoint
PEST/PCB – pesticide/polychlorinated biphenyl
PRG – preliminary remediation goal
Q95 – 95th quantile in Alameda Point pink background data set (TtEMI 2004)
U.S. EPA – United States Environmental Protection Agency

Sources:

CHHSL – residential human health screening level for soil; Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties, Cal/EPA, January 2005
PRG – residential soil and tap water preliminary remediation goals, U.S. EPA, October 2004

Table J2-6
Tier 1 Evaluation
AOC 8

Parameter Code	Analyte Name	Frequency of Detection	Minimum Result	Maximum Result	Location of Maximum	Units	RISK GUIDELINE Value	RISK GUIDELINE Source	RISK GUIDELINE End Point	Q95 Background	Background Evaluation	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND[a] Hazard Quotient	WITHOUT BACKGROUND[a] Cancer Risk
Soil[b]															
PEST/PCB	Aroclor-1254	1/14	300	300	098-0006	µg/kg	89	CHHSL	ca	—	—	—	3E-06	—	3E-06
											Soil Total	**0**	**3E-06**	**0**	**3E-06**

Notes:
[a] the cancer risk and noncancer hazards were calculated without metals with concentrations below background concentrations
[b] soil only site, no groundwater data

Acronyms/Abbreviations:
AOC – area of concern
ca – PRG with a cancer endpoint
Cal/EPA – California Environmental Protection Agency
CHHSL – California Human Health Screening Level
ESL – environmental screening level
µg/kg – micrograms per kilogram
PEST/PCB – pesticide/polychlorinated biphenyl
PRG – preliminary remediation goal
Q95 – 95th quantile in Alameda Point pink background data set (TtEMI 2004)

Source:
CHHSL – residential human health screening level for soil; Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties, Cal/EPA, January 2005

Table J2-7
Tier 1 Evaluation
AOC 9

Parameter Code	Analyte Name	Frequency of Detection	Minimum Result	Maximum Result	Location of Maximum	Units	RISK GUIDELINE Value	RISK GUIDELINE Source	RISK GUIDELINE End Point	Q95 Background	Background Evaluation	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND[a] Hazard Quotient	WITHOUT BACKGROUND[a] Cancer Risk
Soil[b]															
METALS	arsenic	4/4	2.3	5.5	0040-WHA-6124	mg/kg	0.062	PRG	ca	9.1	below	—	9E-05	—	—
PEST/PCB	endrin	1/12	21	21	C077S140	µg/kg	18,331	PRG	nc	—	—	0.001	—	0.001	—
											Soil Total	**0.001**	9E-05	**0.001**	**0E+00**

Notes:
[a] the cancer risk and noncancer hazards were calculated without metals with concentrations below background concentrations
[b] soil only site, no groundwater data

Acronyms/Abbreviations:
AOC – area of concern
ca – PRG with a cancer endpoint
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
nc – PRG with a noncancer endpoint
PEST/PCB – pesticide/polychlorinated biphenyl
PRG – preliminary remediation goal
Q95 – 95th quantile in Alameda Point pink background data set (TtEMI 2004)
U.S. EPA – United States Environmental Protection Agency

Source:
PRG – residential soil and tap water preliminary remediation goals, U.S. EPA, October 2004

Table J2-8
Tier 1 Evaluation
AOC 13

Parameter Code	Analyte Name	Frequency of Detection	Minimum Result	Maximum Result	Location of Maximum	Units	RISK GUIDELINE Value	RISK GUIDELINE Source	RISK GUIDELINE End Point	Q95 Background	Background Evaluation	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND[a] Hazard Quotient	WITHOUT BACKGROUND[a] Cancer Risk
Soil[b]															
METALS	arsenic	4/4	2.3	5.5	0040-WHA-6124	mg/kg	0.062	PRG	ca	9.1	below	—	9E-05	—	—
PEST/PCB	4,4'-DDD	11/24	3	5,300	103-0020	µg/kg	2,300	CHHSL	ca	—	—	—	2E-06	—	2E-06
PEST/PCB	4,4'-DDE	13/24	0.86	590	103-0002	µg/kg	1,600	CHHSL	ca	—	—	—	4E-07	—	4E-07
PEST/PCB	4,4'-DDT	12/24	1	2,600	103-0020	µg/kg	1,600	CHHSL	ca	—	—	—	2E-06	—	2E-06
PEST/PCB	alpha-chlordane	7/24	2	93	103-0002	µg/kg	430	CHHSL	ca	—	—	—	2E-07	—	2E-07
PEST/PCB	beta-BHC	1/24	4.4	4.4	103-0020	µg/kg	316	PRG	ca	—	—	—	1E-08	—	1E-08
PEST/PCB	delta-BHC	1/10	3.4	3.4	103-0020	µg/kg	437	PRG	ca	—	—	—	8E-09	—	8E-09
PEST/PCB	dieldrin	2/24	7.3	50	103-0023	µg/kg	30	PRG	ca	—	—	—	2E-06	—	2E-06
PEST/PCB	endosulfan I	2/24	3	3	103-0020	µg/kg	366,619	PRG	nc	—	—	0.000008	—	0.000008	—
PEST/PCB	endrin	2/24	4.7	5.5	C077S245	µg/kg	18,331	PRG	nc	—	—	0.0003	—	0.0003	—
PEST/PCB	endrin aldehyde	4/24	0.72	3.8	C077S248	µg/kg	18,331	PRG	nc	—	—	0.0002	—	0.0002	—
PEST/PCB	gamma-BHC (lindane)	1/24	2	2	103-0020	µg/kg	437	PRG	ca	—	—	—	5E-09	—	5E-09
PEST/PCB	gamma-chlordane	7/24	2	82	103-0002	µg/kg	430	CHHSL	ca	—	—	—	2E-07	—	2E-07
PEST/PCB	heptachlor	2/24	2.8	3.6	103-0020	µg/kg	108	PRG	ca	—	—	—	3E-08	—	3E-08
PEST/PCB	heptachlor epoxide	3/24	3.1	4	103-0020	µg/kg	53	PRG	ca	—	—	—	7E-08	—	7E-08
PEST/PCB	methoxychlor	1/10	51	51	103-0032	µg/kg	305,515	PRG	nc	—	—	0.0002	—	0.0002	—
											Soil Total	**0.0007**	**1E-04**	**0.0007**	**6E-06**

Notes:
[a] the cancer risk and noncancer hazards were calculated without metals with concentrations below background concentrations
[b] soil only site, no groundwater data

Acronyms/Abbreviations:
AOC – area of concern
ca – PRG with a cancer endpoint
Cal/EPA – California Environmental Protection Agency
CHHSL – California Human Health Screening Level
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
nc – PRG with a noncancer endpoint
PEST/PCB – pesticide/polychlorinated biphenyl
PRG – preliminary remediation goal
Q95 – 95th quantile in Alameda Point pink background data set (TtEMI 2004)
U.S. EPA – United States Environmental Protection Agency

Sources:
CHHSL – residential human health screening level for soil; Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties, Cal/EPA, January 2005
PRG – residential soil and tap water preliminary remediation goals, U.S. EPA, October 2004

Table J2-9
Tier 1 Evaluation
AOC 17

Parameter Code	Analyte Name	Frequency of Detection	Minimum Result	Maximum Result	Location of Maximum	Units	RISK GUIDELINE Value	RISK GUIDELINE Source	RISK GUIDELINE End Point	Q95 Background	Background Evaluation	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND[a] Hazard Quotient	WITHOUT BACKGROUND[a] Cancer Risk
Soil															
METALS	aluminum	18/18	3,780	14,500	B12-10-014	mg/kg	76,142	PRG	nc	13,960	above	0.2	—	0.2	—
METALS	antimony	4/20	3.1	6.8	B12-10-014	mg/kg	30	CHHSL	nc	9.5	below	0.2	—	—	—
METALS	arsenic	15/18	1.2	4.02	B12-10-014	mg/kg	0	PRG	ca	9.1	below	—	7E-05	—	—
METALS	barium	18/18	17.8	85.9	C077S284	mg/kg	5,200	CHHSL	nc	93.7	below	0.02	—	—	—
METALS	beryllium	15/20	0.12	0.9	185I-001	mg/kg	150	CHHSL	nc	1.3	below	0.006	—	—	—
METALS	cadmium	2/20	0.11	0.31	185I-002	mg/kg	2	CHHSL	nc	1.7	below	0.2	—	—	—
METALS	chromium	18/20	12.9	48.8	B12-10-014	mg/kg	211	PRG	ca	54.8	below	—	2E-07	—	—
METALS	chromium, hexavalent	8/9	0.086	0.45	C077S285	mg/kg	17	CHHSL	ca	—	—	—	3E-08	—	3E-08
METALS	cobalt	18/18	3.4	9.92	B12-10-000	mg/kg	660	CHHSL	ca	14.3	below	—	2E-08	—	—
METALS	copper	18/20	4.51	24.9	C077S284	mg/kg	3,000	CHHSL	nc	39.1	below	0.008	—	—	—
METALS	iron	18/18	7,440	27,000	C077S284	mg/kg	23,463	PRG	nc	22,280	above	1	—	1	—
METALS	lead[b]	18/20	1.6	19.4	B12-10-000	mg/kg	150	PRG	nc	37.7	below	0.1	—	—	—
METALS	manganese	18/18	76.6	685	C077S284	mg/kg	1,762	PRG	nc	383	above	0.4	—	0.4	—
METALS	mercury	2/20	0.032	0.108	B12-10-000	mg/kg	18	CHHSL	nc	0.5	below	0.006	—	—	—
METALS	nickel	20/20	10.8	49.3	B12-10-000	mg/kg	1,564	PRG	nc	55.7	below	0.03	—	—	—
METALS	silver	6/20	0.33	1.09	B12-10-014	mg/kg	380	CHHSL	nc	2.2	below	0.003	—	—	—
METALS	thallium	1/18	0.53	0.53	185I-001	mg/kg	5	CHHSL	nc	0.5	above	0.1	—	0.1	—
METALS	vanadium	18/18	16.7	42.4	B12-10-014	mg/kg	78	PRG	nc	47.3	below	0.5	—	—	—
METALS	zinc	19/20	12.8	48.1	C077S284	mg/kg	23,000	CHHSL	nc	67.5	below	0.002	—	—	—
SVOC	di-n-butyl phthalate	1/9	40	40	185I-002	µg/kg	6,110,310	PRG	nc	—	—	0.000007	—	0.000007	—
VOC	methylene chloride	6/16	4.9	11	C077S282	µg/kg	520	ESL	ca	—	—	—	2E-08	—	2E-08
											Soil Total	**3**	**7E-05**	**2**	**5E-08**
Groundwater															
METALS	aluminum	2/6	14,100	45,800	185I-008	µg/L	36,499	PRG	nc	1070	above	1	—	1	—
METALS	arsenic	2/6	10.7	15.9	185I-008	µg/L	0.007	PRG	ca	20.7	below	—	2E-03	—	—
METALS	barium	6/6	61.3	273	C077G063	µg/L	2,555	PRG	nc	570	below	0.1	—	—	—
METALS	chromium	5/6	4.7	173	185I-008	µg/L	109	PRG	ca	12.5	above	—	2E-06	—	2E-06
METALS	cobalt	2/6	16.8	34.2	185I-008	µg/L	730	PRG	ca	NA	—	—	5E-08	—	5E-08
METALS	copper	2/6	20.5	72.5	185I-008	µg/L	1,460	PRG	nc	24.0	above	0.05	—	0.05	—
METALS	iron	4/6	135	64,900	185I-008	µg/L	10,950	PRG	nc	6,586	above	6	—	6	—
METALS	lead	2/6	4	15	185I-008	µg/L	15	AL	—	11.5	above	—	—	—	—
METALS	manganese	6/6	180	1,360	C077G062	µg/L	876	PRG	nc	1741	below	2	—	—	—
METALS	molybdenum	1/2	5.8	5.8	185I-006	µg/L	182	PRG	nc	NA	—	0.03	—	0.03	—
METALS	nickel	2/6	60.4	208	185I-008	µg/L	730	PRG	nc	NA	—	0.3	—	0.3	—
METALS	vanadium	6/6	1.2	124	185I-008	µg/L	36	PRG	nc	26.3	above	3	—	3	—
METALS	zinc	2/6	32.6	115	185I-008	µg/L	10,950	PRG	nc	36.4	above	0.01	—	0.01	—
VOC	carbon disulfide	1/3	0.31	0.31	C077G063	µg/L	1,043	PRG	nc	—	—	0.0003	—	0.0003	—
VOC	toluene	1/3	0.29	0.29	C077G062	µg/L	723	PRG	sat	—	—	0.0004	—	0.0004	—
											Groundwater Total	**13**	**2E-03**	**11**	**2E-06**
											Total	**16**	**2E-03**	**13**	**2E-06**

Table J2-9
Tier 1 Evaluation
AOC 17

Notes:

[a] the cancer risk and noncancer hazards were calculated without metals with concentrations below background concentrations

[b] the noncancer value for lead is not additive with noncancer values for other chemicals; however, the total risk does include the value for lead

Acronyms/Abbreviations:

AL – action level
AOC – area of concern
ca – PRG with a cancer endpoint
Cal/EPA – California Environmental Protection Agency
CHHSL – California Human Health Screening Level
ESL – environmental screening level
µg/kg – micrograms per kilogram
µg/L – micrograms per liter
mg/kg – milligrams per kilogram
NA – not available
nc – PRG with a noncancer endpoint
PRG – preliminary remediation goal
Q95 – 95th quantile in Alameda Point pink background data set (TtEMI 2004)
sat – saturation limit
SVOC – semivolatile organic compound
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Sources:

CHHSL – residential human health screening level for soil; Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties, Cal/EPA, January 2005
ESL – residential soil and groundwater screening levels for evaluation of potential vapor intrusion concerns; Screening for Environmental Concerns at Sites With Contaminated Soil and Groundwater, San Francisco Regional Water Quality Control Board, February 2005
PRG – residential soil and tap water preliminary remediation goals, U.S. EPA, October 2004

Table J2-10
Tier 1 Evaluation
AOC 18

Parameter Code	Analyte Name	Frequency of Detection	Minimum Result	Maximum Result	Location of Maximum	Units	RISK GUIDELINE Value	RISK GUIDELINE Source	RISK GUIDELINE End Point	Q95 Background	Background Evaluation	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND[a] Hazard Quotient	WITHOUT BACKGROUND[a] Cancer Risk
Soil															
METALS	aluminum	12/12	3,020	5,480	C077S308	mg/kg	76,142	PRG	nc	13,960	below	0.07	—	—	—
METALS	arsenic	12/12	1.2	2.3	C077S301	mg/kg	0.062	PRG	ca	9.1	below	—	4E-05	—	—
METALS	barium	12/12	19.2	36.4	C077S308	mg/kg	5,200	CHHSL	nc	93.7	below	0.007	—	—	—
METALS	beryllium	12/12	0.091	0.15	C077S308	mg/kg	150	CHHSL	nc	1.3	below	0.001	—	—	—
METALS	chromium	12/12	23.9	34.2	C077S308	mg/kg	211	PRG	ca	54.8	below	—	2E-07	—	—
METALS	cobalt	12/12	3.3	5.1	C077S308	mg/kg	660	CHHSL	ca	14.3	below	—	8E-09	—	—
METALS	copper	12/12	4.5	16.4	C077S312	mg/kg	3,000	CHHSL	nc	39.1	below	0.005	—	—	—
METALS	iron	12/12	7,200	10,900	C077S308	mg/kg	23,463	PRG	nc	22,280	below	0.5	—	—	—
METALS	lead[b]	12/14	1.3	2.6	C077S303	mg/kg	150	PRG	nc	37.7	below	0.02	—	—	—
METALS	manganese	12/12	67.7	112	C077S308	mg/kg	1,762	PRG	nc	383	below	0.06	—	—	—
METALS	mercury	1/12	0.019	0.019	C077S301	mg/kg	18	CHHSL	nc	0.5	below	0.001	—	—	—
METALS	nickel	12/12	21.1	34.2	C077S308	mg/kg	1,564	PRG	nc	55.7	below	0.02	—	—	—
METALS	silver	9/12	0.053	0.16	C077S303	mg/kg	380	CHHSL	nc	2.2	below	0.0004	—	—	—
METALS	vanadium	12/12	14	21.9	C077S312	mg/kg	78	PRG	nc	47.3	below	0.3	—	—	—
METALS	zinc	12/12	11.1	43.3	C077S312	mg/kg	23,000	CHHSL	nc	67.5	below	0.002	—	—	—
SVOC	di-n-butyl phthalate	10/12	81	990	C077S308	µg/kg	6,110,310	PRG	nc	—	—	0.0002	—	0.0002	—
VOC	2-butanone	2/16	1.8	2.7	C077S307	µg/kg	490,000	ESL	nc	—	—	0.000006	—	0.000006	—
VOC	carbon disulfide	1/16	1.2	1.2	C077S301	µg/kg	355,340	PRG	nc	—	—	0.000003	—	0.000003	—
VOC	cis-1,2-dichloroethene	1/18	0.34	0.34	C077S312	µg/kg	1,600	ESL	nc	—	—	0.0002	—	0.0002	—
											Soil Total	**0.9**	**4E-05**	**0.0004**	**0E+00**
Groundwater															
METALS	aluminum	1/2	153	153	C077G073	µg/L	36,499	PRG	nc	1,070	below	0.004	—	—	—
METALS	barium	2/2	25.6	48.6	C077G071	µg/L	2,555	PRG	nc	570	below	0.02	—	—	—
METALS	copper	1/2	1.7	1.7	C077G073	µg/L	1,460	PRG	nc	24.0	below	0.001	—	—	—
METALS	iron	1/2	228	228	C077G073	µg/L	10,950	PRG	nc	6,586	below	0.02	—	—	—
METALS	manganese	2/2	63.4	74.4	C077G071	µg/L	876	PRG	nc	1,741	below	0.08	—	—	—
METALS	vanadium	2/2	1.3	1.8	C077G073	µg/L	36	PRG	nc	26.3	below	0.05	—	—	—
VOC	cis-1,2-dichloroethene	3/3	1.1	2.7	C077G071	µg/L	61	PRG	nc	—	—	0.04	—	0.04	—
VOC	naphthalene	2/2	1.1	3.6	C077G071	µg/L	0.093	PRG[c]	ca	—	—	—	4E-05	—	4E-05
VOC	trichloroethene	2/3	0.57	0.72	C077G071	µg/L	1	PRG	ca	—	—	—	5E-07	—	5E-07
											Groundwater Total	**0.2**	**4E-05**	**0.04**	**4E-05**
											Total	**1**	8E-05	**0.04**	**4E-05**

Notes:

[a] the cancer risk and noncancer hazards were calculated without metals with concentrations below background concentrations

[b] the noncancer value for lead is not additive with noncancer values for other chemicals; however, the total risk does include the value for lead

[c] Cal-modified PRG

Acronyms/Abbreviations:

AOC – area of concern
ca – PRG with a cancer endpoint
Cal/EPA – California Environmental Protection Agency
CHHSL – California Human Health Screening Level
ESL – environmental screening level
µg/kg – micrograms per kilogram
µg/L – micrograms per liter
mg/kg – milligrams per kilogram
nc – PRG with a noncancer endpoint
PRG – preliminary remediation goal
Q95 – 95th quantile in Alameda Point pink background data set (TtEMI 2004)
SVOC – semivolatile organic compound
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Sources:

CHHSL – residential human health screening level for soil; Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties, Cal/EPA, January 2005
ESL – residential soil and groundwater screening levels for evaluation of potential vapor intrusion concerns; Screening for Environmental Concerns at Sites With Contaminated Soil and Groundwater, San Francisco Regional Water Quality Control Board, February 2005
PRG – residential soil and tap water preliminary remediation goals, U.S. EPA, October 2004

Table J2-11
Tier 1 Evaluation
AOC 20

Parameter Code	Analyte Name	Frequency of Detection	Minimum Result	Maximum Result	Location of Maximum	Units	RISK GUIDELINE Value	RISK GUIDELINE Source	RISK GUIDELINE End Point	Q95 Background	Background Evaluation	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND[a] Hazard Quotient	WITHOUT BACKGROUND[a] Cancer Risk
Soil															
METALS	aluminum	7/7	3,530	4,060	C077S321	mg/kg	76,142	PRG	nc	13,960	below	0.05	—	—	—
METALS	arsenic	10/11	1.3	2.3	C077S322	mg/kg	0.062	PRG	ca	9.1	below	—	4E-05	—	—
METALS	barium	11/11	25.2	88	023-0035M	mg/kg	5,200	CHHSL	nc	93.7	below	0.02	—	—	—
METALS	beryllium	10/11	0.12	0.29	023-0034M	mg/kg	150	CHHSL	nc	1.3	below	0.002	—	—	—
METALS	cadmium	4/11	0.16	0.33	023-0034M	mg/kg	2	CHHSL	nc	1.7	below	0.2	—	—	—
METALS	chromium	11/11	26	31	023-0019M	mg/kg	211	PRG	ca	54.8	below	—	1E-07	—	—
METALS	cobalt	11/11	3.4	5.6	023-0034M	mg/kg	660	CHHSL	ca	14.3	below	—	8E-09	—	—
METALS	copper	11/11	4.7	16	023-0019M	mg/kg	3,000	CHHSL	nc	39.1	below	0.005	—	—	—
METALS	iron	7/7	6,400	9,250	C077S321	mg/kg	23,463	PRG	nc	22,280	below	0.4	—	—	—
METALS	lead[b]	11/11	1.8	4.1	023-0034M	mg/kg	150	PRG	nc	37.7	below	0.03	—	—	—
METALS	manganese	7/7	75.6	100	C077S321	mg/kg	1,762	PRG	nc	383	below	0.06	—	—	—
METALS	mercury	2/11	0.02	0.022	C077S326	mg/kg	18	CHHSL	nc	0.52	below	0.001	—	—	—
METALS	nickel	11/11	16.9	25.3	C077S321	mg/kg	1,564	PRG	nc	55.7	below	0.02	—	—	—
METALS	thallium	1/11	1.8	1.8	023-0020	mg/kg	5	CHHSL	nc	0.50	above	0.4	—	0.4	—
METALS	vanadium	11/11	15	21	023-0019M	mg/kg	78	PRG	nc	47.3	below	0.3	—	—	—
METALS	zinc	11/11	12	18	023-0019M	mg/kg	23,000	CHHSL	nc	67.5	below	0.0008	—	—	—
VOC	cis-1,2-dichloroethene	1/6	0.29	0.29	C077S324	µg/kg	1,600	ESL	nc	—	—	0.0002	—	0.0002	—
VOC	methylene chloride	2/6	5.9	13	C077S324	µg/kg	520	ESL	ca	—	—	—	3E-08	—	3E-08
VOC	toluene	1/6	3.6	3.6	C077S324	µg/kg	130,000	ESL	sat	—	—	0.00003	—	0.00003	—
											Soil Total	**1**	**4E-05**	**0.4**	**3E-08**
Groundwater															
METALS	aluminum	1/2	187	187	C077G083	µg/L	36,499	PRG	nc	1,070	below	0.005	—	—	—
METALS	arsenic	2/2	11	26.9	C077G083	µg/L	0.007	PRG	ca	20.7	above	—	4E-03	—	4E-03
METALS	barium	2/2	1.3	5.1	C077G081	µg/L	2,555	PRG	nc	570	below	0.002	—	—	—
METALS	iron	2/2	47.4	103	C077G083	µg/L	10,950	PRG	nc	6,586	below	0.009	—	—	—
METALS	manganese	2/2	2	4.9	C077G081	µg/L	876	PRG	nc	1,741	below	0.006	—	—	—
METALS	mercury	2/4	0.00306	0.0105	C077G083	µg/L	11	PRG	nc	NA	—	0.001	—	0.001	—
METALS	vanadium	2/2	11.5	29.1	C077G083	µg/L	36	PRG	nc	26.3	above	0.8	—	0.8	—
VOC	2-butanone	1/3	3.9	3.9	C077G083	µg/L	6,968	PRG	nc	—	—	0.0006	—	0.0	—
VOC	toluene	1/3	0.17	0.17	C077G083	µg/L	723	PRG	sat	—	—	0.0002	—	0.0002	—
VOC	trichloroethene	1/3	0.24	0.24	C077G083	µg/L	1.4	PRG	ca	—	—	—	2E-07	—	2E-07
											Groundwater Total	**0.8**	**4E-03**	**0.8**	**4E-03**
											Total	**2**	**4E-03**	**1**	**4E-03**

Notes:

[a] the cancer risk and noncancer hazards were calculated without metals with concentrations below background concentrations

[b] the noncancer value for lead is not additive with noncancer values for other chemicals; however, the total risk does include the value for lead

Acronyms/Abbreviations:

AOC – area of concern
ca – PRG with a cancer endpoint
Cal/EPA – California Environmental Protection Agency
CHHSL – California Human Health Screening Level
ESL – environmental screening level
MCL – *maximum contaminant level*
µg/kg – micrograms per kilogram
µg/L – micrograms per liter
mg/kg – milligrams per kilogram
nc – PRG with a noncancer endpoint
NA – not available
PRG – preliminary remediation goal
Q95 – 95th quantile in Alameda Point pink background data set (TtEMI 2004)
sat – saturation limit
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Sources:

CHHSL – residential human health screening level for soil; Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties, Cal/EPA, January 2005
ESL – residential soil and groundwater screening levels for evaluation of potential vapor intrusion concerns; *Screening for Environmental Concerns at Sites With Contaminated Soil and Groundwater*, San Francisco Regional Water Quality Control Board, February 2005
PRG – residential soil and tap water preliminary remediation goals, U.S. EPA, October 2004

Table J2-12
Tier 1 Evaluation
AOC 21

Parameter Code	Analyte Name	Frequency of Detection	Minimum Result	Maximum Result	Location of Maximum	Units	RISK GUIDELINE Value	RISK GUIDELINE Source	RISK GUIDELINE End Point	Q95 Background	Background Evaluation	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND* Hazard Quotient	WITHOUT BACKGROUND* Cancer Risk
Soil															
SVOC	bis(2-ethylhexyl)phthalate	2/6	68	540	023-0052	µg/kg	34,741	PRG	ca	—	—	—	2E-08	—	2E-08
SVOC	dibenzofuran	1/6	830	830	023-0052	µg/kg	145,263	PRG	nc	—	—	0.006	—	0.006	—
VOC	acetone	2/12	27	37	023-0059	µg/kg	1,400,000	ESL	nc	—	—	0.00003	—	0.00003	—
VOC	carbon disulfide	1/12	2.4	2.4	C077S346	µg/kg	355,340	PRG	nc	—	—	0.000007	—	0.000007	—
VOC	ethylbenzene	1/14	830	830	023-0052	µg/kg	390,000	ESL	sat	—	—	0.002	—	0.002	—
VOC	total xylenes	2/14	53	8,000	023-0052	µg/kg	270,631	PRG	nc	—	—	0.03	—	0.03	—
											Soil Total	**0.04**	**2E-08**	**0.04**	**2E-08**
Groundwater															
VOC	carbon disulfide	3/7	0.33	1.5	C077G092	µg/L	1,043	PRG	nc	—	—	0.001	—	0.001	—
VOC	cis-1,2-dichloroethene	3/8	0.63	0.76	C077G091	µg/L	61	PRG	nc	—	—	0.01	—	0.01	—
VOC	toluene	4/8	0.19	6	023-0056	µg/L	723	PRG	sat	—	—	0.008	—	0.008	—
VOC	total xylenes	1/8	2	2	023-0054	µg/L	206	PRG	nc	—	—	0.01	—	0.01	—
VOC	trichloroethene	5/8	0.59	2	023-0054	µg/L	1	PRG	ca	—	—	—	1E-06	—	1E-06
											Groundwater Total	**0.03**	**1E-06**	**0.03**	**1E-06**
											Total	**0.07**	**1E-06**	**0.07**	**1E-06**

Note:
* the cancer risk and noncancer hazards were calculated without metals with concentrations below background concentrations

Acronyms/Abbreviations:
AOC – area of concern
ca – PRG with a cancer endpoint
Cal/EPA – California Environmental Protection Agency
ESL – environmental screening level
µg/kg – micrograms per kilogram
µg/L – micrograms per liter
nc – PRG with a noncancer endpoint
PRG – preliminary remediation goal
Q95 – 95th quantile in Alameda Point pink background data set (TtEMI 2004)
sat – saturation limit
SVOC – semivolatile organic compound
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Sources:
ESL – residential soil and groundwater screening levels for evaluation of potential vapor intrusion concerns; Screening for Environmental Concerns at Sites With Contaminated Soil and Groundwater, San Francisco Regional Water Quality Control Board, February 2005
PRG – residential soil and tap water preliminary remediation goals, U.S. EPA, October 2004

Table J2-13
Tier 1 Evaluation
AOC 24

Parameter Code	Analyte Name	Frequency of Detection	Minimum Result	Maximum Result	Location of Maximum	Units	RISK GUIDELINE Value	RISK GUIDELINE Source	RISK GUIDELINE End Point	Q95 Background	Background Evaluation	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND[a] Hazard Quotient	WITHOUT BACKGROUND[a] Cancer Risk
Soil															
METALS	aluminum	3/3	5,300	22,900	C077S463	mg/kg	76,142	PRG	nc	13,960	above	0.3	—	0.3	—
METALS	arsenic	4/4	0.98	11.2	C077S463	mg/kg	0.062	PRG	ca	9.1	above	—	2E-04	—	2E-04
METALS	barium	4/4	23.1	142	C077S463	mg/kg	5,200	CHHSL	nc	93.7	above	0.03	—	0.03	—
METALS	beryllium	4/4	0.14	0.6	C077S463	mg/kg	150	CHHSL	nc	1.3	below	0.004	—	—	—
METALS	cadmium	2/4	0.2	0.35	C077S463	mg/kg	2	CHHSL	nc	1.7	below	0.2	—	—	—
METALS	chromium	4/4	6.1	83.5	C077S463	mg/kg	211	PRG	ca	54.8	above	—	4E-07	—	4E-07
METALS	cobalt	4/4	4.1	13.6	C077S463	mg/kg	660	CHHSL	ca	14.3	below	—	2E-08	—	—
METALS	copper	4/4	8.5	62.2	C077S463	mg/kg	3,000	CHHSL	nc	39.1	above	0.02	—	0.02	—
METALS	iron	3/3	10,700	34,500	C077S463	mg/kg	23,463	PRG	nc	22,280	above	1	—	1	—
METALS	lead[b]	4/4	2.1	79	C077S463	mg/kg	150	PRG	nc	37.7	above	0.5	—	—	—
METALS	manganese	3/3	161	439	C077S462	mg/kg	1,762	PRG	nc	383	above	0.2	—	0.2	—
METALS	mercury	3/4	0.2	1.3	C077S463	mg/kg	18	CHHSL	nc	0.5	above	0.07	—	0.07	—
METALS	nickel	4/4	5.5	93.1	C077S463	mg/kg	1,564	PRG	nc	55.7	above	0.06	—	0.06	—
METALS	vanadium	4/4	19	58.8	C077S463	mg/kg	78	PRG	nc	47.3	above	0.8	—	0.8	—
METALS	zinc	4/4	22.2	157	C077S463	mg/kg	23,000	CHHSL	nc	67.5	above	0.007	—	0.007	—
VOC	2-butanone	1/4	9.2	9.2	C077S463	µg/kg	490,000	ESL	nc	—	—	0.00002	—	0.00002	—
VOC	acetone	1/4	96	96	C077S463	µg/kg	1,400,000	ESL	nc	—	—	0.00007	—	0.00007	—
VOC	carbon disulfide	1/4	4.2	4.2	C077S461	µg/kg	355,340	PRG	nc	—	—	0.00001	—	0.00001	—
VOC	cis-1,2-dichloroethene	1/4	0.29	0.29	C077S461	µg/kg	1,600	ESL	nc	—	—	0.0002	—	0.0002	—
VOC	methylene chloride	3/4	15	18	C077S463	µg/kg	520	ESL	ca	—	—	—	3E-08	—	3E-08
VOC	naphthalene	2/3	0.96	3.9	C077S461	µg/kg	460	ESL	ca	—	—	—	8E-09	—	8E-09
											Soil Total	**4**	**2E-04**	**3**	**2E-04**
Groundwater															
METALS	arsenic	1/1	5.1	5.1	C077G161	µg/L	0.007	PRG	ca	20.7	below	—	7E-04	—	—
METALS	barium	1/1	429	429	C077G161	µg/L	2,555	PRG	nc	570	below	0.2	—	—	—
METALS	chromium	1/1	6.6	6.6	C077G161	µg/L	109	PRG	ca	12.5	below	—	6E-08	—	—
METALS	cobalt	1/1	0.79	0.79	C077G161	µg/L	730	PRG	ca	NA	—	—	1E-09	—	1E-09
METALS	iron	1/1	36,700	36,700	C077G161	µg/L	10,950	PRG	nc	6,586	above	3	—	3	—
METALS	manganese	1/1	3,060	3,060	C077G161	µg/L	876	PRG	nc	1,741	above	3	—	3	—
METALS	vanadium	1/1	1.6	1.6	C077G161	µg/L	36	PRG	nc	26.3	below	0.04	—	—	—
VOC	carbon disulfide	1/1	0.26	0.26	C077G161	µg/L	1,043	PRG	nc	—	—	0.0002	—	0.0002	—
											Groundwater Total	**7**	**7E-04**	**7**	**1E-09**
											Total	**11**	**9E-04**	**10**	**2E-04**

Notes:

[a] the cancer risk and noncancer hazards were calculated without metals with concentrations below background concentrations

[b] the noncancer value for lead is not additive with noncancer values for other chemicals; however, the total risk does include the value for lead

Acronyms/Abbreviations:

AOC – area of concern
ca – PRG with a cancer endpoint
Cal/EPA – California Environmental Protection Agency
CHHSL – California Human Health Screening Level
ESL – environmental screening level
µg/kg – micrograms per kilogram
µg/L – micrograms per liter
mg/kg – milligrams per kilogram
NA – not available
nc – PRG with a noncancer endpoint
PRG – preliminary remediation goal
Q95 – 95th quantile in Alameda Point pink background data set (TtEMI 2004)
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Sources:

CHHSL – residential human health screening level for soil; Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties, Cal/EPA, January 2005
ESL – residential soil and groundwater screening levels for evaluation of potential vapor intrusion concerns; Screening for Environmental Concerns at Sites With Contaminated Soil and Groundwater, San Francisco Regional Water Quality Control Board, February 2005
PRG – residential soil and tap water preliminary remediation goals, U.S. EPA, October 2004

Table J2-14
Tier 1 Evaluation
AOC 25

Parameter Code	Analyte Name	Frequency of Detection	Minimum Result	Maximum Result	Location of Maximum	Units	RISK GUIDELINE Value	RISK GUIDELINE Source	RISK GUIDELINE End Point	Q95 Background	Background Evaluation	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND[a] Hazard Quotient	WITHOUT BACKGROUND[a] Cancer Risk
Soil															
METALS	aluminum	15/15	3,960	22,500	C077S481	mg/kg	76,142	PRG	nc	13,960	above	0.3	—	0.3	—
METALS	arsenic[b]	23/24	1.5	9.6	130M-001M	mg/kg	0.062	PRG	ca	9.1	above	—	2E-04	—	—
METALS	barium	24/24	20	155	C077S489	mg/kg	5,200	CHHSL	nc	93.7	above	0.03	—	0.03	—
METALS	beryllium	19/25	0.12	1.1	130M-001M	mg/kg	150	CHHSL	nc	1.3	below	0.007	—	—	—
METALS	cadmium	10/25	0.072	1.8	130M-001M	mg/kg	2	CHHSL	nc	1.7	above	1	—	1	—
METALS	chromium	24/25	22.9	150	132-0005M	mg/kg	211	PRG	ca	54.8	above	—	7E-07	—	7E-07
METALS	cobalt	22/24	1.9	16.4	130M-001M	mg/kg	660	CHHSL	ca	14.3	above	—	2E-08	—	2E-08
METALS	copper	25/25	4.5	230	132-0009M	mg/kg	3,000	CHHSL	nc	39.1	above	0.08	—	0.08	—
METALS	iron	15/15	5,990	35,900	C077S481	mg/kg	23,463	PRG	nc	22,280	above	2	—	2	—
METALS	lead[c]	29/30	2.5	157	C077S488	mg/kg	150	PRG	nc	37.7	above	1	—	—	—
METALS	manganese	15/15	50	241	C077S481	mg/kg	1,762	PRG	nc	383	below	0.1	—	—	—
METALS	mercury	15/25	0.14	4.7	130M-001M	mg/kg	18	CHHSL	nc	0.5	above	0.3	—	0.3	—
METALS	molybdenum	1/11	3.7	3.7	132-0005M	mg/kg	380	CHHSL	nc	5.2	below	0.01	—	—	—
METALS	nickel	25/25	13.6	120	132-0005M	mg/kg	1,564	PRG	nc	55.7	above	0.08	—	0.08	—
METALS	silver	5/25	0.11	0.92	132-0005M	mg/kg	380	CHHSL	nc	2.2	below	0.002	—	—	—
METALS	thallium	4/24	0.32	1.8	132-0007	mg/kg	5	CHHSL	nc	0.5	above	0.4	—	0.4	—
METALS	vanadium	24/24	17.4	66.1	130M-001M	mg/kg	78	PRG	nc	47.3	above	0.8	—	0.8	—
METALS	zinc	25/25	14.7	316	M-BG3-000	mg/kg	23,000	CHHSL	nc	67.5	above	0.01	—	0.01	—
PEST/PCB	Aroclor-1260	2/11	28	30	132-0008	µg/kg	89	CHHSL	ca	—	—	—	3E-07	—	3E-07
PEST/PCB	dieldrin	1/9	4.2	4.2	132-0004	µg/kg	30	PRG	ca	—	—	—	1E-07	—	1E-07
VOC	acetone	1/6	36	36	130M-001M	µg/kg	1,400,000	ESL	nc	—	—	0.00003	—	0.00003	—
VOC	ethylbenzene	1/8	10	10	385-S03-007	µg/kg	390,000	ESL	sat	—	—	0.00003	—	0.00003	—
VOC	meta-,para-xylene	1/3	53	53	385-S03-007	µg/kg	270,631	PRG	nc	—	—	0.0002	—	0.0002	—
VOC	o-xylene	1/3	32	32	385-S03-007	µg/kg	270,631	PRG	nc	—	—	0.0001	—	0.0001	—
VOC	toluene	1/8	8.1	8.1	385-S03-007	µg/kg	130,000	ESL	sat	—	—	0.00006	—	0.00006	—
SVOC	bis(2-ethylhexyl)phthalate	2/7	31	200	132-0008	µg/kg	34,741	PRG	ca	—	—	—	6E-09	—	6E-09
SVOC	di-n-butyl phthalate	2/7	83	90	132-0008	µg/kg	6,110,310	PRG	nc	—	—	0.00001	—	0.00001	—
											Soil Total	**6**	**2E-04**	**5**	**1E-06**
Groundwater															
METALS	aluminum	3/15	76.7	150	M03-11-A1735	µg/L	36,499	PRG	nc	1,070	below	0.004	—	—	—
METALS	antimony	3/15	0.18	0.23	M03-11-A1735	µg/L	15	PRG	nc	37.5	below	0.02	—	—	—
METALS	arsenic	9/15	10.2	21.7	M03-11-B2237	µg/L	0.007	PRG	ca	20.7	above	—	3E-03	—	3E-03
METALS	barium	14/15	41.1	421	C077G172	µg/L	2,555	PRG	nc	570	below	0.2	—	—	—
METALS	beryllium	4/15	0.24	1.8	280-S03-075	µg/L	73	PRG	nc	2.5	below	0.02	—	—	—
METALS	cadmium	1/15	17.2	17.2	280-S03-075	µg/L	18	PRG	nc	NA	—	0.9	—	0.9	—
METALS	chromium	9/15	1.6	27.5	C077G171	µg/L	109	PRG	ca	12.5	above	—	3E-07	—	3E-07
METALS	cobalt	6/15	0.088	15.6	C077G171	µg/L	730	PRG	ca	NA	below	—	2E-08	—	—
METALS	copper	3/15	0.1	3.9	M03-11-C4101	µg/L	1,460	PRG	nc	24.0	below	0.003	—	—	—
METALS	iron	15/15	237	38,100	C077G172	µg/L	10,950	PRG	nc	6,586	above	3	—	3	—
METALS	lead	1/16	0.33	0.33	M03-11-A1735	µg/L	15	AL	—	11.5	below	—	—	—	—
METALS	manganese	15/15	202	1,820	C077G172	µg/L	876	PRG	nc	1,741	above	2	—	2	—
METALS	molybdenum	2/11	1.3	3.7	M03-11-A1735	µg/L	182	PRG	nc	NA	below	0.02	—	—	—
METALS	nickel	6/15	1.2	41.3	280-S03-075	µg/L	730	PRG	nc	NA	below	0.06	—	—	—
METALS	selenium	6/15	0.64	16.6	C077G172	µg/L	182	PRG	nc	8.6	above	0.09	—	0.09	—
METALS	thallium	1/14	51.8	51.8	280-S03-075	µg/L	2	PRG	nc	16.2	above	22	—	22	—

Table J2-14
Tier 1 Evaluation
AOC 25

Parameter Code	Analyte Name	Frequency of Detection	Minimum Result	Maximum Result	Location of Maximum	Units	RISK GUIDELINE Value	RISK GUIDELINE Source	RISK GUIDELINE End Point	Q95 Background	Background Evaluation	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND[a] Hazard Quotient	WITHOUT BACKGROUND[a] Cancer Risk
METALS	vanadium	9/15	2.1	29.8	C077G171	µg/L	36	PRG	nc	26.3	above	0.8	—	0.8	—
METALS	zinc	6/15	1.4	677	280-S03-075	µg/L	10,950	PRG	nc	36.4	above	0.06	—	0.06	—
VOC	acetone	3/13	4.1	50	M03-11-A1956	µg/L	5,475	PRG	nc	—	—	0.009	—	0.009	—
VOC	carbon disulfide	3/13	0.5	1.5	M03-11-B2516	µg/L	1,043	PRG	nc	—	—	0.001	—	0.001	—
VOC	chloromethane	1/14	1	1	MBG-3-B2815	µg/L	41	ESL	nc	—	—	0.02	—	0.02	—
VOC	meta-,para-xylene	1/12	1.8	1.8	385-S03-008	µg/L	206	PRG	nc	—	—	0.009	—	0.009	—
VOC	methylene chloride	1/14	0.77	0.77	MBG-3-B2815	µg/L	4	PRG	ca	—	—	—	2E-07	—	2E-07
VOC	tert-butyl alcohol	3/11	4.7	22	M03-11-B2804	µg/L	—	—	—	—	—	—	—	—	—
VOC	toluene	3/14	0.1	2.2	385-S03-008	µg/L	723	PRG	sat	—	—	0.003	—	0.003	—
VOC	trichloroethene	1/14	0.3	0.3	M03-11-A1956	µg/L	1	PRG	ca	—	—	—	2E-07	—	2E-07
VOC	trichlorofluoromethane	1/11	0.7	0.7	MBG-3-B2815	µg/L	1,288	PRG	nc	—	—	0.0005	—	0.0005	—
											Groundwater Total	**29**	**3E-03**	**29**	**3E-03**
											Total	**35**	**3E-03**	**34**	**3E-03**

Notes:

[a] the cancer risk and noncancer hazards were calculated without metals with concentrations below background concentrations

[b] the maximum concentration is not considered to be above background

[c] the noncancer value for lead is not additive with noncancer values for other chemicals; however, the total risk does include the value for lead

Acronyms/Abbreviations:

AL – action level
AOC – area of concern
ca – PRG with a cancer endpoint
Cal/EPA – California Environmental Protection Agency
CHHSL – California Human Health Screening Level
ESL – environmental screening level
µg/kg – micrograms per kilogram
µg/L – micrograms per liter
mg/kg – milligrams per kilogram
NA – not available
nc – PRG with a noncancer endpoint
PEST/PCB – pesticide/polychlorinated biphenyl
PRG – preliminary remediation goal
Q95 – 95th quantile in Alameda Point pink background data set (TtEMI 2004)
sat – saturation limit
SVOC – semivolatile organic compound
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Sources:

CHHSL – residential human health screening level for soil; Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties, Cal/EPA, January 2005
ESL – residential soil and groundwater screening levels for evaluation of potential vapor intrusion concerns; Screening for Environmental Concerns at Sites With Contaminated Soil and Groundwater, San Francisco Regional Water Quality Control Board, February 2005
PRG – residential soil and tap water preliminary remediation goals, U.S. EPA, October 2004

Table J2-15
Ratio of Dermal Exposure to Exposure From Ingestion for Tier 1 Organic COPCs

Parameter Code	Analyte Name	Dermal/Ingestion Ratio
SVOC	acenaphthene	2.1
SVOC	fluorene	3.0
SVOC	phenanthrene	4.4
SVOC	pyrene	7.2
VOC	2-butanone	0.011
VOC	acetone	0.0053
VOC	carbon disulfide	0.15
VOC	chloromethane	0.037
VOC	cis-1,2-dichloroethene	0.16
VOC	meta-, para-xylene	0.80
VOC	methyl tert-butyl ether	0.027
VOC	methylene chloride	0.046
VOC	tert-butyl alcohol	0.012
VOC	toluene	0.48
VOC	total xylenes	0.80
VOC	trichloroethene	0.21
VOC	trichlorofluoromethane	0.24

Acronyms/Abbreviations:

COPC – chemical of potential concern
SVOC – semivolatile organic compound
VOC – volatile organic compound

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Table J3-1
Chemicals of Potential Concern
AOC 1

Chemical	CAS Number	Vadose Zone Soil (0–5 feet bgs)	Groundwater
Volatile Organic Compounds			
acenaphthylene	208-96-8	✔	
anthracene	120-12-7	✔	
benzo(g,h,i)perylene	191-24-2	✔	
carbon disulfide	75-15-0		✔
cis-1,2-dichloroethene	156-59-2	✔	
ethylbenzene	100-41-4		✔
fluorene	86-73-7	✔	
isopropylbenzene	98-82-8		✔
p-isopropyltoluene	99-87-6		✔
2-methylnaphthalene	91-57-6	✔	
naphthalene	91-20-3	✔	✔
phenanthrene	85-01-8	✔	
pyrene	129-00-0	✔	
toluene	108-88-3		✔
1,2,4-trimethylbenzene	95-63-6		✔
1,3,5-trimethylbenzene	108-67-8		✔
m,p-xylene	7816-60-0		✔
o-xylene	95-47-6		✔
Semivolatile Organic Compounds			
benz(a)anthracene	56-55-3	✔	
benzo(b)fluoranthene	205-99-2	✔	
benzo(k)fluoranthene	207-08-9	✔	
benzo(a)pyrene	50-32-8	✔	
chrysene	218-01-9	✔	
dibenz(a,h)anthracene	53-70-3	✔	
fluoranthene	206-44-0	✔	
indeno(1,2,3-cd)pyrene	193-39-5	✔	

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
CAS – Chemical Abstract Service

Table J3-2
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Vadose Zone Soil (0–5 feet bgs)
AOC 1

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–5 feet bgs)

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value[b]	COPC Flag (Y/N)	Selection or Deletion[c]
Volatile Organic Compounds													
acenaphthylene	208-96-8	2.40E-03	J	2.40E-03	J	mg/kg	C032C763	1/4	Not Available	2.40E-03	NA	Y	FD
anthracene	120-12-7	3.90E-03	J	3.90E-03	J	mg/kg	C032C763	1/4	Not Available	3.90E-03	NA	Y	FD
benzo(g,h,i)perylene	191-24-2	2.50E-03	J	5.00E-02		mg/kg	C032C763	3/4	Not Available	5.00E-02	NA	Y	FD
cis-1,2-dichloroethene	156-59-2	3.40E-04	J	3.40E-04	J	mg/kg	C077S004	1/6	0.00023 - 0.00027	3.40E-04	NA	Y	FD
fluorene	86-73-7	1.20E-03	J	1.20E-03	J	mg/kg	C032C763	1/4	Not Available	1.20E-03	NA	Y	FD
2-methylnaphthalene	91-57-6	2.90E-03	J	2.90E-03	J	mg/kg	C032C763	1/4	Not Available	2.90E-03	NA	Y	FD
naphthalene	91-20-3	2.70E-03	J	2.70E-03	J	mg/kg	C032C763	1/10	0.00044 - 0.0005	2.70E-03	NA	Y	FD
phenanthrene	85-01-8	1.80E-03	J	2.90E-02		mg/kg	C032C763	3/4	Not Available	2.90E-02	NA	Y	FD
pyrene	129-00-0	4.00E-03	J	5.80E-02		mg/kg	C032C763	3/4	Not Available	5.80E-02	NA	Y	FD
Semivolatile Organic Compounds													
benz(a)anthracene	56-55-3	2.50E-03	J	2.70E-02		mg/kg	C032C763	2/4	Not Available	2.70E-02	NA	Y	FD
benzo(b)fluoranthene	205-99-2	1.50E-03	J	4.50E-02		mg/kg	C032C763	3/4	Not Available	4.50E-02	NA	Y	FD
benzo(k)fluoranthene	207-08-9	3.00E-03	J	4.60E-02		mg/kg	C032C763	2/4	Not Available	4.60E-02	NA	Y	FD
benzo(a)pyrene	50-32-8	4.40E-03	J	4.60E-02		mg/kg	C032C763	2/4	Not Available	4.60E-02	NA	Y	FD
chrysene	218-01-9	3.70E-03	J	5.10E-02		mg/kg	C032C763	2/4	Not Available	5.10E-02	NA	Y	FD
dibenz(a,h)anthracene	53-70-3	8.50E-03		8.50E-03		mg/kg	C032C763	1/4	Not Available	8.50E-03	NA	Y	FD
fluoranthene	206-44-0	2.80E-03	J	5.40E-02		mg/kg	C032C763	3/4	Not Available	5.40E-02	NA	Y	FD
indeno(1,2,3-cd)pyrene	193-39-5	1.90E-03	J	4.90E-02		mg/kg	C032C763	3/4	Not Available	4.90E-02	NA	Y	FD

Notes:

[a] minimum and maximum detected concentrations

[b] 95th Quantile from Tetra Tech EM Inc. 2004. Remedial Investigation Report, Sites 6, 7, 8, and 16, Alameda Point, Alameda, California. Final. November 18.

[c] rationale codes:

selection reason:

frequency of detection (FD)

deletion reason:

low frequency of detection (LFD)

background comparison (BKG)

[d] although this chemical was found to be below background levels, it was retained as a COPC at the direction of U.S. EPA

Table J3-2
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Vadose Zone Soil (0–5 feet bgs)
AOC 1

Acronyms/Abbreviations:
- AOC – area of concern
- bgs – below ground surface
- BKG – background comparison
- CAS – Chemical Abstract Service
- COPC – chemical of potential concern
- FD – frequency of detection
- LFD – low frequency of detection
- mg/kg – micrograms per kilogram
- NA – not applicable
- U.S. EPA – United States Environmental Protection Agency
- (Y/N) – yes/no

Review Qualifiers:
- J – indicates a value estimated by the laboratory

Table J3-3
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Groundwater
AOC 1

Scenario Time Frame: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value	COPC Flag (Y/N)	Selection or Deletion[b]
Volatile Organic Compounds													
carbon disulfide	75-15-0	2.50E-04	J	2.10E-03		mg/L	C077G003	3/3	0.0002 - 0.0002	2.10E-03	NA	Y	FD
ethylbenzene	100-41-4	1.70E-03		1.70E-03		mg/L	C077G003	1/3	0.00023 - 0.00023	1.70E-03	NA	Y	FD
isopropylbenzene	98-82-8	3.70E-04	J	3.70E-04	J	mg/L	C077G003	1/3	0.00016 - 0.00016	3.70E-04	NA	Y	FD
p-isopropyltoluene	99-87-6	6.90E-04		6.90E-04		mg/L	C077G003	1/3	0.00012 - 0.00012	6.90E-04	NA	Y	FD
naphthalene	91-20-3	1.20E+00		1.20E+00		mg/L	C077G003	1/3	0.00036 - 0.018	1.20E+00	NA	Y	FD
toluene	108-88-3	7.90E-04		7.90E-04		mg/L	C077G003	1/3	0.00017 - 0.00017	7.90E-04	NA	Y	FD
1,2,4-trimethylbenzene	95-63-6	7.10E-03		7.10E-03		mg/L	C077G003	1/3	0.00019 - 0.00019	7.10E-03	NA	Y	FD
1,3,5-trimethylbenzene	108-67-8	2.30E-03		2.30E-03		mg/L	C077G003	1/3	0.00012 - 0.00012	2.30E-03	NA	Y	FD
m,p-xylene	7816-60-0	2.70E-03		2.70E-03		mg/L	C077G003	1/3	0.00019 - 0.00019	2.70E-03	NA	Y	FD
o-xylene	95-47-6	1.50E-03		1.50E-03		mg/L	C077G003	1/3	0.00019 - 0.00019	1.50E-03	NA	Y	FD

Notes:
[a] minimum and maximum detected concentrations
[b] rationale codes:
selection reason:
frequency of detection (FD)
deletion reason:
low frequency of detection (LFD)

Acronyms/Abbreviations:
AOC – area of concern
CAS – Chemical Abstract Service
COPC – chemical of potential concern
FD – frequency of detection
LFD – low frequency of detection
mg/L – milligrams per liter
NA – not applicable
(Y/N) – yes/no

Review Qualifiers:
J – indicates a value estimated by the laboratory

Table J3-4
Exposure Point Concentration Summary
Vadose Zone Soil (0–5 feet bgs)
AOC 1

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–5 feet bgs)

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Statistic	Rationale*
Volatile Organic Compounds							
acenaphthylene	mg/kg	NA	NA	2.40E-03	2.40E-03	Maximum	U.S. EPA guidance
anthracene	mg/kg	NA	NA	3.90E-03	3.90E-03	Maximum	U.S. EPA guidance
benzo(g,h,i)perylene	mg/kg	NA	NA	5.00E-02	5.00E-02	Maximum	U.S. EPA guidance
cis-1,2-dichloroethene	mg/kg	NA	NA	3.40E-04	3.40E-04	Maximum	U.S. EPA guidance
fluorene	mg/kg	NA	NA	1.20E-03	1.20E-03	Maximum	U.S. EPA guidance
2-methylnaphthalene	mg/kg	NA	NA	2.90E-03	2.90E-03	Maximum	U.S. EPA guidance
naphthalene	mg/kg	7.66E-03	1.37E-02	2.70E-03	2.70E-03	Maximum	U.S. EPA guidance
phenanthrene	mg/kg	NA	NA	2.90E-02	2.90E-02	Maximum	U.S. EPA guidance
pyrene	mg/kg	NA	NA	5.80E-02	5.80E-02	Maximum	U.S. EPA guidance
Semivolatile Organic Compounds							
benz(a)anthracene	mg/kg	NA	NA	2.70E-02	2.70E-02	Maximum	U.S. EPA guidance
benzo(b)fluoranthene	mg/kg	NA	NA	4.50E-02	4.50E-02	Maximum	U.S. EPA guidance
benzo(k)fluoranthene	mg/kg	NA	NA	4.60E-02	4.60E-02	Maximum	U.S. EPA guidance
benzo(a)pyrene	mg/kg	NA	NA	4.60E-02	4.60E-02	Maximum	U.S. EPA guidance
chrysene	mg/kg	NA	NA	5.10E-02	5.10E-02	Maximum	U.S. EPA guidance
dibenz(a,h)anthracene	mg/kg	NA	NA	8.50E-03	8.50E-03	Maximum	U.S. EPA guidance
fluoranthene	mg/kg	NA	NA	5.40E-02	5.40E-02	Maximum	U.S. EPA guidance
indeno(1,2,3-cd)pyrene	mg/kg	NA	NA	4.90E-02	4.90E-02	Maximum	U.S. EPA guidance

Notes:
* the maximum positive detection was used as the exposure point concentration when the 95% UCL exceeded the maximum positive detection

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
mg/kg – milligrams per kilogram
NA – not applicable
UCL – upper confidence limit
U.S. EPA – United States Environmental Protection Agency

Table J3-5
Exposure Point Concentration Summary
Groundwater
AOC 1

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Groundwater

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Statistic	Rationale*
Volatile Organic Compounds							
carbon disulfide	mg/L	NA	NA	2.10E-03	2.10E-03	Maximum	U.S. EPA guidance
ethylbenzene	mg/L	NA	NA	1.70E-03	1.70E-03	Maximum	U.S. EPA guidance
isopropylbenzene	mg/L	NA	NA	3.70E-04	3.70E-04	Maximum	U.S. EPA guidance
p-isopropyltoluene	mg/L	NA	NA	6.90E-04	6.90E-04	Maximum	U.S. EPA guidance
naphthalene	mg/L	NA	NA	1.20E+00	1.20E+00	Maximum	U.S. EPA guidance
toluene	mg/L	NA	NA	7.90E-04	7.90E-04	Maximum	U.S. EPA guidance
1,2,4-trimethylbenzene	mg/L	NA	NA	7.10E-03	7.10E-03	Maximum	U.S. EPA guidance
1,3,5-trimethylbenzene	mg/L	NA	NA	2.30E-03	2.30E-03	Maximum	U.S. EPA guidance
m,p-xylene	mg/L	NA	NA	2.70E-03	2.70E-03	Maximum	U.S. EPA guidance
o-xylene	mg/L	NA	NA	1.50E-03	1.50E-03	Maximum	U.S. EPA guidance

Notes:
* the maximum positive detection was used as the exposure point concentration when the 95% UCL exceeded the maximum positive detection

Acronyms/Abbreviations:
AOC – area of concern
mg/L – micrograms per liter
NA – not applicable
UCL – upper confidence limit
U.S. EPA – United States Environmental Protection Agency

Table J3-6
Human-Health Risk Assessment by Exposure Group
AOC 1

Exposure Group	U.S. EPA Cancer	Cal/EPA Cancer	Hazard Index
Residential			
All soil and groundwater exposure pathways			
Total	1E-06	4E-03	29
Exposure pathways for soil and vapors from VOCs in groundwater			
Total	1E-06	5E-05	2
Without PAHs in soil	0E+00	5E-05	2
Exposure pathways for residential use of groundwater			
Total	0E+00	4E-03	27

Acronyms/Abbreviations:
AOC – area of concern
Cal/EPA – California Environmental Protection Agency
U.S. EPA – United States Environmental Protection Agency

Table J3-7
Human-Health Risk Assessment by Pathway
AOC 1

Exposure Pathway	U.S. EPA Cancer	Cal/EPA Cancer	Hazard Index
Ingestion of soil	9E-07	1E-06	0.0001
Dermal contact with soil	4E-07	7E-07	0.00006
Direct Contact with Soil Subtotal	**1E-06**	**2E-06**	**0.0002**
Inhalation of vapors in indoor air from soil	0E+00	4E-08	0.003
Inhalation of vapors in indoor air from groundwater	0E+00	5E-05	2
Indoor Air Subtotal	**0E+00**	**5E-05**	**2**
Inhalation of vapors in outdoor air from soil	0E+00	1E-09	0.0001
Inhalation of particulates in outdoor air from soil	6E-11	3E-11	0.000000003
Outdoor Air Subtotal	**6E-11**	**1E-09**	**0.0001**
Ingestion of Homegrown Produce	1E-07	2E-07	0.000004
Total without residential use of groundwater	**1E-06**	**5E-05**	**2**
Ingestion of groundwater	0E+00	2E-03	4
Dermal contact while showering	0E+00	2E-03	4
Inhalation of vapors while showering	0E+00	4E-04	19
Residential Use of Groundwater Subtotal	**0E+00**	**4E-03**	**27**
Total with residential use of groundwater	**1E-06**	**4E-03**	**29**

Acronyms/Abbreviations:
AOC – area of concern
Cal/EPA – California Environmental Protection Agency
U.S. EPA – United States Environmental Protection Agency

Table J3-8
Summary of Risk Drivers for Cancer Risk
U.S. EPA (Residential)
AOC 1

Scenario Time Frame: Future
Exposure Point: Site 35
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Medium	Chemical	EPC: Direct Contact[a]	EPC: Indoor Vapor[b]	CANCER RISK: Ingestion	Dermal Contact	Inhalation While Showering	Inhalation of Dust	Inhalation of Indoor Air	Inhalation of Outdoor Air	Ingestion of Homegrown Produce	Exposure Route Total	Percent of Total
0–5 feet bgs	**Semivolatile Organic Compounds**											
Soil	benzo(a)pyrene	4.60E-02	—	6E-07	3E-07		4E-11			7E-08	1E-06	70%
	Risk Drivers Across Soil			**6E-07**	**3E-07**	**0E+00**	**4E-11**	**0E+00**	**0E+00**	**7E-08**	**1E-06**	
	Total Risk Across All Media			**9E-07**	**4E-07**	**0E+00**	**6E-11**	**0E+00**	**0E+00**	**1E-07**	**1E-06**	

Notes:
[a] units for soil concentrations are milligrams per kilogram (mg/kg) and units for groundwater concentrations are milligrams per liter (mg/L)
[b] units for vapor phase are milligrams per cubic meter (mg/m^3)

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
EPC – exposure point concentration
U.S. EPA – United States Environmental Protection Agency

Table J3-9
Summary of Risk Drivers for Cancer Risk
Cal/EPA (Residential)
AOC 1

Scenario Time Frame:	**Future**
Exposure Point:	**Site 35**
Receptor Population:	**Residential**
Receptor Age:	**Child/Adult**

		EPC		CANCER RISK								
Exposure Medium	**Chemical**	**Direct Contact[a]**	**Indoor Vapor[b]**	**Ingestion**	**Dermal Contact**	**Inhalation While Showering**	**Inhalation of Dust**	**Inhalation of Indoor Air**	**Inhalation of Outdoor Air**	**Ingestion of Homegrown Produce**	**Exposure Route Total**	**Percent of Total**
0–5 feet bgs	**Semivolatile Organic Compounds**											
Soil	benzo(a)pyrene	4.60E-02	—	9E-07	5E-07		2E-11			1E-07	2E-06	0.04%
	Risk Drivers Across Soil			**9E-07**	**5E-07**	**0E+00**	**2E-11**	**0E+00**	**0E+00**	**1E-07**	**2E-06**	
Groundwater	**Volatile Organic Compounds**											
	naphthalene	1.20E+00	2.96E-03	2E-03	2E-03	4E-04		5E-05			4E-03	100%
	Risk Drivers Across Groundwater			**2E-03**	**2E-03**	**4E-04**	**0E+00**	**5E-05**	**0E+00**	**0E+00**	**4E-03**	
	Total Risk Across All Media			**2E-03**	**2E-03**	**4E-04**	**3E-11**	**5E-05**	**1E-09**	**2E-07**	**4E-03**	

Notes:

[a] units for soil concentrations are milligrams per kilogram (mg/kg) and units for groundwater concentrations are milligrams per liter (mg/L)

[b] units for vapor phase are milligrams per cubic meter (mg/m^3)

Acronyms/Abbreviations:

AOC – area of concern
bgs – below ground surface
Cal/EPA – California Environmental Protection Agency
EPC – exposure point concentration

Table J3-10
Summary of Risk Drivers for Hazard Index
U.S. EPA (Residential)
AOC 1

Scenario Time Frame:	**Future**
Exposure Point:	**Site 35**
Receptor Population:	**Residential**
Receptor Age:	**Child**

		EPC		HAZARD INDEX								
Exposure Medium	**Chemical**	**Direct Contact[a]**	**Indoor Vapor[b]**	**Ingestion**	**Dermal Contact**	**Inhalation While Showering**	**Inhalation of Dust**	**Inhalation of Indoor Air**	**Inhalation of Outdoor Air**	**Ingestion of Homegrown Produce**	**Exposure Route Total**	**Percent of Total**
Groundwater	**Volatile Organic Compounds**											
	naphthalene	1.20E+00	2.96E-03	4E+00	4E+00	1.9E+01		2E+00			2.9E+01	99%
Risk Drivers Across Groundwater				**4E+00**	**4E+00**	**1.9E+01**	**0E+00**	**2E+00**	**0E+00**	**0E+00**	**2.9E+01**	
Total Hazard Index Across All Media				**4E+00**	**4E+00**	**1.9E+01**	**3E-09**	**2E+00**	**1E-04**	**4E-06**	**2.9E+01**	

Notes:

[a] units for soil concentrations are milligrams per kilogram (mg/kg) and units for groundwater concentrations are milligrams per liter (mg/L)

[b] units for vapor phase are milligrams per cubic meter (mg/m^3)

Acronyms/Abbreviations:

AOC – area of concern

EPC – exposure point concentration

U.S. EPA – United States Environmental Protection Agency

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Table J4-1
Chemicals of Potential Concern
AOC 3

Chemical	CAS Number	Vadose Zone Soil (0–5 feet bgs)
Volatile Organic Compounds		
acenaphthene	83-32-9	✔
acenaphthylene	208-96-8	✔
anthracene	120-12-7	✔
benzo(g,h,i)perylene	191-24-2	✔
fluorene	86-73-7	✔
2-methylnaphthalene	91-57-6	✔
naphthalene	91-20-3	✔
phenanthrene	85-01-8	✔
pyrene	129-00-0	✔
Semivolatile Organic Compounds		
benz(a)anthracene	56-55-3	✔
benzo(b)fluoranthene	205-99-2	✔
benzo(k)fluoranthene	207-08-9	✔
benzo(a)pyrene	50-32-8	✔
chrysene	218-01-9	✔
dibenz(a,h)anthracene	53-70-3	✔
fluoranthene	206-44-0	✔
indeno(1,2,3-cd)pyrene	193-39-5	✔
Pesticides/Polychlorinated Biphenyls		
alpha-chlordane	5103-71-9	✔
gamma-chlordane	5566-34-7	✔
4,4'-DDD	72-54-8	✔
4,4'-DDE	72-55-9	✔
4,4'-DDT	50-29-3	✔
dieldrin	60-57-1	✔
heptachlor	76-44-8	✔

Acronyms/Abbreviations:

AOC – area of concern
bgs – below ground surface
CAS – Chemical Abstract Service
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane

Table J4-2
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Vadose Zone Soil (0–5 feet bgs)
AOC 3

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–5 feet bgs)

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value[b]	COPC Flag (Y/N)	Selection or Deletion[c]
Volatile Organic Compounds													
acenaphthene	83-32-9	1.50E-03	J	1.50E-03	J	mg/kg	C032C943	2/4	Not Available	1.50E-03	NA	Y	FD
acenaphthylene	208-96-8	3.40E-03	J	4.40E-02	J	mg/kg	C032C944	3/4	Not Available	4.40E-02	NA	Y	FD
anthracene	120-12-7	7.60E-03		1.30E-01		mg/kg	C032C944	3/4	Not Available	1.30E-01	NA	Y	FD
benzo(g,h,i)perylene	191-24-2	1.90E-02	J	1.80E-01	J	mg/kg	C032C944	4/4	Not Available	1.80E-01	NA	Y	FD
fluorene	86-73-7	1.90E-03	J	2.90E-02	J	mg/kg	C032C944	3/4	Not Available	2.90E-02	NA	Y	FD
2-methylnaphthalene	91-57-6	1.10E-03	J	4.70E-03	J	mg/kg	C032C944	3/4	Not Available	4.70E-03	NA	Y	FD
naphthalene	91-20-3	4.00E-03	J	6.80E-03	J	mg/kg	C032C944	3/4	Not Available	6.80E-03	NA	Y	FD
phenanthrene	85-01-8	3.00E-02		5.90E-01		mg/kg	C032C944	3/4	Not Available	5.90E-01	NA	Y	FD
pyrene	129-00-0	1.20E-02	J	1.00E+00		mg/kg	C032C944	4/4	Not Available	1.00E+00	NA	Y	FD
Semivolatile Organic Compounds													
benz(a)anthracene	56-55-3	8.10E-03	J	2.60E-01		mg/kg	C032C944	4/4	Not Available	2.60E-01	NA	Y	FD
benzo(b)fluoranthene	205-99-2	1.50E-02	J	2.00E-01		mg/kg	C032C944	4/4	Not Available	2.00E-01	NA	Y	FD
benzo(k)fluoranthene	207-08-9	9.90E-03	J	2.60E-01		mg/kg	C032C944	4/4	Not Available	2.60E-01	NA	Y	FD
benzo(a)pyrene	50-32-8	1.20E-02	J	3.10E-01		mg/kg	C032C944	4/4	Not Available	3.10E-01	NA	Y	FD
chrysene	218-01-9	1.30E-02	J	3.20E-01		mg/kg	C032C944	4/4	Not Available	3.20E-01	NA	Y	FD
dibenz(a,h)anthracene	53-70-3	1.00E-02		3.40E-02	J	mg/kg	C032C944	3/4	Not Available	3.40E-02	NA	Y	FD
fluoranthene	206-44-0	1.00E-02	J	7.60E-01		mg/kg	C032C944	4/4	Not Available	7.60E-01	NA	Y	FD
indeno(1,2,3-cd)pyrene	193-39-5	1.10E-02	J	1.90E-01		mg/kg	C032C944	4/4	Not Available	1.90E-01	NA	Y	FD
Pesticides/Polychlorinated Biphenyls													
alpha-chlordane	5103-71-9	2.80E-02	J	2.80E-02	J	mg/kg	091-0001	1/13	0.0009 - 0.0011	2.80E-02	NA	Y	FD
gamma-chlordane	5566-34-7	2.60E-02	J	2.60E-02	J	mg/kg	091-0001	1/13	0.0009 - 0.0011	2.60E-02	NA	Y	FD
4,4'-DDD	72-54-8	1.40E-02	J	1.40E-02	J	mg/kg	091-0001	1/13	0.0004 - 0.0005	1.40E-02	NA	Y	FD
4,4'-DDE	72-55-9	3.90E-02	J	3.90E-02	J	mg/kg	091-0001	1/13	0.0004 - 0.0005	3.90E-02	NA	Y	FD
4,4'-DDT	50-29-3	4.70E-02	J	4.70E-02	J	mg/kg	091-0001	1/13	0.0004 - 0.0005	4.70E-02	NA	Y	FD
dieldrin	60-57-1	8.70E-03	J	8.70E-03	J	mg/kg	091-0001	1/13	0.0011 - 0.0013	8.70E-03	NA	Y	FD
heptachlor	76-44-8	1.80E+01	J	1.80E+01	J	mg/kg	C077S043	1/13	0.0011 - 0.0013	1.80E+01	NA	Y	FD

Table J4-2
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Vadose Zone Soil (0–5 feet bgs)
AOC 3

Notes:
[a] minimum and maximum detected concentrations
[b] 95th Quantile from Tetra Tech EM Inc. 2004. Remedial Investigation Report, Sites 6, 7, 8, and 16, Alameda Point, Alameda, California. Final. November 18.
[c] rationale codes:
selection reason:
frequency of detection (FD)
deletion reason:
low frequency of detection (LFD)
background comparison (BKG)

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
BKG – background comparison
CAS – Chemical Abstract Service
COPC – chemical of potential concern
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
FD – frequency of detection
LFD – low frequency of detection
mg/kg – milligrams per kilogram
NA – not applicable
(Y/N) – yes/no

Review Qualifiers:
J – indicates a value estimated by the laboratory

Table J4-3
Exposure Point Concentration Summary
Vadose Zone Soil (0–5 feet bgs)
AOC 3

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–5 feet bgs)

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Statistic	Rationale*
Volatile Organic Compounds							
acenaphthene	mg/kg	NA	NA	1.50E-03	1.50E-03	Maximum	U.S. EPA guidance
acenaphthylene	mg/kg	NA	NA	4.40E-02	4.40E-02	Maximum	U.S. EPA guidance
anthracene	mg/kg	NA	NA	1.30E-01	1.30E-01	Maximum	U.S. EPA guidance
benzo(g,h,i)perylene	mg/kg	NA	NA	1.80E-01	1.80E-01	Maximum	U.S. EPA guidance
fluorene	mg/kg	NA	NA	2.90E-02	2.90E-02	Maximum	U.S. EPA guidance
2-methylnaphthalene	mg/kg	NA	NA	4.70E-03	4.70E-03	Maximum	U.S. EPA guidance
naphthalene	mg/kg	NA	NA	6.80E-03	6.80E-03	Maximum	U.S. EPA guidance
phenanthrene	mg/kg	NA	NA	5.90E-01	5.90E-01	Maximum	U.S. EPA guidance
pyrene	mg/kg	NA	NA	1.00E+00	1.00E+00	Maximum	U.S. EPA guidance
Semivolatile Organic Compounds							
benz(a)anthracene	mg/kg	NA	NA	2.60E-01	2.60E-01	Maximum	U.S. EPA guidance
benzo(b)fluoranthene	mg/kg	NA	NA	2.00E-01	2.00E-01	Maximum	U.S. EPA guidance
benzo(k)fluoranthene	mg/kg	NA	NA	2.60E-01	2.60E-01	Maximum	U.S. EPA guidance
benzo(a)pyrene	mg/kg	NA	NA	3.10E-01	3.10E-01	Maximum	U.S. EPA guidance
chrysene	mg/kg	NA	NA	3.20E-01	3.20E-01	Maximum	U.S. EPA guidance
dibenz(a,h)anthracene	mg/kg	NA	NA	3.40E-02	3.40E-02	Maximum	U.S. EPA guidance
fluoranthene	mg/kg	NA	NA	7.60E-01	7.60E-01	Maximum	U.S. EPA guidance
indeno(1,2,3-cd)pyrene	mg/kg	NA	NA	1.90E-01	1.90E-01	Maximum	U.S. EPA guidance
Pesticides/Polychlorinated Biphenyls							
alpha-chlordane	mg/kg	4.58E-03	1.31E-02	2.80E-02	1.31E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
gamma-chlordane	mg/kg	4.42E-03	1.23E-02	2.60E-02	1.23E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
4,4'-DDD	mg/kg	3.50E-03	7.32E-03	1.40E-02	7.32E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
4,4'-DDE	mg/kg	5.42E-03	1.76E-02	3.90E-02	1.76E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
4,4'-DDT	mg/kg	6.04E-03	2.09E-02	4.70E-02	2.09E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
dieldrin	mg/kg	3.09E-03	5.15E-03	8.70E-03	5.15E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
heptachlor	mg/kg	1.39E+00	7.42E+00	1.80E+01	7.42E+00	Data are Non-parametric (0.05)	U.S. EPA guidance

Table J4-3
Exposure Point Concentration Summary
Vadose Zone Soil (0–5 feet bgs)
AOC 3

Notes:
* the maximum positive detection was used as the exposure point concentration when the 95% UCL exceeded the maximum positive detection

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
mg/kg – milligrams per kilogram
NA – not applicable
UCL – upper confidence limit
U.S. EPA – United States Environmental Protection Agency

Table J4-4
Human-Health Risk Assessment by Exposure Group
AOC 3

Exposure Group	U.S. EPA Cancer	Cal/EPA Cancer	Hazard Index
Residential			
All soil exposure pathways			
Total	3E-03	3E-03	3
Without PAHs in soil	3E-03	3E-03	3

Acronyms/Abbreviations:

AOC – area of concern

Cal/EPA – California Environmental Protection Agency

U.S. EPA – United States Environmental Protection Agency

Table J4-5
Human-Health Risk Assessment by Pathway
AOC 3

Exposure Pathway	U.S. EPA Cancer	Cal/EPA Cancer	Hazard Index
Ingestion of soil	6E-05	5E-05	0.2
Dermal contact with soil	2E-05	2E-05	0.05
Direct Contact with Soil Subtotal	**8E-05**	**7E-05**	**0.3**
Inhalation of vapors in indoor air from soil	0E+00	1E-07	0.006
Inhalation of vapors in indoor air from groundwater	NA	NA	NA
Indoor Air Subtotal	**0E+00**	**1E-07**	**0.006**
Inhalation of vapors in outdoor air from soil	0E+00	3E-09	0.0002
Inhalation of particulates in outdoor air from soil	4E-09	3E-09	0.000007
Outdoor Air Subtotal	**4E-09**	**6E-09**	**0.0002**
Ingestion of Homegrown Produce	3E-03	3E-03	3
Total without residential use of groundwater	**3E-03**	**3E-03**	**3**
Ingestion of groundwater	NA	NA	NA
Dermal contact while showering	NA	NA	NA
Inhalation of vapors while showering	NA	NA	NA
Residential Use of Groundwater Subtotal	**NA**	**NA**	**NA**
Total with residential use of groundwater	**3E-03**	**3E-03**	**3**

Acronyms/Abbreviations:
AOC – area of concern
Cal/EPA – California Environmental Protection Agency
U.S. EPA – United States Environmental Protection Agency

Table J4-6
Summary of Risk Drivers for Cancer Risk
U.S. EPA (Residential)
AOC 3

Scenario Time Frame:	**Future**
Exposure Point:	**Site 35**
Receptor Population:	**Residential**
Receptor Age:	**Child/Adult**

Exposure Medium	Chemical	EPC: Direct Contact[a]	EPC: Indoor Vapor[b]	CANCER RISK: Ingestion	Dermal Contact	Inhalation While Showering	Inhalation of Dust	Inhalation of Indoor Air	Inhalation of Outdoor Air	Ingestion of Homegrown Produce	Exposure Route Total	Percent of Total
0–5 feet bgs	**Semivolatile Organic Compounds**											
Soil	benzo(a)pyrene	3.10E-01	—	3E-06	2E-06		3E-10			4E-07	5E-06	0.2%
	Pesticides/Polychlorinated Biphenyls											
	dieldrin	5.15E-03	—	1E-07	5E-08		9E-12			1E-05	1E-05	0.3%
	heptachlor	7.42E+00	—	6E-05	2E-05		4E-09			3E-03	3E-03	90%
	Risk Drivers Across Soil			**6E-05**	**2E-05**	**0E+00**	**4E-09**	**0E+00**	**0E+00**	**3E-03**	**3E-03**	
	Total Risk Across All Media			**6E-05**	**2E-05**	**0E+00**	**4E-09**	**0E+00**	**0E+00**	**3E-03**	**3E-03**	

Notes:
[a] units for soil concentrations are milligrams per kilogram (mg/kg)
[b] units for vapor phase are milligrams per cubic meter (mg/m^3)

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
EPC – exposure point concentration
U.S. EPA – United States Environmental Protection Agency

Table J4-7
Summary of Risk Drivers for Cancer Risk
Cal/EPA (Residential)
AOC 3

Scenario Time Frame:	**Future**
Exposure Point:	**Site 35**
Receptor Population:	**Residential**
Receptor Age:	**Child/Adult**

		EPC		CANCER RISK								
Exposure Medium	**Chemical**	**Direct Contact[a]**	**Indoor Vapor[b]**	**Ingestion**	**Dermal Contact**	**Inhalation While Showering**	**Inhalation of Dust**	**Inhalation of Indoor Air**	**Inhalation of Outdoor Air**	**Ingestion of Homegrown Produce**	**Exposure Route Total**	**Percent of Total**
0–5 feet bgs	**Volatile Organic Compounds**											
Soil	benzo(a)pyrene	3.10E-01	—	6E-06	3E-06		1E-10			7E-07	1E-05	0.3%
	Pesticides/Polychlorinated Biphenyls											
	alpha-chlordane	1.31E-02	—	3E-08	5E-09		2E-12			1E-06	1E-06	0.04%
	dieldrin	5.15E-03	—	1E-07	5E-08		9E-12			1E-05	1E-05	0.3%
	heptachlor	7.42E+00	—	4E-05	2E-05		3E-09			3E-03	3E-03	85%
	Risk Drivers Across Soil			**5E-05**	**2E-05**	**0E+00**	**3E-09**	**0E+00**	**0E+00**	**3E-03**	**3E-03**	
	Total Risk Across All Media			**5E-05**	**2E-05**	**0E+00**	**3E-09**	**1E-07**	**3E-09**	**3E-03**	**3E-03**	

Notes:
[a] units for soil concentrations are milligrams per kilogram (mg/kg)
[b] units for vapor phase are milligrams per cubic meter (mg/m^3)

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
Cal/EPA – California Environmental Protection Agency
EPC – exposure point concentration

Table J4-8
Summary of Risk Drivers for Hazard Index
U.S. EPA (Residential)
AOC 3

Scenario Time Frame:	**Future**
Exposure Point:	**Site 35**
Receptor Population:	**Residential**
Receptor Age:	**Child**

		EPC		HAZARD INDEX								
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation While Showering	Inhalation of Dust	Inhalation of Indoor Air	Inhalation of Outdoor Air	Ingestion of Homegrown Produce	Exposure Route Total	Percent of Total
0–5 feet bgs	**Pesticides/Polychlorinated Biphenyls**											
Soil	heptachlor	7.42E+00	—	2E-01	5E-02		7E-06			3E+00	3E+00	98%
Risk Drivers Across Soil				**2E-01**	**5E-02**	**0E+00**	**7E-06**	**0E+00**	**0E+00**	**3E+00**	**3E+00**	
Total Hazard Index Across All Media				**2E-01**	**5E-02**	**0E+00**	**7E-06**	**6E-03**	**2E-04**	**3E+00**	**3E+00**	

Notes:
[a] units for soil concentrations are milligrams per kilogram (mg/kg)
[b] units for vapor phase are milligrams per cubic meter (mg/m^3)

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
EPC – exposure point concentration
U.S. EPA – United States Environmental Protection Agency

Table J5-1
Chemicals of Potential Concern
AOC 11/EBS 78-79

Chemical	CAS Number	Vadose Zone Soil (0–9 feet bgs)	Groundwater
Volatile Organic Compounds			
acenaphthene	83-32-9	✔	
acenaphthylene	208-96-8	✔	
acetone	67-64-1	✔	
anthracene	120-12-7	✔	
benzene	71-43-2	✔	✔
benzo(g,h,i)perylene	191-24-2	✔	
2-butanone	78-93-3	✔	✔
carbon disulfide	75-15-0		✔
cis-1,2-dichloroethene	156-59-2	✔	✔
trans-1,2-dichloroethene	156-60-5		✔
fluorene	86-73-7	✔	
methyl tert-butyl ether	1634-04-4	✔	
methylene chloride	75-09-2	✔	
2-methylnaphthalene	91-57-6	✔	
naphthalene	91-20-3	✔	
phenanthrene	85-01-8	✔	
pyrene	129-00-0	✔	✔
tetrachloroethene	127-18-4	✔	
toluene	108-88-3	✔	✔
trichloroethene	79-01-6		✔
m,p-xylene	7816-60-0	✔	✔
Semivolatile Organic Compounds			
benz(a)anthracene	56-55-3	✔	
benzo(b)fluoranthene	205-99-2	✔	
benzo(k)fluoranthene	207-08-9	✔	
benzo(a)pyrene	50-32-8	✔	
bis(2-ethylhexyl)phthalate	117-81-7	✔	
chrysene	218-01-9	✔	
dibenz(a,h)anthracene	53-70-3	✔	
di-n-butyl phthalate	84-74-2	✔	
fluoranthene	206-44-0	✔	
indeno(1,2,3-cd)pyrene	193-39-5	✔	
Pesticides/Polychlorinated Biphenyls			
Aroclor-1260	11096-82-5		✔
alpha-BHC	319-84-6		✔
gamma-BHC (lindane)	58-89-9		✔
alpha-chlordane	5103-71-9	✔	✔
gamma-chlordane	5566-34-7	✔	✔
4,4'-DDE	72-55-9	✔	✔
4,4'-DDT	50-29-3	✔	✔
dieldrin	60-57-1		✔
endosulfan I	959-98-8		✔
endosulfan II	33213-65-9		✔

Table J5-1
Chemicals of Potential Concern
AOC 11/EBS 78-79

Chemical	CAS Number	Vadose Zone Soil (0–9 feet bgs)	Groundwater
endosulfan sulfate	1031-07-8		✔
endrin aldehyde	7421-93-4		✔
heptachlor	76-44-8		✔
heptachlor epoxide	1024-57-3		✔
Metals			
aluminum	7429-90-5	✔	
antimony	7440-36-0	✔	
arsenic	7440-38-2	✔	✔
barium	7440-39-3	✔	✔
beryllium	7440-41-7	✔	✔
cadmium	7440-43-9	✔	
chromium	7440-47-3	✔	✔
chromium, hexavalent	18540-29-9	✔	
cobalt	7440-48-4	✔	
copper	7440-50-8	✔	
iron	7439-89-6	✔	✔
lead	7439-92-1	✔	
manganese	7439-96-5	✔	✔
mercury	7439-97-6	✔	
molybdenum	7439-98-7	✔	
nickel	7440-02-0	✔	
selenium	7782-49-2	✔	✔
silver	7440-22-4	✔	
thallium	7440-28-0	✔	
vanadium	7440-62-2	✔	✔
zinc	7440-66-6	✔	

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
BHC – benzene hexachloride
CAS – Chemical Abstract Service
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EBS – environmental baseline survey

Table J5-2
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Vadose Zone Soil (0–9 feet bgs)
AOC 11/EBS 78-79

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–9 feet bgs)

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value[b]	COPC Flag (Y/N)	Selection or Deletion[c]
Volatile Organic Compounds													
acenaphthene	83-32-9	1.50E-03	J	3.70E-03	J	mg/kg	C077S521	3/52	0.0013 - 0.0015	3.70E-03	NA	Yes	FD
acenaphthylene	208-96-8	2.80E-03	J	1.10E-02		mg/kg	C077S521	5/52	0.0013 - 0.0016	1.10E-02	NA	Yes	FD
acetone	67-64-1	2.20E-02	J	9.50E-02	J	mg/kg	C077S524	3/44	0.0028 - 0.0035	9.50E-02	NA	Yes	FD
anthracene	120-12-7	5.00E-04	J	1.30E-02		mg/kg	C077S521	10/52	0.0011 - 0.0014	1.30E-02	NA	Yes	FD
benzene	71-43-2	7.90E-04	J	7.90E-04	J	mg/kg	C077S532	1/44	0.00063 - 0.00078	7.90E-04	NA	Yes	FD
benzo(g,h,i)perylene	191-24-2	2.90E-03	J	1.70E-01		mg/kg	C077S521	21/52	0.0016 - 0.0019	1.70E-01	NA	Yes	FD
2-butanone	78-93-3	1.90E-03	J	2.70E-03	J	mg/kg	C077S507	3/44	0.00071 - 0.00088	2.70E-03	NA	Yes	FD
cis-1,2-dichloroethene	156-59-2	4.20E-04	J	1.70E-03	J	mg/kg	C077S524	3/44	0.00022 - 0.00027	1.70E-03	NA	Yes	FD
fluorene	86-73-7	1.40E-03	J	2.90E-03	J	mg/kg	C077S521	2/52	0.0014 - 0.0017	2.90E-03	NA	Yes	FD
methyl tert-butyl ether	1634-04-4	2.10E-03	J	2.10E-03	J	mg/kg	C077S524	1/44	0.001 - 0.001	2.10E-03	NA	Yes	FD
methylene chloride	75-09-2	1.10E-02	J	6.00E-02		mg/kg	C077S178	6/44	0.00458 - 0.0057	6.00E-02	NA	Yes	FD
2-methylnaphthalene	91-57-6	6.70E-04	J	3.50E-03	J	mg/kg	C077S521	4/52	0.0008 - 0.001	3.50E-03	NA	Yes	FD
naphthalene	91-20-3	4.80E-04	J	1.80E-02		mg/kg	C077S521	12/53	0.00041 - 0.0011	1.80E-02	NA	Yes	FD
phenanthrene	85-01-8	2.40E-03	J	5.60E-02		mg/kg	C077S521	14/52	0.0018 - 0.0021	5.60E-02	NA	Yes	FD
pyrene	129-00-0	2.00E-03	J	2.80E-01		mg/kg	C077S521	24/52	0.0016 - 0.0019	2.80E-01	NA	Yes	FD
tetrachloroethene	127-18-4	2.50E-03	J	2.50E-03	J	mg/kg	C077S524	1/44	0.00054 - 0.00067	2.50E-03	NA	Yes	FD
toluene	108-88-3	9.50E-04	J	9.50E-04	J	mg/kg	C077S524	1/44	0.00065 - 0.00081	9.50E-04	NA	Yes	FD
m,p-xylene	7816-60-0	5.00E-04	J	5.00E-04	J	mg/kg	C077S524	1/35	0.00043 - 0.00053	5.00E-04	NA	Yes	FD
Semivolatile Organic Compounds													
benz(a)anthracene	56-55-3	1.40E-03	J	9.80E-02		mg/kg	C077S521	23/52	0.0019 - 0.0022	9.80E-02	NA	Yes	FD
benzo(b)fluoranthene	205-99-2	1.80E-03	J	2.90E-01		mg/kg	C077S521	22/52	0.0014 - 0.0017	2.90E-01	NA	Yes	FD
benzo(k)fluoranthene	207-08-9	2.90E-03	J	8.90E-02	J	mg/kg	C077S522	18/52	0.0019 - 0.0023	8.90E-02	NA	Yes	FD
benzo(a)pyrene	50-32-8	1.80E-03	J	1.90E-01		mg/kg	C077S521	20/52	0.0014 - 0.0017	1.90E-01	NA	Yes	FD
bis(2-ethylhexyl)phthalate	117-81-7	1.60E-01	J	6.10E-01		mg/kg	C077S530	3/44	0.064 - 0.076	6.10E-01	NA	Yes	FD
chrysene	218-01-9	2.20E-03	J	1.40E-01		mg/kg	C077S521	28/52	0.0017 - 0.0021	1.40E-01	NA	Yes	FD
dibenz(a,h)anthracene	53-70-3	1.10E-03	J	2.10E-02		mg/kg	C077S522	10/52	0.0014 - 0.0017	2.10E-02	NA	Yes	FD
di-n-butyl phthalate	84-74-2	9.70E-02	J	4.80E-01		mg/kg	C077S529	10/44	0.068 - 0.082	4.80E-01	NA	Yes	FD
fluoranthene	206-44-0	2.40E-03	J	2.30E-01		mg/kg	C077S521	22/52	0.0019 - 0.0023	2.30E-01	NA	Yes	FD
indeno(1,2,3-cd)pyrene	193-39-5	1.40E-03	J	9.80E-02		mg/kg	C077S521	19/52	0.0021 - 0.0025	9.80E-02	NA	Yes	FD
Pesticides/Polychlorinated Biphenyls													
alpha-chlordane	5103-71-9	2.60E-03	J	2.60E-03	J	mg/kg	C077S508	1/44	0.0009 - 0.0011	2.60E-03	NA	Yes	FD
gamma-chlordane	5566-34-7	4.90E-03	J	4.90E-03	J	mg/kg	C077S508	1/35	0.0009 - 0.0011	4.90E-03	NA	Yes	FD

Table J5-2
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Vadose Zone Soil (0–9 feet bgs)
AOC 11/EBS 78-79

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value[b]	COPC Flag (Y/N)	Selection or Deletion[c]
4,4'-DDE	72-55-9	6.00E-02		6.00E-02		mg/kg	C077S508	1/44	0.0004 - 0.0005	6.00E-02	NA	Yes	FD
4,4'-DDT	50-29-3	4.30E-02		4.30E-02		mg/kg	C077S508	1/44	0.0004 - 0.0005	4.30E-02	NA	Yes	FD
Metals													
aluminum	7429-90-5	2.65E+03		3.30E+04		mg/kg	C077S504	35/35	4.2 - 112	3.30E+04	1.40E+04	Yes	FD
antimony	7440-36-0	1.20E+00	J	1.40E+00	J	mg/kg	C077S507	2/53	0.22 - 0.26	1.40E+00	9.50E+00	Yes	BKG[d]
arsenic	7440-38-2	6.00E-01		5.10E+00		mg/kg	79-011(A-D)	51/53	0.18 - 0.22	5.10E+00	9.14E+00	Yes	BKG[d]
barium	7440-39-3	1.44E+01		3.86E+02		mg/kg	C077S507	53/53	0.049 - 1.1	3.86E+02	9.37E+01	Yes	FD
beryllium	7440-41-7	5.30E-02	J	5.10E-01		mg/kg	88-001	40/53	0.046 - 0.055	5.10E-01	1.27E+00	Yes	BKG[d]
cadmium	7440-43-9	7.60E-02	J	2.00E+00		mg/kg	88-001	23/53	0.029 - 0.035	2.00E+00	1.72E+00	Yes	BKG[e]
chromium	7440-47-3	3.70E+00		1.13E+02		mg/kg	C077S507	53/53	0.03 - 0.036	1.13E+02	5.48E+01	Yes	FD
chromium, hexavalent	18540-29-9	4.00E-02	J	1.20E-01		mg/kg	79-001(A-D)	3/9	Not Available	1.20E-01	—	Yes	FD
cobalt	7440-48-4	2.40E+00		1.85E+01	J	mg/kg	C077S507	53/53	0.053 - 0.063	1.85E+01	1.43E+01	Yes	FD
copper	7440-50-8	3.00E+00		9.38E+01		mg/kg	C077S507	53/53	0.098 - 0.12	9.38E+01	3.91E+01	Yes	FD
iron	7439-89-6	7.21E+03		4.95E+04		mg/kg	C077S504	35/35	8.5 - 45	4.95E+04	2.23E+04	Yes	FD
lead	7439-92-1	1.10E+00		1.50E+02		mg/kg	79-002(A-D)	54/55	0.096 - 0.11	1.50E+02	3.77E+01	Yes	FD
manganese	7439-96-5	7.62E+01	J	1.16E+03	J	mg/kg	C077S507	35/35	0.14 - 2.9	1.16E+03	3.83E+02	Yes	FD
mercury	7439-97-6	6.80E-03	J	1.60E-01		mg/kg	79-001(A-D)	10/53	0.018 - 0.021	1.60E-01	5.20E-01	Yes	BKG[d]
molybdenum	7439-98-7	2.30E-01	J	2.30E-01	J	mg/kg	79-001(A-D)	1/18	Not Available	2.30E-01	5.20E+00	Yes	BKG[d]
nickel	7440-02-0	1.60E+00		5.90E+01		mg/kg	C077S507	53/53	0.071 - 0.084	5.90E+01	5.57E+01	Yes	FD
selenium	7782-49-2	1.30E-01	J	4.20E-01		mg/kg	79-001(A-D)	5/53	0.25 - 0.3	4.20E-01	1.78E+00	Yes	BKG[d]
silver	7440-22-4	3.30E-01		8.40E-01		mg/kg	C077S504	9/53	0.037 - 0.045	8.40E-01	2.22E+00	Yes	BKG[d]
thallium	7440-28-0	1.40E-01	J	1.50E-01	J	mg/kg	79-010(A-D)	2/53	0.21 - 0.26	1.50E-01	5.00E-01	Yes	BKG[d]
vanadium	7440-62-2	9.30E+00		1.10E+02		mg/kg	C077S507	53/53	0.058 - 0.069	1.10E+02	4.73E+01	Yes	FD
zinc	7440-66-6	7.80E+00		1.70E+02		mg/kg	79-002(A-D)	53/53	1.2 - 1.4	1.70E+02	6.75E+01	Yes	FD

Table J5-2
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Vadose Zone Soil (0–9 feet bgs)
AOC 11/EBS 78-79

Notes:

[a] minimum and maximum detected concentrations

[b] 95th Quantile from Tetra Tech EM Inc. 2004. Remedial Investigation Report, Sites 6, 7, 8, and 16, Alameda Point, Alameda, California. Final. November 18.

[c] rationale codes:

selection reason:

frequency of detection (FD)

deletion reason:

low frequency of detection (LFD)

background comparison (BKG)

[d] although this chemical was found to be below background levels, it was retained as a COPC at the direction of U.S. EPA

[e] although additional evaluation shows this chemical is below background levels (Appendix H), it was retained as a COPC at the direction of U.S. EPA

Acronyms/Abbreviations:

AOC – area of concern
bgs – below ground surface
BKG – background comparison
CAS – Chemical Abstract Service
COPC – chemical of potential concern
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EBS – environmental baseline survey
FD – frequency of detection
LFD – low frequency of detection
mg/kg – milligrams per kilogram
NA – not applicable
U.S. EPA – United States Environmental Protection Agency
(Y/N) – yes/no

Review Qualifiers:

J – indicates a value estimated by the laboratory

Table J5-3
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Groundwater
AOC 11/EBS 78-79

Scenario Time Frame: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value[b]	COPC Flag (Y/N)	Selection or Deletion[c]
Volatile Organic Compounds													
benzene	71-43-2	4.20E-04	J	4.20E-04	J	mg/L	C077G196	1/10	0.00016 - 0.00016	4.20E-04	NA	Y	FD
2-butanone	78-93-3	2.00E-01	J	2.00E-01	J	mg/L	C077G051	1/9	0.0006 - 0.0006	2.00E-01	NA	Y	FD
carbon disulfide	75-15-0	4.50E-04	J	6.50E-03		mg/L	C077G187	5/9	0.0002 - 0.0002	6.50E-03	NA	Y	FD
cis-1,2-dichloroethene	156-59-2	2.80E-04	J	3.90E-03		mg/L	C077G196	4/9	0.00016 - 0.00016	3.90E-03	NA	Y	FD
trans-1,2-dichloroethene	156-60-5	4.10E-04	J	4.10E-04	J	mg/L	C077G196	1/9	0.00019 - 0.00019	4.10E-04	NA	Y	FD
pyrene	129-00-0	1.40E-04	J	1.70E-04	J	mg/L	C077G181	2/10	0.0000845 - 0.0000845	1.70E-04	NA	Y	FD
toluene	108-88-3	1.90E-04	J	3.90E-04	J	mg/L	C077G196	3/10	0.00017 - 0.00017	3.90E-04	NA	Y	FD
trichloroethene	79-01-6	4.50E-04	J	1.10E-03		mg/L	C077G193	3/9	0.00016 - 0.00016	1.10E-03	NA	Y	FD
m,p-xylene	7816-60-0	2.00E-04	J	2.00E-04	J	mg/L	C077G196	1/9	0.00019 - 0.00019	2.00E-04	NA	Y	FD
Pesticides/Polychlorinated Biphenyls													
Aroclor-1260	11096-82-5	1.80E-04	J	1.80E-04	J	mg/L	C077G181	1/10	0.00009 - 0.00009	1.80E-04	NA	Y	FD
alpha-BHC	319-84-6	6.00E-06	J	6.00E-06	J	mg/L	C077G191	1/10	0.000005 - 0.000005	6.00E-06	NA	Y	FD
gamma-BHC (lindane)	58-89-9	7.00E-06	J	7.00E-06	J	mg/L	C077G191	1/10	0.000005 - 0.000005	7.00E-06	NA	Y	FD
alpha-chlordane	5103-71-9	9.00E-06	J	9.00E-06	J	mg/L	C077G191	1/10	0.000007 - 0.000007	9.00E-06	NA	Y	FD
gamma-chlordane	5566-34-7	9.00E-06	J	9.00E-06	J	mg/L	C077G191	1/10	0.000006 - 0.000006	9.00E-06	NA	Y	FD
4,4'-DDE	72-55-9	9.00E-06	J	9.00E-06	J	mg/L	C077G191	1/10	0.000004 - 0.000004	9.00E-06	NA	Y	FD
4,4'-DDT	50-29-3	1.00E-05	J	1.00E-05	J	mg/L	C077G191	1/10	0.000007 - 0.000007	1.00E-05	NA	Y	FD
dieldrin	60-57-1	9.00E-06	J	9.00E-06	J	mg/L	C077G191	1/10	0.000005 - 0.000005	9.00E-06	NA	Y	FD
endosulfan I	959-98-8	1.00E-05	J	1.00E-05	J	mg/L	C077G191	1/10	0.000005 - 0.000005	1.00E-05	NA	Y	FD
endosulfan II	33213-65-9	8.00E-06	J	8.00E-06	J	mg/L	C077G191	1/10	0.000004 - 0.000004	8.00E-06	NA	Y	FD
endosulfan sulfate	1031-07-8	7.00E-06	J	7.00E-06	J	mg/L	C077G191	1/10	0.000005 - 0.000005	7.00E-06	NA	Y	FD
endrin aldehyde	7421-93-4	1.10E-05	J	1.10E-05	J	mg/L	C077G191	1/10	0.000009 - 0.000009	1.10E-05	NA	Y	FD
heptachlor	76-44-8	1.00E-05	J	1.00E-05	J	mg/L	C077G191	1/10	0.000008 - 0.000008	1.00E-05	NA	Y	FD
heptachlor epoxide	1024-57-3	9.00E-06	J	9.00E-06	J	mg/L	C077G191	1/10	0.000007 - 0.000007	9.00E-06	NA	Y	FD
Metals													
arsenic	7440-38-2	3.40E-03	J	2.13E-02		mg/L	C077G196	4/10	0.00245 - 0.025	2.13E-02	2.07E-02	Y	BKG[e]
barium	7440-39-3	2.09E-01	J	5.67E-01		mg/L	C077G181	10/10	0.00075 - 0.0075	5.67E-01	5.70E-01	Y	BKG[d]
beryllium	7440-41-7	2.70E-04	J	2.70E-04	J	mg/L	C077G185	1/10	0.00024 - 0.0024	2.70E-04	2.50E-03	Y	BKG[d]

Table J5-3
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Groundwater
AOC 11/EBS 78-79

Scenario Time Frame: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value[b]	COPC Flag (Y/N)	Selection or Deletion[c]
chromium	7440-47-3	2.30E-03	J	2.00E-02	J	mg/L	C077G181	9/10	0.00137 - 0.014	2.00E-02	1.25E-02	Y	FD
iron	7439-89-6	1.08E+00		1.54E+01		mg/L	C077G181	10/10	0.0258 - 0.258	1.54E+01	6.59E+00	Y	BKG[e]
manganese	7439-96-5	2.37E-01		2.41E+00		mg/L	C077G181	10/10	0.00123 - 0.012	2.41E+00	1.74E+00	Y	BKG[e]
selenium	7782-49-2	6.50E-03		2.27E-02	J	mg/L	C077G187	4/10	0.00317 - 0.032	2.27E-02	8.58E-03	Y	FD
vanadium	7440-62-2	1.30E-03	J	8.10E-03	J	mg/L	C077G191	7/10	0.00097 - 0.0097	8.10E-03	2.63E-02	Y	BKG[d]

Notes:

[a] minimum and maximum detected concentrations

[b] 95th Quantile from Tetra Tech EM Inc. 2004. Remedial Investigation Report, Sites 6, 7, 8, and 16, Alameda Point, Alameda, California. Final. November 18.

[c] rationale codes:

selection reason:

frequency of detection (FD)

deletion reason:

low frequency of detection (LFD)

background comparison (BKG)

[d] although this chemical was found to be below background levels, it was retained as a COPC at the direction of U.S. EPA

[e] although additional evaluation shows this chemical is below background levels (Appendix H), it was retained as a COPC at the direction of U.S. EPA

Acronyms/Abbreviations:

AOC – area of concern
BHC – benzene hexachloride
BKG – background comparison
CAS – Chemical Abstract Service
COPC – chemical of potential concern
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EBS – environmental baseline survey
FD – frequency of detection
LFD – low frequency of detection
mg/L – milligrams per liter
NA – not applicable
U.S. EPA – United States Environmental Protection Agency
(Y/N) – yes/no

Review Qualifiers:

J – indicates a value estimated by the laboratory

Table J5-4
Exposure Point Concentration Summary
Vadose Zone Soil (0–9 feet bgs)
AOC 11/EBS 78-79

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–9 feet bgs)

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Statistic	Rationale*
Volatile Organic Compounds							
acenaphthene	mg/kg	2.87E-03	3.21E-03	3.70E-03	3.21E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
acenaphthylene	mg/kg	3.14E-03	3.93E-03	1.10E-02	3.93E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
acetone	mg/kg	4.18E-02	5.39E-02	9.50E-02	5.39E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
anthracene	mg/kg	3.05E-03	4.03E-03	1.30E-02	4.03E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
benzene	mg/kg	2.67E-03	2.92E-03	7.90E-04	7.90E-04	Maximum	U.S. EPA guidance
benzo(g,h,i)perylene	mg/kg	4.70E-02	8.94E-02	1.70E-01	8.94E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
2-butanone	mg/kg	3.75E-02	5.11E-02	2.70E-03	2.70E-03	Maximum	U.S. EPA guidance
cis-1,2-dichloroethene	mg/kg	2.61E-03	2.94E-03	1.70E-03	1.70E-03	Maximum	U.S. EPA guidance
fluorene	mg/kg	2.86E-03	3.20E-03	2.90E-03	2.90E-03	Maximum	U.S. EPA guidance
methyl tert-butyl ether	mg/kg	1.73E-02	2.28E-02	2.10E-03	2.10E-03	Maximum	U.S. EPA guidance
methylene chloride	mg/kg	2.35E-02	3.00E-02	6.00E-02	3.00E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
2-methylnaphthalene	mg/kg	3.43E-02	7.64E-02	3.50E-03	3.50E-03	Maximum	U.S. EPA guidance
naphthalene	mg/kg	3.28E-03	4.84E-03	1.80E-02	4.84E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
phenanthrene	mg/kg	5.89E-03	1.13E-02	5.60E-02	1.13E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
pyrene	mg/kg	5.11E-02	9.71E-02	2.80E-01	9.71E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
tetrachloroethene	mg/kg	2.72E-03	2.89E-03	2.50E-03	2.50E-03	Maximum	U.S. EPA guidance
toluene	mg/kg	2.68E-03	2.93E-03	9.50E-04	9.50E-04	Maximum	U.S. EPA guidance
m,p-xylene	mg/kg	2.73E-03	3.07E-03	5.00E-04	5.00E-04	Maximum	U.S. EPA guidance
Semivolatile Organic Compounds							
benz(a)anthracene	mg/kg	1.02E-02	2.02E-02	9.80E-02	2.02E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
benzo(b)fluoranthene	mg/kg	1.85E-02	4.56E-02	2.90E-01	4.56E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
benzo(k)fluoranthene	mg/kg	9.79E-03	2.12E-02	8.90E-02	2.12E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
benzo(a)pyrene	mg/kg	1.36E-02	3.18E-02	1.90E-01	3.18E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
bis(2-ethylhexyl)phthalate	mg/kg	1.88E-01	2.47E-01	6.10E-01	2.47E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
chrysene	mg/kg	9.27E-03	2.14E-02	1.40E-01	2.14E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
dibenz(a,h)anthracene	mg/kg	3.67E-03	5.64E-03	2.10E-02	5.64E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
di-n-butyl phthalate	mg/kg	1.71E-01	2.08E-01	4.80E-01	2.08E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
fluoranthene	mg/kg	1.50E-02	3.65E-02	2.30E-01	3.65E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
indeno(1,2,3-cd)pyrene	mg/kg	4.16E-02	8.31E-02	9.80E-02	8.31E-02	Data are Non-parametric (0.05)	U.S. EPA guidance

Table J5-4
Exposure Point Concentration Summary
Vadose Zone Soil (0–9 feet bgs)
AOC 11/EBS 78-79

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–9 feet bgs)

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Statistic	Rationale*
Pesticides/Polychlorinated Biphenyls							
alpha-chlordane	mg/kg	2.42E-03	2.94E-03	2.60E-03	2.60E-03	Maximum	U.S. EPA guidance
gamma-chlordane	mg/kg	2.87E-03	3.18E-03	4.90E-03	3.18E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
4,4'-DDE	mg/kg	3.91E-03	9.61E-03	6.00E-02	9.61E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
4,4'-DDT	mg/kg	3.53E-03	7.54E-03	4.30E-02	7.54E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
Metals							
aluminum	mg/kg	7.63E+03	1.21E+04	3.30E+04	1.21E+04	Data are Non-parametric (0.05)	U.S. EPA guidance
antimony	mg/kg	7.21E-01	1.09E+00	1.40E+00	1.09E+00	Data are Non-parametric (0.05)	U.S. EPA guidance
arsenic	mg/kg	2.44E+00	2.92E+00	5.10E+00	2.92E+00	Data are lognormal (0.05)	U.S. EPA guidance
barium	mg/kg	5.89E+01	9.95E+01	3.86E+02	9.95E+01	Data are Non-parametric (0.05)	U.S. EPA guidance
beryllium	mg/kg	1.97E-01	2.91E-01	5.10E-01	2.91E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
cadmium	mg/kg	7.18E-01	1.12E+00	2.00E+00	1.12E+00	Data are Non-parametric (0.05)	U.S. EPA guidance
chromium	mg/kg	3.06E+01	3.92E+01	1.13E+02	3.92E+01	Data are Non-parametric (0.05)	U.S. EPA guidance
chromium, hexavalent	mg/kg	NA	NA	1.20E-01	1.20E-01	Maximum	U.S. EPA guidance
cobalt	mg/kg	5.97E+00	7.78E+00	1.85E+01	7.78E+00	Data are Non-parametric (0.05)	U.S. EPA guidance
copper	mg/kg	1.05E+01	1.85E+01	9.38E+01	1.85E+01	Data are Non-parametric (0.05)	U.S. EPA guidance
iron	mg/kg	1.46E+04	2.23E+04	4.95E+04	2.23E+04	Data are Non-parametric (0.05)	U.S. EPA guidance
lead	mg/kg	1.31E+01	2.78E+01	1.50E+02	2.78E+01	Data are Non-parametric (0.05)	U.S. EPA guidance
manganese	mg/kg	2.34E+02	4.49E+02	1.16E+03	4.49E+02	Data are Non-parametric (0.05)	U.S. EPA guidance
mercury	mg/kg	3.08E-02	3.66E-02	1.60E-01	3.66E-02	Data are lognormal (0.05)	U.S. EPA guidance
molybdenum	mg/kg	5.00E-01	5.82E-01	2.30E-01	2.30E-01	Maximum	U.S. EPA guidance
nickel	mg/kg	2.87E+01	3.58E+01	5.90E+01	3.58E+01	Data are Non-parametric (0.05)	U.S. EPA guidance
selenium	mg/kg	2.45E-01	3.07E-01	4.20E-01	3.07E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
silver	mg/kg	1.53E-01	2.52E-01	8.40E-01	2.52E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
thallium	mg/kg	7.38E-01	1.02E+00	1.50E-01	1.50E-01	Maximum	U.S. EPA guidance
vanadium	mg/kg	2.49E+01	3.44E+01	1.10E+02	3.44E+01	Data are Non-parametric (0.05)	U.S. EPA guidance
zinc	mg/kg	3.87E+01	6.12E+01	1.70E+02	6.12E+01	Data are Non-parametric (0.05)	U.S. EPA guidance

Table J5-4
Exposure Point Concentration Summary
Vadose Zone Soil (0–9 feet bgs)
AOC 11/EBS 78-79

Notes:
* the maximum positive detection was used as the exposure point concentration when the 95% UCL exceeded the maximum positive detection

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EBS – environmental baseline survey
mg/kg – milligrams per kilogram
NA – not applicable
UCL – upper confidence limit
U.S. EPA – United States Environmental Protection Agency

Table J5-5
Exposure Point Concentration Summary
Groundwater
AOC 11/EBS 78-79

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Groundwater

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Statistic	Rationale*
Volatile Organic Compounds							
benzene	mg/L	2.67E-04	3.41E-04	4.20E-04	3.41E-04	Data are Non-parametric (0.05)	U.S. EPA guidance
2-butanone	mg/L	NA	NA	2.00E-01	2.00E-01	Maximum	U.S. EPA guidance
carbon disulfide	mg/L	NA	NA	6.50E-03	6.50E-03	Maximum	U.S. EPA guidance
cis-1,2-dichloroethene	mg/L	NA	NA	3.90E-03	3.90E-03	Maximum	U.S. EPA guidance
trans-1,2-dichloroethene	mg/L	NA	NA	4.10E-04	4.10E-04	Maximum	U.S. EPA guidance
pyrene	mg/L	1.11E-04	1.44E-04	1.70E-04	1.44E-04	Data are Non-parametric (0.05)	U.S. EPA guidance
toluene	mg/L	2.62E-04	3.32E-04	3.90E-04	3.32E-04	Data are Non-parametric (0.05)	U.S. EPA guidance
trichloroethene	mg/L	NA	NA	1.10E-03	1.10E-03	Maximum	U.S. EPA guidance
m,p-xylene	mg/L	NA	NA	2.00E-04	2.00E-04	Maximum	U.S. EPA guidance
Pesticides/Polychlorinated Biphenyls							
Aroclor-1260	mg/L	1.08E-04	1.43E-04	1.80E-04	1.43E-04	Data are Non-parametric (0.05)	U.S. EPA guidance
alpha-BHC	mg/L	9.60E-06	1.13E-05	6.00E-06	6.00E-06	Maximum	U.S. EPA guidance
gamma-BHC (lindane)	mg/L	9.70E-06	1.10E-05	7.00E-06	7.00E-06	Maximum	U.S. EPA guidance
alpha-chlordane	mg/L	9.90E-06	1.03E-05	9.00E-06	9.00E-06	Maximum	U.S. EPA guidance
gamma-chlordane	mg/L	9.90E-06	1.03E-05	9.00E-06	9.00E-06	Maximum	U.S. EPA guidance
4,4'-DDE	mg/L	9.90E-06	1.03E-05	9.00E-06	9.00E-06	Maximum	U.S. EPA guidance
4,4'-DDT	mg/L	1.00E-05	NA	1.00E-05	1.00E-05	Maximum	U.S. EPA guidance
dieldrin	mg/L	9.90E-06	1.03E-05	9.00E-06	9.00E-06	Maximum	U.S. EPA guidance
endosulfan I	mg/L	1.00E-05	NA	1.00E-05	1.00E-05	Maximum	U.S. EPA guidance
endosulfan II	mg/L	9.80E-06	1.07E-05	8.00E-06	8.00E-06	Maximum	U.S. EPA guidance
endosulfan sulfate	mg/L	9.70E-06	1.10E-05	7.00E-06	7.00E-06	Maximum	U.S. EPA guidance
endrin aldehyde	mg/L	1.01E-05	1.05E-05	1.10E-05	1.05E-05	Data are Non-parametric (0.05)	U.S. EPA guidance
heptachlor	mg/L	1.00E-05	NA	1.00E-05	1.00E-05	Maximum	U.S. EPA guidance
heptachlor epoxide	mg/L	9.90E-06	1.03E-05	9.00E-06	9.00E-06	Maximum	U.S. EPA guidance
Metals							
arsenic	mg/L	1.37E-02	1.88E-02	2.13E-02	1.88E-02	Data are normal (0.05)	U.S. EPA guidance
barium	mg/L	3.74E-01	4.41E-01	5.67E-01	4.41E-01	Data are normal (0.05)	U.S. EPA guidance
beryllium	mg/L	3.27E-03	8.75E-03	2.70E-04	2.70E-04	Maximum	U.S. EPA guidance
chromium	mg/L	8.36E-03	1.42E-02	2.00E-02	1.42E-02	Assuming gamma distribution (0.05)	U.S. EPA guidance

Table J5-5
Exposure Point Concentration Summary
Groundwater
AOC 11/EBS 78-79

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Groundwater

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Statistic	Rationale*
iron	mg/L	5.25E+00	9.37E+00	1.54E+01	9.37E+00	Data follow gamma distribution (0.05)	U.S. EPA guidance
manganese	mg/L	6.88E-01	1.09E+00	2.41E+00	1.09E+00	Data are lognormal (0.05)	U.S. EPA guidance
selenium	mg/L	1.19E-02	2.06E-02	2.27E-02	2.06E-02	Data follow gamma distribution (0.05)	U.S. EPA guidance
vanadium	mg/L	8.69E-03	1.68E-02	8.10E-03	8.10E-03	Maximum	U.S. EPA guidance

Notes:
* the maximum positive detection was used as the exposure point concentration when the 95% UCL exceeded the maximum positive detection

Acronyms/Abbreviations:
AOC – area of concern
BHC – benzene hexachloride
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EBS – environmental baseline survey
mg/L – micrograms per liter
NA – not applicable
UCL – upper confidence limit
U.S. EPA – United States Environmental Protection Agency

Table J5-6
Human-Health Risk Assessment by Exposure Group
AOC 11/EBS 78-79

Exposure Group	U.S. EPA Cancer	Cal/EPA Cancer	Hazard Index
Residential			
All soil and groundwater exposure pathways			
Total	3E-03	8E-03	233
Without metals below background	2E-03	5E-03	222
Exposure pathways for soil and vapors from VOCs in groundwater			
Total	2E-05	8E-05	2
Without metals below background	5E-06	3E-06	2
Without metals below background and PAHs in soil	4E-06	1E-06	2
Exposure pathways for residential use of groundwater			
Total	3E-03	8E-03	231
Without metals below background	2E-03	5E-03	220

Acronyms/Abbreviations:
AOC – area of concern
Cal/EPA – California Environmental Protection Agency
EBS – environmental baseline survey
U.S. EPA – United States Environmental Protection Agency

Table J5-7
Human-Health Risk Assessment by Pathway
AOC 11/EBS 78-79

Exposure Pathway	U.S. EPA Cancer	Cal/EPA Cancer	Hazard Index
Ingestion of soil	8E-06	4E-05	2
Dermal contact with soil	9E-07	5E-06	0.07
Direct Contact with Soil Subtotal	**9E-06**	**5E-05**	**2**
Inhalation of vapors in indoor air from soil	8E-08	3E-07	0.007
Inhalation of vapors in indoor air from groundwater	3E-06	2E-07	0.02
Indoor Air Subtotal	**3E-06**	**5E-07**	**0.03**
Inhalation of vapors in outdoor air from soil	7E-09	2E-08	0.0003
Inhalation of particulates in outdoor air from soil	2E-07	3E-07	0.03
Outdoor Air Subtotal	**2E-07**	**3E-07**	**0.03**
Ingestion of Homegrown Produce	5E-06	3E-05	0.1
Total without residential use of groundwater	**2E-05**	**8E-05**	**2**
Ingestion of groundwater	5E-04	3E-03	11
Dermal contact while showering	2E-03	5E-03	220
Inhalation of vapors while showering	1E-06	1E-07	0.009
Residential Use of Groundwater Subtotal	**3E-03**	**8E-03**	**231**
Total with residential use of groundwater	**3E-03**	**8E-03**	**233**

Acronyms/Abbreviations:
AOC – area of concern
Cal/EPA – California Environmental Protection Agency
EBS – environmental baseline survey
U.S. EPA – United States Environmental Protection Agency

Table J5-8
Summary of Risk Drivers for Cancer Risk
U.S. EPA (Residential)
AOC 11/EBS 78-79

Scenario Time Frame:	**Future**
Exposure Point:	**Site 35**
Receptor Population:	**Residential**
Receptor Age:	**Child/Adult**

Exposure Medium	Chemical	EPC: Direct Contact[a]	EPC: Indoor Vapor[b]	CANCER RISK: Ingestion	Dermal Contact	Inhalation While Showering	Inhalation of Dust	Inhalation of Indoor Air	Inhalation of Outdoor Air	Ingestion of Homegrown Produce	Exposure Route Total	Percent of Total
0–9 feet bgs	**Metals**											
Soil	arsenic[c]	2.92E+00	—	7E-06	6E-07		5E-09			5E-06	1E-05	0.41%
	Risk Drivers in Soil			**7E-06**	**6E-07**	**0E+00**	**5E-09**	**0E+00**	**0E+00**	**5E-06**	**1E-05**	
Groundwater	**Volatile Organic Compounds**											
	trichloroethene	1.10E-03	6.59E-05	6E-06	1E-06	1E-06		3E-06			1E-05	0.38%
	Pesticides/Polychlorinated Biphenyls											
	Aroclor-1260	1.43E-04	—	5E-06	2E-03						2E-03	69%
	alpha-BHC	6.00E-06	—	6E-07	7E-07						1E-06	0.042%
	gamma-chlordane	9.00E-06	—	5E-08	3E-06						3E-06	0.090%
	4,4'-DDE	9.00E-06	—	5E-08	2E-06						2E-06	0.074%
	4,4'-DDT	1.00E-05	—	5E-08	4E-06						4E-06	0.12%
	dieldrin	9.00E-06	—	2E-06	8E-06						9E-06	0.31%
	heptachlor	1.00E-05	—	6E-07	1E-05						1E-05	0.39%
	heptachlor epoxide	9.00E-06	—	1E-06	3E-06						4E-06	0.13%
	Metals											
	arsenic[c]	1.88E-02	—	5E-04	5E-06						5E-04	17%
	Risk Drivers in Groundwater			**5E-04**	**2E-03**	**1E-06**	**0E+00**	**3E-06**	**0E+00**	**0E+00**	**3E-03**	
	Total Risk Across All Media			**5E-04**	**2E-03**	**1E-06**	**2E-07**	**3E-06**	**7E-09**	**5E-06**	**3E-03**	

Notes:

[a] units for soil concentrations are milligrams per kilogram (mg/kg) and units for groundwater concentrations are milligrams per liter (mg/L)

[b] units for vapor phase are milligrams per cubic meter (mg/m^3)

[c] this chemical is below background

Acronyms/Abbreviations:

AOC – area of concern
bgs – below ground surface
BHC – benzene hexachloride
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EBS – environmental baseline survey
EPC – exposure point concentration
U.S. EPA – United States Environmental Protection Agency

Table J5-9
Summary of Risk Drivers for Cancer Risk
Cal/EPA (Residential)
AOC 11/EBS 78-79

Scenario Time Frame:	**Future**
Exposure Point:	**Site 35**
Receptor Population:	**Residential**
Receptor Age:	**Child/Adult**

		EPC		CANCER RISK								
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation While Showering	Inhalation of Dust	Inhalation of Indoor Air	Inhalation of Outdoor Air	Ingestion of Homegrown Produce	Exposure Route Total	Percent of Total
0–9 feet bgs Soil	**Semivolatile Organic Compounds**											
	benzo(a)pyrene	3.18E-02	—	6E-07	3E-07	0E+00	1E-11	0E+00	0E+00	7E-08	1E-06	0.01%
	Metals											
	arsenic[c]	2.92E+00	—	4E-05	5E-06		3E-09			3E-05	7E-05	0.9%
	cadmium[c]	1.12E+00	—	7E-07	2E-09		2E-09			6E-06	7E-06	0.08%
	Risk Drivers in Soil			**4E-05**	**5E-06**	**0E+00**	**5E-09**	**0E+00**	**0E+00**	**3E-05**	**8E-05**	
Groundwater	**Pesticides/Polychlorinated Biphenyls**											
	Aroclor-1260	1.43E-04	—	1E-05	5E-03						5E-03	63%
	alpha-chlordane	9.00E-06	—	2E-07	3E-06						3E-06	0.04%
	gamma-chlordane	9.00E-06	—	2E-07	9E-06						9E-06	0.1%
	4,4'-DDE	9.00E-06	—	5E-08	2E-06						2E-06	0.02%
	4,4'-DDT	1.00E-05	—	5E-08	3E-06						3E-06	0.04%
	dieldrin	9.00E-06	—	2E-06	8E-06						1E-05	0.1%
	heptachlor	1.00E-05	—	6E-07	1E-05						1E-05	0.1%
	heptachlor epoxide	9.00E-06	—	8E-07	2E-06						2E-06	0.03%
	Metals											
	arsenic[c]	1.88E-02	—	3E-03	3E-05						3E-03	38%
	Risk Drivers in Groundwater			**3E-03**	**5E-03**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**8E-03**	
	Total Risk Across All Media			**3E-03**	**5E-03**	**1E-07**	**3E-07**	**5E-07**	**2E-08**	**3E-05**	**8E-03**	

Notes:

[a] units for soil concentrations are milligrams per kilogram (mg/kg) and units for groundwater concentrations are milligrams per liter (mg/L)

[b] units for vapor phase are milligrams per cubic meter (mg/m^3)

[c] this chemical is below background

Acronyms/Abbreviations:

AOC – Area of concern
bgs – below ground surface
BHC – benzene hexachloride
Cal/EPA – California Environmental Protection Agency
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EBS – environmental baseline survey
EPC – exposure point concentration

Table J5-10
Summary of Risk Drivers for Hazard Index
U.S. EPA (Residential)
AOC 11/EBS 78-79

Scenario Time Frame: Future
Exposure Point: Site 35
Receptor Population: Residential
Receptor Age: Child

Exposure Medium	Chemical	EPC		HAZARD INDEX								
		Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation While Showering	Inhalation of Dust	Inhalation of Indoor Air	Inhalation of Outdoor Air	Ingestion of Homegrown Produce	Exposure Route Total	Percent of Total
0–9 feet bgs	**Metals**											
Soil	iron	2.23E+04	—	1E+00	3E-02		—			—	1E+00	0.44%
	Risk Drivers in Soil			**1E+00**	**3E-02**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**1E+00**	
Groundwater	**Pesticides/Polychlorinated Biphenyls**											
	Aroclor-1260	1.43E-04	—	5E-01	2.19E+02						2.20E+02	94%
	Metals											
	arsenic[c]	1.88E-02	—	4E+00	5E-02						4E+00	1.7%
	iron[c]	9.37E+00	—	2E+00	3E-03						2E+00	0.86%
	manganese[c]	1.09E+00	—	3E+00	2E-02						3E+00	1.3%
	Risk Drivers in Groundwater			**9.5E+00**	**2.19E+02**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**0E+00**	**2.29E+02**	
	Total Hazard Index Across All Media			**1.3E+01**	**2.20E+02**	**9E-03**	**3E-02**	**3E-02**	**3E-04**	**1E-01**	**2.33E+02**	

Notes:

[a] units for soil concentrations are milligrams per kilogram (mg/kg) and units for groundwater concentrations are milligrams per liter (mg/L)

[b] units for vapor phase are milligrams per cubic meter (mg/m^3)

[c] this chemical is below background

Acronyms/Abbreviations:

AOC – area of concern
bgs – below ground surface
BHC – benzene hexachloride
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EBS – environmental baseline survey
EPC – exposure point concentration
U.S. EPA – United States Environmental Protection Agency

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Table J6-1
Chemicals of Potential Concern
AOC 23

Chemical	CAS Number	Vadose Zone Soil (0–6 feet bgs)	Groundwater
Volatile Organic Compounds			
acenaphthene	83-32-9	✔	✔
acenaphthylene	208-96-8	✔	✔
acetone	67-64-1	✔	
anthracene	120-12-7	✔	✔
benzene	71-43-2	✔	✔
benzo(g,h,i)perylene	191-24-2	✔	✔
2-butanone	78-93-3	✔	
sec-butylbenzene	135-98-8	✔	
carbon disulfide	75-15-0	✔	✔
chlorobenzene	108-90-7	✔	
chloroform	67-66-3	✔	
dibenzofuran	132-64-9	✔	
1,2-dichlorobenzene	95-50-1	✔	✔
1,3-dichlorobenzene	541-73-1		✔
1,1-dichloroethane	75-34-3		✔
1,2-dichloroethane	107-06-2		✔
1,1-dichloroethene	75-35-4	✔	
cis-1,2-dichloroethene	156-59-2	✔	✔
trans-1,2-dichloroethene	156-60-5	✔	✔
ethylbenzene	100-41-4		✔
fluorene	86-73-7	✔	✔
isopropylbenzene	98-82-8	✔	
p-isopropyltoluene	99-87-6	✔	
methyl tert-butyl ether	1634-04-4	✔	✔
methylene chloride	75-09-2	✔	
2-methylnaphthalene	91-57-6	✔	✔
naphthalene	91-20-3	✔	✔
phenanthrene	85-01-8	✔	✔
n-propylbenzene	103-65-1	✔	
pyrene	129-00-0	✔	✔
tetrachloroethene	127-18-4	✔	✔
toluene	108-88-3	✔	✔
1,2,4-trichlorobenzene	120-82-1		✔
trichloroethene	79-01-6	✔	✔
1,2,4-trimethylbenzene	95-63-6		✔
1,3,5-trimethylbenzene	108-67-8	✔	
vinyl chloride	75-01-4	✔	✔
m,p-xylene	7816-60-0	✔	✔
o-xylene	95-47-6		✔
total xylenes	1330-20-7		✔

Table J6-1
Chemicals of Potential Concern
AOC 23

Chemical	CAS Number	Vadose Zone Soil (0–6 feet bgs)	Groundwater
Semivolatile Organic Compounds			
benz(a)anthracene	56-55-3	✔	✔
benzo(b)fluoranthene	205-99-2	✔	✔
benzo(k)fluoranthene	207-08-9	✔	
benzo(a)pyrene	50-32-8	✔	✔
bis(2-ethylhexyl)phthalate	117-81-7	✔	
bromoform	75-25-2	✔	
butyl benzyl phthalate	85-68-7		✔
carbazole	86-74-8	✔	
chrysene	218-01-9	✔	✔
dibenz(a,h)anthracene	53-70-3	✔	
di-n-butyl phthalate	84-74-2	✔	
1,4-dioxane	123-91-1		✔
fluoranthene	206-44-0	✔	✔
indeno(1,2,3-cd)pyrene	193-39-5	✔	✔
pentachlorophenol	87-86-5	✔	
phenol	108-95-2	✔	
Pesticides/Polychlorinated Biphenyls			
Aroclor-1016	12674-11-2		✔
Aroclor-1254	11097-69-1	✔	
Aroclor-1260	11096-82-5	✔	✔
alpha-BHC	319-84-6	✔	
alpha-chlordane	5103-71-9	✔	
4,4'-DDE	72-55-9	✔	
4,4'-DDT	50-29-3	✔	
endosulfan II	33213-65-9	✔	
heptachlor epoxide	1024-57-3	✔	
Metals			
aluminum	7429-90-5	✔	✔
antimony	7440-36-0	✔	
arsenic	7440-38-2	✔	✔
barium	7440-39-3	✔	✔
beryllium	7440-41-7	✔	✔
cadmium	7440-43-9	✔	✔
chromium	7440-47-3	✔	✔
cobalt	7440-48-4	✔	✔
copper	7440-50-8	✔	✔
iron	7439-89-6	✔	✔
lead	7439-92-1	✔	✔
manganese	7439-96-5	✔	✔
mercury	7439-97-6	✔	✔
molybdenum	7439-98-7		✔
nickel	7440-02-0	✔	✔
selenium	7782-49-2	✔	✔

Table J6-1
Chemicals of Potential Concern
AOC 23

Chemical	CAS Number	Vadose Zone Soil (0–6 feet bgs)	Groundwater
silver	7440-22-4	✔	✔
thallium	7440-28-0	✔	✔
vanadium	7440-62-2	✔	✔
zinc	7440-66-6	✔	✔

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
BHC – benzene hexachloride
CAS – Chemical Abstract Service
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane

Table J6-2
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Vadose Zone Soil (0–6 feet bgs)
AOC 23

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–6 feet bgs)

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value[b]	COPC Flag (Y/N)	Selection or Deletion[c]
Volatile Organic Compounds													
acenaphthene	83-32-9	1.40E-03	J	6.80E-01		mg/kg	C077S372	15/107	0.0013 - 0.0023	6.80E-01	NA	Y	FD
acenaphthylene	208-96-8	1.10E-03	J	2.10E-01		mg/kg	C077S372	25/107	0.0013 - 0.0024	2.10E-01	NA	Y	FD
acetone	67-64-1	3.30E-03	J	3.30E-01		mg/kg	C077S451	44/114	0.0028 - 0.0099	3.30E-01	NA	Y	FD
anthracene	120-12-7	6.70E-04	J	1.10E+00		mg/kg	C077S372	28/107	0.0011 - 0.002	1.10E+00	NA	Y	FD
benzene	71-43-2	2.70E-03	J	1.00E-02	J	mg/kg	071M-012	4/129	0.00063 - 0.0022	1.00E-02	NA	Y	FD
benzo(g,h,i)perylene	191-24-2	1.60E-03	J	2.00E+00		mg/kg	C077S372	75/107	0.0016 - 0.0028	2.00E+00	NA	Y	FD
2-butanone	78-93-3	9.90E-04	J	2.40E-02	J	mg/kg	C077S451	22/117	0.00071 - 0.0025	2.40E-02	NA	Y	FD
sec-butylbenzene	135-98-8	2.00E-03	J	2.00E-03	J	mg/kg	C077S421	1/90	0.00093 - 0.0033	2.00E-03	NA	Y	FD
carbon disulfide	75-15-0	1.20E-03	J	1.90E-02	J	mg/kg	C077S452	18/114	0.00108 - 0.0038	1.90E-02	NA	Y	FD
chlorobenzene	108-90-7	2.10E-02	J	2.10E-02	J	mg/kg	071M-012	1/126	0.00049 - 0.0017	2.10E-02	NA	Y	FD
chloroform	67-66-3	3.00E-03	J	3.70E-03	J	mg/kg	C077S377	2/126	0.00143 - 0.005	3.70E-03	NA	Y	FD
dibenzofuran	132-64-9	1.50E-01	J	1.10E+00		mg/kg	071I-001	2/124	0.059 - 0.11	1.10E+00	NA	Y	FD
1,2-dichlorobenzene	95-50-1	2.40E-03	J	2.40E-03	J	mg/kg	C077S405	1/149	0.00046 - 0.0016	2.40E-03	NA	Y	FD
1,1-dichloroethene	75-35-4	4.80E-03	J	4.80E-03	J	mg/kg	C077S411	1/129	0.00076 - 0.0027	4.80E-03	NA	Y	FD
cis-1,2-dichloroethene	156-59-2	2.90E-04	J	1.90E-01		mg/kg	C077S411	26/108	0.00022 - 0.00078	1.90E-01	NA	Y	FD
trans-1,2-dichloroethene	156-60-5	1.10E-03	J	1.60E-02		mg/kg	C077S411	2/111	0.00034 - 0.0012	1.60E-02	NA	Y	FD
fluorene	86-73-7	1.50E-03	J	6.10E-01	J	mg/kg	C077S372	13/107	0.0014 - 0.0025	6.10E-01	NA	Y	FD
isopropylbenzene	98-82-8	2.60E-03	J	2.60E-03	J	mg/kg	C077S447	1/90	0.00111 - 0.0039	2.60E-03	NA	Y	FD
p-isopropyltoluene	99-87-6	3.00E-03	J	3.00E-03	J	mg/kg	C077S421	1/90	0.00045 - 0.0016	3.00E-03	NA	Y	FD
methyl tert-butyl ether	1634-04-4	1.10E-03	J	2.50E-03	J	mg/kg	C077S362	16/92	0.001 - 0.004	2.50E-03	NA	Y	FD
methylene chloride	75-09-2	2.00E-03	J	4.00E-02		mg/kg	123-0016M	25/129	0.00458 - 0.016	4.00E-02	NA	Y	FD
2-methylnaphthalene	91-57-6	4.00E-04	J	5.50E-01	J	mg/kg	C077S372	28/107	0.0008 - 0.0015	5.50E-01	NA	Y	FD
naphthalene	91-20-3	3.90E-04	J	5.90E-01	J	mg/kg	C077S372	30/122	0.00041 - 0.0016	5.90E-01	NA	Y	FD
phenanthrene	85-01-8	4.20E-04	J	4.70E+00		mg/kg	C077S372	58/107	0.0018 - 0.0032	4.70E+00	NA	Y	FD
n-propylbenzene	103-65-1	1.50E-03	J	3.70E-03	J	mg/kg	C077S447	2/90	0.00042 - 0.0015	3.70E-03	NA	Y	FD
pyrene	129-00-0	1.90E-03	J	7.80E+00	J	mg/kg	C077S372	78/107	0.0016 - 0.029	7.80E+00	NA	Y	FD
tetrachloroethene	127-18-4	1.00E-03	J	6.60E-03	J	mg/kg	C077S362	19/129	0.00054 - 0.0019	6.60E-03	NA	Y	FD
toluene	108-88-3	8.40E-04	J	9.00E-03	J	mg/kg	071M-012	15/129	0.00065 - 0.0023	9.00E-03	NA	Y	FD
trichloroethene	79-01-6	6.00E-03	J	1.50E-02	J	mg/kg	C077S404	3/129	0.00094 - 0.0033	1.50E-02	NA	Y	FD
1,3,5-trimethylbenzene	108-67-8	2.50E-03	J	2.50E-03	J	mg/kg	C077S421	1/92	0.00097 - 0.0034	2.50E-03	NA	Y	FD
vinyl chloride	75-01-4	1.20E-02		2.10E-01		mg/kg	C077S411	2/129	0.0034 - 0.012	2.10E-01	NA	Y	FD
m,p-xylene	7816-60-0	6.20E-04	J	1.20E-03	J	mg/kg	C077S427	5/96	0.00043 - 0.0015	1.20E-03	NA	Y	FD

Table J6-2
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Vadose Zone Soil (0–6 feet bgs)
AOC 23

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–6 feet bgs)

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value[b]	COPC Flag (Y/N)	Selection or Deletion[c]
Semivolatile Organic Compounds													
benz(a)anthracene	56-55-3	8.30E-04	J	4.90E+00		mg/kg	C077S372	49/107	0.0019 - 0.034	4.90E+00	NA	Y	FD
benzo(b)fluoranthene	205-99-2	1.10E-03	J	7.00E+00	J	mg/kg	C077S372	67/107	0.0014 - 0.025	7.00E+00	NA	Y	FD
benzo(k)fluoranthene	207-08-9	1.10E-03	J	6.70E+00	J	mg/kg	C077S372	57/107	0.0019 - 0.034	6.70E+00	NA	Y	FD
benzo(a)pyrene	50-32-8	1.70E-03	J	4.20E+00		mg/kg	C077S372	75/107	0.0014 - 0.0025	4.20E+00	NA	Y	FD
bis(2-ethylhexyl)phthalate	117-81-7	2.40E-02	J	8.10E+00		mg/kg	124-0002M	10/124	0.064 - 0.11	8.10E+00	NA	Y	FD
bromoform	75-25-2	1.20E-03	J	1.20E-03	J	mg/kg	C077S421	1/126	0.0008 - 0.0028	1.20E-03	NA	Y	FD
carbazole	86-74-8	3.80E-01	J	3.80E-01	J	mg/kg	C077S372	1/84	0.084 - 0.15	3.80E-01	NA	Y	FD
chrysene	218-01-9	9.60E-04	J	3.90E+00		mg/kg	C077S372	52/107	0.0017 - 0.0031	3.90E+00	NA	Y	FD
dibenz(a,h)anthracene	53-70-3	2.90E-04	J	6.80E-01		mg/kg	C077S372	33/107	0.0014 - 0.0025	6.80E-01	NA	Y	FD
di-n-butyl phthalate	84-74-2	3.70E-02	J	1.10E+00		mg/kg	C077S435	31/124	0.068 - 0.12	1.10E+00	NA	Y	FD
fluoranthene	206-44-0	1.30E-03	J	7.90E+00		mg/kg	C077S372	71/107	0.0019 - 0.035	7.90E+00	NA	Y	FD
indeno(1,2,3-cd)pyrene	193-39-5	1.30E-03	J	1.90E+00		mg/kg	C077S372	68/107	0.0021 - 0.0037	1.90E+00	NA	Y	FD
pentachlorophenol	87-86-5	2.00E-02	J	2.00E-02	J	mg/kg	124-0005	1/123	0.061 - 0.11	2.00E-02	NA	Y	FD
phenol	108-95-2	3.90E-01	J	3.90E-01	J	mg/kg	071M-014	1/124	0.045 - 0.08	3.90E-01	NA	Y	FD
Pesticides/Polychlorinated Biphenyls													
Aroclor-1254	11097-69-1	1.50E-02	J	5.00E-02		mg/kg	124-0003M	2/106	0.0017 - 0.003	5.00E-02	NA	Y	FD
Aroclor-1260	11096-82-5	1.10E-02	J	5.00E-01	J	mg/kg	123-0022	8/106	0.0037 - 0.0067	5.00E-01	NA	Y	FD
alpha-BHC	319-84-6	2.00E-04	J	2.00E-04	J	mg/kg	123-0029	1/84	0.001 - 0.0019	2.00E-04	NA	Y	FD
alpha-chlordane	5103-71-9	2.10E-03		2.10E-03		mg/kg	072-0002	1/85	0.0009 - 0.0017	2.10E-03	NA	Y	FD
4,4'-DDE	72-55-9	2.00E-04	J	2.00E-03	J	mg/kg	123-0023	2/84	0.0004 - 0.0007	2.00E-03	NA	Y	FD
4,4'-DDT	50-29-3	2.10E-03	J	5.80E-03		mg/kg	123-0023	2/84	0.0004 - 0.0007	5.80E-03	NA	Y	FD
endosulfan II	33213-65-9	3.00E-03	J	3.00E-03	J	mg/kg	123-0022	1/84	0.0019 - 0.0033	3.00E-03	NA	Y	FD
heptachlor epoxide	1024-57-3	5.00E-04	J	5.00E-04	J	mg/kg	123-0024	1/84	0.0011 - 0.002	5.00E-04	NA	Y	FD
Metals													
aluminum	7429-90-5	3.30E+03		3.03E+04		mg/kg	C077S384	104/104	4.2 - 90	3.03E+04	1.40E+04	Y	BKG[e]
antimony	7440-36-0	8.70E-01	J	6.70E+00		mg/kg	123-0001M	7/131	0.21 - 0.38	6.70E+00	9.50E+00	Y	BKG[d]
arsenic	7440-38-2	7.60E-01		1.43E+01		mg/kg	123-0022	131/138	0.18 - 0.32	1.43E+01	9.14E+00	Y	BKG[e]
barium	7440-39-3	1.84E+01		4.74E+02		mg/kg	126-0009	137/138	0.049 - 0.087	4.74E+02	9.37E+01	Y	FD
beryllium	7440-41-7	5.10E-02	J	1.90E+00		mg/kg	071I-001	116/141	0.046 - 0.081	1.90E+00	1.27E+00	Y	FD
cadmium	7440-43-9	1.80E-02	J	1.10E+00		mg/kg	C077S397	65/141	0.029 - 0.052	1.10E+00	1.72E+00	Y	BKG[d]
chromium	7440-47-3	3.00E+00		1.07E+02	J	mg/kg	C077S384	137/141	0.03 - 0.054	1.07E+02	5.48E+01	Y	BKG[e]
cobalt	7440-48-4	2.80E+00		4.68E+01		mg/kg	C077S397	138/138	0.053 - 0.094	4.68E+01	1.43E+01	Y	FD
copper	7440-50-8	3.90E+00		1.85E+02		mg/kg	C077S397	139/141	0.097 - 0.17	1.85E+02	3.91E+01	Y	FD

Table J6-2
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Vadose Zone Soil (0–6 feet bgs)
AOC 23

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–6 feet bgs)

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value[b]	COPC Flag (Y/N)	Selection or Deletion[c]
iron	7439-89-6	6.38E+03	J	4.90E+04		mg/kg	C077S384	104/104	4 - 46	4.90E+04	2.23E+04	Y	FD
lead	7439-92-1	1.20E+00		1.35E+02		mg/kg	123-0007M	143/149	0.095 - 0.17	1.35E+02	3.77E+01	Y	FD
manganese	7439-96-5	6.09E+01	J	1.46E+03		mg/kg	126-0010	104/104	0.14 - 2.9	1.46E+03	3.83E+02	Y	BKG[e]
mercury	7439-97-6	2.60E-02	J	2.10E+00		mg/kg	C077S366	41/141	0.018 - 0.031	2.10E+00	5.20E-01	Y	FD
nickel	7440-02-0	1.70E+00		1.12E+02	J	mg/kg	C077S384	141/141	0.07 - 0.13	1.12E+02	5.57E+01	Y	FD
selenium	7782-49-2	3.20E-01	J	1.30E+00		mg/kg	126-0009	13/138	0.25 - 0.45	1.30E+00	1.78E+00	Y	BKG[d]
silver	7440-22-4	4.60E-02	J	8.39E-01		mg/kg	B06-10-002	51/141	0.037 - 0.067	8.39E-01	2.22E+00	Y	BKG[d]
thallium	7440-28-0	7.10E-01		6.40E+00	J	mg/kg	126-0005	12/138	0.21 - 0.38	6.40E+00	5.00E-01	Y	FD
vanadium	7440-62-2	1.16E+01		1.27E+02		mg/kg	C077S397	138/138	0.058 - 0.1	1.27E+02	4.73E+01	Y	BKG[e]
zinc	7440-66-6	1.01E+01		3.43E+02		mg/kg	C077S397	141/141	1.2 - 26	3.43E+02	6.75E+01	Y	FD

Notes:

[a] minimum and maximum detected concentrations

[b] 95th Quantile from Tetra Tech EM Inc. 2004. Remedial Investigation Report, Sites 6, 7, 8, and 16, Alameda Point, Alameda, California. Final. November 18.

[c] rationale codes:

selection reason:

frequency of detection (FD)

deletion reason:

low frequency of detection (LFD)

background comparison (BKG)

[d] although this chemical was found to be below background levels, it was retained as a COPC at the direction of U.S. EPA

[e] although additional evaluation shows this chemical is below background levels (Appendix H), it was retained as a COPC at the direction of U.S. EPA

Acronyms/Abbreviations:

AOC – area of concern
bgs – below ground surface
BHC – benzene hexachloride
BKG – background comparison
CAS – Chemical Abstract Service
COPC – chemical of potential concern
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
FD – frequency of detection
LFD – low frequency of detection
mg/kg – milligrams per kilogram
NA – not applicable
U.S. EPA – United States Environmental Protection Agency
(Y/N) – yes/no

Review Qualifiers:

J – indicates a value estimated by the laboratory

Table J6-3
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Groundwater
AOC 23

Scenario Time Frame: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value	COPC Flag (Y/N)	Selection or Deletion[b]
Volatile Organic Compounds													
acenaphthene	83-32-9	6.60E-05	J	2.10E-03		mg/L	C077G105	14/41	0.0000612 - 0.0000612	2.10E-03	NA	Y	FD
acenaphthylene	208-96-8	1.10E-04	J	5.80E-04		mg/L	C077G105	7/41	0.0000657 - 0.0000657	5.80E-04	NA	Y	FD
anthracene	120-12-7	1.30E-04	J	5.00E-04		mg/L	C077G113	7/41	0.00011 - 0.00011	5.00E-04	NA	Y	FD
benzene	71-43-2	1.60E-04	J	1.10E-03		mg/L	C077G105	9/60	0.00016 - 0.00016	1.10E-03	NA	Y	FD
benzo(g,h,i)perylene	191-24-2	1.20E-04	J	2.00E-03	J	mg/L	071M-013	2/41	0.0000785 - 0.0000785	2.00E-03	NA	Y	FD
carbon disulfide	75-15-0	2.90E-04	J	1.10E-02		mg/L	C077G148	24/55	0.0002 - 0.0002	1.10E-02	NA	Y	FD
1,2-dichlorobenzene	95-50-1	4.40E-03		4.40E-03		mg/L	C077G123	1/59	0.00017 - 0.00017	4.40E-03	NA	Y	FD
1,3-dichlorobenzene	541-73-1	1.20E-04	J	3.60E-04	J	mg/L	C077G124	3/59	0.00011 - 0.00011	3.60E-04	NA	Y	FD
1,1-dichloroethane	75-34-3	3.30E-04	J	2.80E-03		mg/L	C077G127	4/60	0.00019 - 0.00019	2.80E-03	NA	Y	FD
1,2-dichloroethane	107-06-2	9.10E-04		2.40E-03		mg/L	C077G153	2/60	0.00014 - 0.00014	2.40E-03	NA	Y	FD
cis-1,2-dichloroethene	156-59-2	2.10E-04	J	1.40E-03		mg/L	C077G124	11/49	0.00016 - 0.00016	1.40E-03	NA	Y	FD
trans-1,2-dichloroethene	156-60-5	3.70E-04	J	8.50E-04		mg/L	C077G141	2/49	0.00019 - 0.00019	8.50E-04	NA	Y	FD
ethylbenzene	100-41-4	5.30E-04		5.90E-04		mg/L	C077G105	2/60	0.00023 - 0.00023	5.90E-04	NA	Y	FD
fluorene	86-73-7	1.00E-04	J	1.20E-03		mg/L	C077G113	11/41	0.0000724 - 0.0000724	1.20E-03	NA	Y	FD
methyl tert-butyl ether	1634-04-4	2.80E-04	J	3.10E-04	J	mg/L	C077G113	3/50	0.00019 - 0.00019	3.10E-04	NA	Y	FD
2-methylnaphthalene	91-57-6	2.40E-04		2.40E-04		mg/L	C077G105	1/36	0.00006 - 0.00006	2.40E-04	NA	Y	FD
naphthalene	91-20-3	1.10E-04	J	4.20E-03		mg/L	C077G105	7/60	0.0000536 - 0.00036	4.20E-03	NA	Y	FD
phenanthrene	85-01-8	8.10E-05	J	3.00E-03	J	mg/L	071M-013	17/41	0.0000788 - 0.0000788	3.00E-03	NA	Y	FD
pyrene	129-00-0	1.20E-04	J	9.00E-03	J	mg/L	071M-013	21/41	0.0000845 - 0.0000845	9.00E-03	NA	Y	FD
tetrachloroethene	127-18-4	3.00E-04	J	4.70E-04	J	mg/L	C077G153	2/60	0.00015 - 0.00015	4.70E-04	NA	Y	FD
toluene	108-88-3	1.80E-04	J	1.10E-03		mg/L	C077G105	14/60	0.00017 - 0.00017	1.10E-03	NA	Y	FD
1,2,4-trichlorobenzene	120-82-1	2.90E-04	J	2.90E-04	J	mg/L	C077G150	1/58	0.00021 - 0.00021	2.90E-04	NA	Y	FD
trichloroethene	79-01-6	3.00E-04	J	9.40E-04		mg/L	C077G153	5/60	0.00016 - 0.00016	9.40E-04	NA	Y	FD
1,2,4-trimethylbenzene	95-63-6	2.40E-04	J	2.00E-03		mg/L	123-0042	5/48	0.00019 - 0.00019	2.00E-03	NA	Y	FD
vinyl chloride	75-01-4	6.20E-04		2.80E-03		mg/L	C077G122	4/60	0.00023 - 0.00023	2.80E-03	NA	Y	FD
m,p-xylene	7816-60-0	2.00E-04	J	7.90E-04		mg/L	C077G106	5/45	0.00019 - 0.00019	7.90E-04	NA	Y	FD
o-xylene	95-47-6	2.70E-04	J	5.30E-04		mg/L	C077G147	3/45	0.00019 - 0.00019	5.30E-04	NA	Y	FD

Table J6-3
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Groundwater
AOC 23

Scenario Time Frame: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value	COPC Flag (Y/N)	Selection or Deletion[b]
total xylenes	1330-20-7	2.00E-03		2.00E-03		mg/L	GPW03-240	1/15	Not Available	2.00E-03	NA	Y	FD
Semivolatile Organic Compounds													
benz(a)anthracene	56-55-3	5.60E-04		2.00E-03	J	mg/L	071M-013	2/41	0.0000689 - 0.0000689	2.00E-03	NA	Y	FD
benzo(b)fluoranthene	205-99-2	3.00E-03	J	3.00E-03	J	mg/L	071M-013	1/41	0.0000621 - 0.0000621	3.00E-03	NA	Y	FD
benzo(a)pyrene	50-32-8	3.00E-03	J	3.00E-03	J	mg/L	071M-013	1/41	0.0000577 - 0.0000577	3.00E-03	NA	Y	FD
butyl benzyl phthalate	85-68-7	1.00E-03	J	2.00E-03	J	mg/L	071M-010	2/41	0.0028 - 0.0028	2.00E-03	NA	Y	FD
chrysene	218-01-9	2.00E-03	J	2.00E-03	J	mg/L	071M-013	1/41	0.0000837 - 0.0000837	2.00E-03	NA	Y	FD
1,4-dioxane	123-91-1	1.80E-04	J	1.80E-04	J	mg/L	13-MW-03-C4142	1/1	Not Available	1.80E-04	NA	Y	FD
fluoranthene	206-44-0	9.30E-05	J	5.00E-03	J	mg/L	071M-013	11/41	0.0000823 - 0.0000823	5.00E-03	NA	Y	FD
indeno(1,2,3-cd)pyrene	193-39-5	2.00E-03	J	2.00E-03	J	mg/L	071M-013	1/41	0.0000644 - 0.0000644	2.00E-03	NA	Y	FD
Pesticides/Polychlorinated Biphenyls													
Aroclor-1016	12674-11-2	2.40E-04		2.40E-04		mg/L	C077G122	1/34	0.00012 - 0.00012	2.40E-04	NA	Y	FD
Aroclor-1260	11096-82-5	3.40E-04	J	3.40E-04	J	mg/L	C077G122	1/34	0.00009 - 0.00009	3.40E-04	NA	Y	FD
Metals													
aluminum	7429-90-5	3.64E-02	J	3.64E-02	J	mg/L	C077G114	1/38	0.0193 - 0.193	3.64E-02	1.07E+00	Y	BKG[c]
arsenic	7440-38-2	3.40E-03	J	2.26E-02		mg/L	C077G116	23/42	0.00245 - 0.025	2.26E-02	2.07E-02	Y	BKG[d]
barium	7440-39-3	1.17E-02		5.33E-01	J	mg/L	C077G132	42/42	0.00075 - 0.0075	5.33E-01	5.70E-01	Y	BKG[c]
beryllium	7440-41-7	2.40E-04	J	3.10E-03	J	mg/L	C077G106	13/42	0.00024 - 0.0024	3.10E-03	2.50E-03	Y	FD
cadmium	7440-43-9	1.50E-04	J	2.30E-04	J	mg/L	123-0040	3/42	0.00051 - 0.0051	2.30E-04	NA	Y	FD
chromium	7440-47-3	5.30E-04	J	4.22E-02	J	mg/L	C077G106	32/42	0.00137 - 0.014	4.22E-02	1.25E-02	Y	FD
cobalt	7440-48-4	8.10E-04	J	3.70E-03	J	mg/L	123-0040	4/42	0.00063 - 0.0063	3.70E-03	NA	Y	FD
copper	7440-50-8	1.70E-03	J	4.70E-03	J	mg/L	123-0040	4/42	0.00097 - 0.0097	4.70E-03	2.40E-02	Y	BKG[c]
iron	7439-89-6	2.99E-02	J	6.90E+00		mg/L	C077G106	36/38	0.0258 - 0.258	6.90E+00	6.59E+00	Y	FD
lead	7439-92-1	1.20E-03	J	1.20E-03	J	mg/L	123-0042	1/42	0.00185 - 0.019	1.20E-03	1.15E-02	Y	BKG[c]
manganese	7439-96-5	8.00E-02		2.55E+00		mg/L	C077G106	37/38	0.00123 - 0.012	2.55E+00	1.74E+00	Y	FD
mercury	7439-97-6	7.80E-07		1.20E-04	J	mg/L	123-0043	13/42	0.0000001 - 0.000041	1.20E-04	NA	Y	FD
molybdenum	7439-98-7	6.70E-03		1.05E-02		mg/L	123-0042	4/4	Not Available	1.05E-02	NA	Y	FD

Table J6-3
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Groundwater
AOC 23

Scenario Time Frame: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value	COPC Flag (Y/N)	Selection or Deletion[b]
nickel	7440-02-0	2.80E-03	J	7.20E-03		mg/L	C077G109A	5/42	0.00361 - 0.036	7.20E-03	NA	Y	FD
selenium	7782-49-2	3.20E-03	J	8.80E-03		mg/L	C077G122	9/42	0.00317 - 0.032	8.80E-03	8.58E-03	Y	FD
silver	7440-22-4	6.10E-04	J	6.10E-04	J	mg/L	123-0042	1/42	0.00073 - 0.0073	6.10E-04	NA	Y	FD
thallium	7440-28-0	2.70E-03	J	3.40E-03	J	mg/L	C077G122	3/42	0.00197 - 0.02	3.40E-03	1.62E-02	Y	BKG[c]
vanadium	7440-62-2	7.00E-04	J	3.14E-02	J	mg/L	C077G106	41/42	0.00097 - 0.0097	3.14E-02	2.63E-02	Y	FD
zinc	7440-66-6	3.20E-03	J	5.42E-02		mg/L	123-0041	4/42	0.012 - 0.318	5.42E-02	3.64E-02	Y	FD

Notes:
[a] minimum and maximum detected concentrations
[b] rationale codes:
selection reason:
frequency of detection (FD)
deletion reason:
low frequency of detection (LFD)
[c] although this chemical was found to be below background levels, it was retained as a COPC at the direction of U.S. EPA
[d] although additional evaluation shows this chemical is below background levels (Appendix H), it was retained as a COPC at the direction of U.S. EPA

Acronyms/Abbreviations:
AOC – area of concern
CAS – Chemical Abstract Service
COPC – chemical of potential concern
FD – frequency of detection
LFD – low frequency of detection
mg/L – milligrams per liter
NA – not applicable
(Y/N) – yes/no

Review Qualifiers:
J – indicates a value estimated by the laboratory

Table J6-4
Exposure Point Concentration Summary
Vadose Zone Soil (0–6 feet bgs)
AOC 23

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–6 feet bgs)

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Statistic	Rationale*
Volatile Organic Compounds							
acenaphthene	mg/kg	1.62E-02	4.55E-02	6.80E-01	4.55E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
acenaphthylene	mg/kg	9.72E-03	1.98E-02	2.10E-01	1.98E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
acetone	mg/kg	4.77E-02	6.68E-02	3.30E-01	6.68E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
anthracene	mg/kg	2.47E-02	7.30E-02	1.10E+00	7.30E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
benzene	mg/kg	3.62E-03	4.25E-03	1.00E-02	4.25E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
benzo(g,h,i)perylene	mg/kg	6.53E-02	1.59E-01	2.00E+00	1.59E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
2-butanone	mg/kg	3.24E-02	4.41E-02	2.40E-02	2.40E-02	Maximum	U.S. EPA guidance
sec-butylbenzene	mg/kg	1.08E-02	1.30E-02	2.00E-03	2.00E-03	Maximum	U.S. EPA guidance
carbon disulfide	mg/kg	3.26E-02	4.41E-02	1.90E-02	1.90E-02	Maximum	U.S. EPA guidance
chlorobenzene	mg/kg	3.66E-03	4.51E-03	2.10E-02	4.51E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
chloroform	mg/kg	3.71E-03	4.76E-03	3.70E-03	3.70E-03	Maximum	U.S. EPA guidance
dibenzofuran	mg/kg	2.08E-01	2.72E-01	1.10E+00	2.72E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
1,2-dichlorobenzene	mg/kg	8.35E-02	1.35E-01	2.40E-03	2.40E-03	Maximum	U.S. EPA guidance
1,1-dichloroethene	mg/kg	3.77E-03	4.81E-03	4.80E-03	4.80E-03	Maximum	U.S. EPA guidance
cis-1,2-dichloroethene	mg/kg	5.13E-03	1.28E-02	1.90E-01	1.28E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
trans-1,2-dichloroethene	mg/kg	3.31E-03	4.06E-03	1.60E-02	4.06E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
fluorene	mg/kg	1.39E-02	3.93E-02	6.10E-01	3.93E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
isopropylbenzene	mg/kg	1.07E-02	1.30E-02	2.60E-03	2.60E-03	Maximum	U.S. EPA guidance
p-isopropyltoluene	mg/kg	3.05E-03	3.48E-03	3.00E-03	3.00E-03	Maximum	U.S. EPA guidance
methyl tert-butyl ether	mg/kg	1.76E-02	2.33E-02	2.50E-03	2.50E-03	Maximum	U.S. EPA guidance
methylene chloride	mg/kg	2.06E-02	2.62E-02	4.00E-02	2.62E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
2-methylnaphthalene	mg/kg	1.36E-02	3.64E-02	5.50E-01	3.64E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
naphthalene	mg/kg	1.43E-02	3.63E-02	5.90E-01	3.63E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
phenanthrene	mg/kg	9.03E-02	2.94E-01	4.70E+00	2.94E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
n-propylbenzene	mg/kg	3.04E-03	3.47E-03	3.70E-03	3.47E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
pyrene	mg/kg	1.81E-01	5.26E-01	7.80E+00	5.26E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
tetrachloroethene	mg/kg	3.74E-03	4.78E-03	6.60E-03	4.78E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
toluene	mg/kg	3.44E-03	4.14E-03	9.00E-03	4.14E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
trichloroethene	mg/kg	3.76E-03	4.55E-03	1.50E-02	4.55E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
1,3,5-trimethylbenzene	mg/kg	1.06E-02	1.29E-02	2.50E-03	2.50E-03	Maximum	U.S. EPA guidance

Table J6-4
Exposure Point Concentration Summary
Vadose Zone Soil (0–6 feet bgs)
AOC 23

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–6 feet bgs)

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Statistic	Rationale*
vinyl chloride	mg/kg	7.42E-03	1.44E-02	2.10E-01	1.44E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
m,p-xylene	mg/kg	3.28E-03	4.12E-03	1.20E-03	1.20E-03	Maximum	U.S. EPA guidance
Semivolatile Organic Compounds							
benz(a)anthracene	mg/kg	7.92E-02	2.82E-01	4.90E+00	2.82E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
benzo(b)fluoranthene	mg/kg	1.20E-01	4.11E-01	7.00E+00	4.11E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
benzo(k)fluoranthene	mg/kg	1.04E-01	3.82E-01	6.70E+00	3.82E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
benzo(a)pyrene	mg/kg	9.35E-02	2.73E-01	4.20E+00	2.73E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
bis(2-ethylhexyl)phthalate	mg/kg	3.09E-01	6.61E-01	8.10E+00	6.61E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
bromoform	mg/kg	3.71E-03	4.77E-03	1.20E-03	1.20E-03	Maximum	U.S. EPA guidance
carbazole	mg/kg	3.23E-01	3.68E-01	3.80E-01	3.68E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
chrysene	mg/kg	6.40E-02	2.25E-01	3.90E+00	2.25E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
dibenz(a,h)anthracene	mg/kg	1.80E-02	4.70E-02	6.80E-01	4.70E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
di-n-butyl phthalate	mg/kg	2.05E-01	2.74E-01	1.10E+00	2.74E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
fluoranthene	mg/kg	1.42E-01	4.75E-01	7.90E+00	4.75E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
indeno(1,2,3-cd)pyrene	mg/kg	5.26E-02	1.36E-01	1.90E+00	1.36E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
pentachlorophenol	mg/kg	1.05E+00	1.36E+00	2.00E-02	2.00E-02	Maximum	U.S. EPA guidance
phenol	mg/kg	2.04E-01	2.60E-01	3.90E-01	2.60E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
Pesticides/Polychlorinated Biphenyls							
Aroclor-1254	mg/kg	4.17E-02	5.17E-02	5.00E-02	5.00E-02	Maximum	U.S. EPA guidance
Aroclor-1260	mg/kg	4.73E-02	6.88E-02	5.00E-01	6.88E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
alpha-BHC	mg/kg	2.49E-03	3.01E-03	2.00E-04	2.00E-04	Maximum	U.S. EPA guidance
alpha-chlordane	mg/kg	2.54E-03	3.03E-03	2.10E-03	2.10E-03	Maximum	U.S. EPA guidance
4,4'-DDE	mg/kg	2.71E-03	3.13E-03	2.00E-03	2.00E-03	Maximum	U.S. EPA guidance
4,4'-DDT	mg/kg	2.80E-03	3.24E-03	5.80E-03	3.24E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
endosulfan II	mg/kg	2.80E-03	3.21E-03	3.00E-03	3.00E-03	Maximum	U.S. EPA guidance
heptachlor epoxide	mg/kg	2.52E-03	3.03E-03	5.00E-04	5.00E-04	Maximum	U.S. EPA guidance
Metals							
aluminum	mg/kg	7.27E+03	9.91E+03	3.03E+04	9.91E+03	Data are Non-parametric (0.05)	U.S. EPA guidance
antimony	mg/kg	1.24E+00	2.01E+00	6.70E+00	2.01E+00	Data are Non-parametric (0.05)	U.S. EPA guidance
arsenic	mg/kg	2.94E+00	3.87E+00	1.43E+01	3.87E+00	Data are Non-parametric (0.05)	U.S. EPA guidance
barium	mg/kg	5.24E+01	7.50E+01	4.74E+02	7.50E+01	Data are Non-parametric (0.05)	U.S. EPA guidance
beryllium	mg/kg	4.91E-01	1.15E+00	1.90E+00	1.15E+00	Data are Non-parametric (0.05)	U.S. EPA guidance

Table J6-4
Exposure Point Concentration Summary
Vadose Zone Soil (0–6 feet bgs)
AOC 23

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–6 feet bgs)

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Statistic	Rationale*
cadmium	mg/kg	5.01E-01	1.16E+00	1.10E+00	1.10E+00	Maximum	U.S. EPA guidance
chromium	mg/kg	3.21E+01	3.79E+01	1.07E+02	3.79E+01	Data are Non-parametric (0.05)	U.S. EPA guidance
cobalt	mg/kg	6.72E+00	8.72E+00	4.68E+01	8.72E+00	Data are Non-parametric (0.05)	U.S. EPA guidance
copper	mg/kg	1.51E+01	2.31E+01	1.85E+02	2.31E+01	Data are Non-parametric (0.05)	U.S. EPA guidance
iron	mg/kg	1.40E+04	1.84E+04	4.90E+04	1.84E+04	Data are Non-parametric (0.05)	U.S. EPA guidance
lead	mg/kg	7.92E+00	1.39E+01	1.35E+02	1.39E+01	Data are Non-parametric (0.05)	U.S. EPA guidance
manganese	mg/kg	2.12E+02	3.21E+02	1.46E+03	3.21E+02	Data are Non-parametric (0.05)	U.S. EPA guidance
mercury	mg/kg	4.16E-01	1.08E+00	2.10E+00	1.08E+00	Data are Non-parametric (0.05)	U.S. EPA guidance
nickel	mg/kg	3.14E+01	3.80E+01	1.12E+02	3.80E+01	Data are Non-parametric (0.05)	U.S. EPA guidance
selenium	mg/kg	2.86E-01	3.43E-01	1.30E+00	3.43E-01	Data are Non-parametric (0.05)	U.S. EPA guidance
silver	mg/kg	4.76E-01	1.13E+00	8.39E-01	8.39E-01	Maximum	U.S. EPA guidance
thallium	mg/kg	9.15E-01	1.20E+00	6.40E+00	1.20E+00	Data are Non-parametric (0.05)	U.S. EPA guidance
vanadium	mg/kg	2.62E+01	3.24E+01	1.27E+02	3.24E+01	Data are Non-parametric (0.05)	U.S. EPA guidance
zinc	mg/kg	3.50E+01	5.00E+01	3.43E+02	5.00E+01	Data are Non-parametric (0.05)	U.S. EPA guidance

Notes:
* the maximum positive detection was used as the exposure point concentration when the 95% UCL exceeded the maximum positive detection

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
BHC – benzene hexachloride
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
mg/kg – milligrams per kilogram
UCL – upper confidence limit
U.S. EPA – United States Environmental Protection Agency

Table J6-5
Exposure Point Concentration Summary
Groundwater
AOC 23

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Groundwater

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Statistic	Rationale*
Volatile Organic Compounds							
acenaphthene	mg/L	1.38E-03	2.68E-03	2.10E-03	2.10E-03	Maximum	U.S. EPA guidance
acenaphthylene	mg/L	1.22E-03	2.61E-03	5.80E-04	5.80E-04	Maximum	U.S. EPA guidance
anthracene	mg/L	1.21E-03	2.59E-03	5.00E-04	5.00E-04	Maximum	U.S. EPA guidance
benzene	mg/L	3.01E-04	3.79E-04	1.10E-03	3.79E-04	Data are Non-parametric (0.05)	U.S. EPA guidance
benzo(g,h,i)perylene	mg/L	1.10E-03	2.44E-03	2.00E-03	2.00E-03	Maximum	U.S. EPA guidance
carbon disulfide	mg/L	3.04E-03	8.59E-03	1.10E-02	8.59E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
1,2-dichlorobenzene	mg/L	1.09E-03	2.09E-03	4.40E-03	2.09E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
1,3-dichlorobenzene	mg/L	1.02E-03	1.99E-03	3.60E-04	3.60E-04	Maximum	U.S. EPA guidance
1,1-dichloroethane	mg/L	3.83E-04	5.76E-04	2.80E-03	5.76E-04	Data are Non-parametric (0.05)	U.S. EPA guidance
1,2-dichloroethane	mg/L	3.18E-04	4.83E-04	2.40E-03	4.83E-04	Data are Non-parametric (0.05)	U.S. EPA guidance
cis-1,2-dichloroethene	mg/L	3.99E-04	5.85E-04	1.40E-03	5.85E-04	Data are Non-parametric (0.05)	U.S. EPA guidance
trans-1,2-dichloroethene	mg/L	3.06E-04	3.82E-04	8.50E-04	3.82E-04	Data are Non-parametric (0.05)	U.S. EPA guidance
ethylbenzene	mg/L	3.48E-04	4.32E-04	5.90E-04	4.32E-04	Data are Non-parametric (0.05)	U.S. EPA guidance
fluorene	mg/L	1.26E-03	2.64E-03	1.20E-03	1.20E-03	Maximum	U.S. EPA guidance
methyl tert-butyl ether	mg/L	4.64E-04	8.41E-04	3.10E-04	3.10E-04	Maximum	U.S. EPA guidance
2-methylnaphthalene	mg/L	1.47E-03	3.08E-03	2.40E-04	2.40E-04	Maximum	U.S. EPA guidance
naphthalene	mg/L	1.09E-03	2.08E-03	4.20E-03	2.08E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
phenanthrene	mg/L	1.42E-03	2.73E-03	3.00E-03	2.73E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
pyrene	mg/L	1.31E-03	2.68E-03	9.00E-03	2.68E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
tetrachloroethene	mg/L	3.30E-04	3.95E-04	4.70E-04	3.95E-04	Data are Non-parametric (0.05)	U.S. EPA guidance
toluene	mg/L	3.81E-04	4.99E-04	1.10E-03	4.99E-04	Data are Non-parametric (0.05)	U.S. EPA guidance
1,2,4-trichlorobenzene	mg/L	1.10E-03	2.13E-03	2.90E-04	2.90E-04	Maximum	U.S. EPA guidance
trichloroethene	mg/L	3.51E-04	4.32E-04	9.40E-04	4.32E-04	Data are Non-parametric (0.05)	U.S. EPA guidance
1,2,4-trimethylbenzene	mg/L	3.20E-04	4.86E-04	2.00E-03	4.86E-04	Data are Non-parametric (0.05)	U.S. EPA guidance
vinyl chloride	mg/L	3.88E-04	6.67E-04	2.80E-03	6.67E-04	Data are Non-parametric (0.05)	U.S. EPA guidance
m,p-xylene	mg/L	2.99E-04	3.82E-04	7.90E-04	3.82E-04	Data are Non-parametric (0.05)	U.S. EPA guidance
o-xylene	mg/L	2.84E-04	3.39E-04	5.30E-04	3.39E-04	Data are Non-parametric (0.05)	U.S. EPA guidance
total xylenes	mg/L	6.33E-04	1.08E-03	2.00E-03	1.08E-03	Data are Non-parametric (0.05)	U.S. EPA guidance

Table J6-5
Exposure Point Concentration Summary
Groundwater
AOC 23

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Groundwater

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Statistic	Rationale*
Semivolatile Organic Compounds							
benz(a)anthracene	mg/L	1.11E-03	2.45E-03	2.00E-03	2.00E-03	Maximum	U.S. EPA guidance
benzo(b)fluoranthene	mg/L	1.13E-03	2.48E-03	3.00E-03	2.48E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
benzo(a)pyrene	mg/L	1.13E-03	2.48E-03	3.00E-03	2.48E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
butyl benzyl phthalate	mg/L	4.83E-03	5.35E-03	2.00E-03	2.00E-03	Maximum	U.S. EPA guidance
chrysene	mg/L	1.10E-03	2.44E-03	2.00E-03	2.00E-03	Maximum	U.S. EPA guidance
1,4-dioxane	mg/L	NA	NA	1.80E-04	1.80E-04	Maximum	U.S. EPA guidance
fluoranthene	mg/L	1.30E-03	2.66E-03	5.00E-03	2.66E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
indeno(1,2,3-cd)pyrene	mg/L	1.10E-03	2.44E-03	2.00E-03	2.00E-03	Maximum	U.S. EPA guidance
Pesticides/Polychlorinated Biphenyls							
Aroclor-1016	mg/L	2.10E-04	4.30E-04	2.40E-04	2.40E-04	Maximum	U.S. EPA guidance
Aroclor-1260	mg/L	1.54E-04	2.55E-04	3.40E-04	2.55E-04	Data are Non-parametric (0.05)	U.S. EPA guidance
Metals							
aluminum	mg/L	8.91E-02	1.69E-01	3.64E-02	3.64E-02	Maximum	U.S. EPA guidance
arsenic	mg/L	8.23E-03	1.24E-02	2.26E-02	1.24E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
barium	mg/L	1.47E-01	1.83E-01	5.33E-01	1.83E-01	Data follow gamma distribution (0.05)	U.S. EPA guidance
beryllium	mg/L	1.34E-03	2.56E-03	3.10E-03	2.56E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
cadmium	mg/L	4.08E-03	7.76E-03	2.30E-04	2.30E-04	Maximum	U.S. EPA guidance
chromium	mg/L	5.31E-03	1.01E-02	4.22E-02	1.01E-02	Data are Non-parametric (0.05)	U.S. EPA guidance
cobalt	mg/L	3.79E-03	7.55E-03	3.70E-03	3.70E-03	Maximum	U.S. EPA guidance
copper	mg/L	4.31E-03	7.92E-03	4.70E-03	4.70E-03	Maximum	U.S. EPA guidance
iron	mg/L	1.60E+00	2.22E+00	6.90E+00	2.22E+00	Data follow gamma distribution (0.05)	U.S. EPA guidance
lead	mg/L	2.75E-03	5.09E-03	1.20E-03	1.20E-03	Maximum	U.S. EPA guidance
manganese	mg/L	4.09E-01	5.29E-01	2.55E+00	5.29E-01	Data follow gamma distribution (0.05)	U.S. EPA guidance
mercury	mg/L	6.62E-05	1.11E-04	1.20E-04	1.11E-04	Data are Non-parametric (0.05)	U.S. EPA guidance
molybdenum	mg/L	NA	NA	1.05E-02	1.05E-02	Maximum	U.S. EPA guidance
nickel	mg/L	4.52E-03	8.12E-03	7.20E-03	7.20E-03	Maximum	U.S. EPA guidance
selenium	mg/L	5.24E-03	8.80E-03	8.80E-03	8.80E-03	Maximum	U.S. EPA guidance
silver	mg/L	1.18E-03	2.20E-03	6.10E-04	6.10E-04	Maximum	U.S. EPA guidance
thallium	mg/L	4.57E-03	8.14E-03	3.40E-03	3.40E-03	Maximum	U.S. EPA guidance

Table J6-5
Exposure Point Concentration Summary
Groundwater
AOC 23

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Groundwater

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Statistic	Rationale*
vanadium	mg/L	5.08E-03	6.31E-03	3.14E-02	6.31E-03	Data follow gamma distribution (0.05)	U.S. EPA guidance
zinc	mg/L	4.23E-02	7.88E-02	5.42E-02	5.42E-02	Maximum	U.S. EPA guidance

Notes:
* the maximum positive detection was used as the exposure point concentration when the 95% UCL exceeded the maximum positive detection

Acronyms/Abbreviations:
AOC – area of concern
mg/L – micrograms per liter
UCL – upper confidence limit
U.S. EPA – United States Environmental Protection Agency

Table J6-6
Human-Health Risk Assessment by Exposure Group
AOC 23

Exposure Group	U.S. EPA Cancer	Cal/EPA Cancer	Hazard Index
Residential			
All soil and groundwater exposure pathways			
Total	2E-02	3E-02	408
Without metals below background	2E-02	3E-02	401
Exposure pathways for soil and vapors from VOCs in groundwater			
Total	3E-05	2E-04	3
Without metals below background	2E-05	5E-05	2
Without metals below background and PAHs in soil	1E-05	3E-05	2
Exposure pathways for residential use of groundwater			
Total	2E-02	3E-02	405
Without metals below background	2E-02	3E-02	399

Acronyms/Abbreviations:
AOC – area of concern
Cal/EPA – California Environmental Protection Agency
U.S. EPA – United States Environmental Protection Agency

Table J6-7
Human-Health Risk Assessment by Pathway
AOC 23

Exposure Pathway	U.S. EPA Cancer	Cal/EPA Cancer	Hazard Index
Ingestion of soil	1E-05	7E-05	2
Dermal contact with soil	3E-06	1E-05	0.1
Direct Contact with Soil Subtotal	**1E-05**	**8E-05**	**2**
Inhalation of vapors in indoor air from soil	1E-06	3E-06	0.05
Inhalation of vapors in indoor air from groundwater	3E-06	9E-06	0.03
Indoor Air Subtotal	**4E-06**	**1E-05**	**0.08**
Inhalation of vapors in outdoor air from soil	2E-07	6E-07	0.003
Inhalation of particulates in outdoor air from soil	2E-07	3E-07	0.02
Outdoor Air Subtotal	**4E-07**	**9E-07**	**0.02**
Ingestion of Homegrown Produce	2E-05	7E-05	0.6
Total without residential use of groundwater	**3E-05**	**2E-04**	**3**
Ingestion of groundwater	7E-04	2E-03	9.7
Dermal contact while showering	2E-02	3E-02	395
Inhalation of vapors while showering	6E-07	1E-06	0.06
Residential Use of Groundwater Subtotal	**2E-02**	**3E-02**	**405**
Total with residential use of groundwater	**2E-02**	**3E-02**	**408**

Acronyms/Abbreviations:
AOC – area of concern
Cal/EPA – California Environmental Protection Agency
U.S. EPA – United States Environmental Protection Agency

Table J6-8
Summary of Risk Drivers for Cancer Risk
U.S. EPA (Residential)
AOC 23

Scenario Time Frame: Future
Exposure Point: Site 35
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK								
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation While Showering	Inhalation of Dust	Inhalation of Indoor Air	Inhalation of Outdoor Air	Ingestion of Homegrown Produce	Exposure Route Total	Percent of Total
0–6 feet bgs	**Semivolatile Organic Compounds**											
Soil	benzo(a)pyrene	2.73E-01	—	3E-06	2E-06		2E-10			4E-07	5E-06	0.02%
	carbazole	3.68E-01	—	1E-08	3E-09		8E-13			2E-06	2E-06	0.01%
	dibenz(a,h)anthracene	4.70E-02	—	6E-07	3E-07		4E-11			7E-08	1E-06	0.005%
	Pesticides/Polychlorinated Biphenyls											
	Aroclor-1254	5.00E-02	—	2E-07	8E-08		1E-11			6E-06	6E-06	0.03%
	Aroclor-1260	6.88E-02	—	3E-07	1E-07		2E-11			4E-06	4E-06	0.02%
	Metals											
	arsenic[c]	3.87E+00	—	9E-06	8E-07		7E-09			6E-06	2E-05	0.08%
	Risk Drivers Across Soil			**1E-05**	**3E-06**	**0E+00**	**7E-09**	**0E+00**	**0E+00**	**2E-05**	**3E-05**	
Groundwater	**Volatile Organic Compounds**											
	tetrachloroethene	3.95E-04	4.59E-05	3E-06	3E-06	2E-08		1E-07			6E-06	0.03%
	trichloroethene	4.32E-04	3.16E-05	3E-06	6E-07	4E-07		2E-06			6E-06	0.03%
	vinyl chloride	6.67E-04	1.86E-04	1E-05	1E-06	3E-08		6E-07			1E-05	0.06%
	Semivolatile Organic Compounds											
	benz(a)anthracene	2.00E-03	—	2E-05	6E-04						6E-04	3%
	benzo(b)fluoranthene	2.48E-03	—	3E-05	6E-04						6E-04	3%
	benzo(a)pyrene	2.48E-03	—	3E-04	1E-02						1E-02	56%
	chrysene	2.00E-03	—	2E-07	6E-06						6E-06	0.03%
	indeno(1,2,3-cd)pyrene	2.00E-03	—	2E-05	2E-03						2E-03	9%
	Pesticides/Polychlorinated Biphenyls											
	Aroclor-1016	2.40E-04	—	3E-07	4E-06						4E-06	0.02%
	Aroclor-1260	2.55E-04	—	8E-06	4E-03						4E-03	19%
	Metals											
	arsenic[c]	1.24E-02	—	3E-04	3E-06						3E-04	2%
Risk Drivers Across Groundwater				**7E-04**	**2E-02**	**4E-07**	**0E+00**	**2E-06**	**0E+00**	**0E+00**	**2E-02**	
Total Risk Across All Media				**7E-04**	**2E-02**	**6E-07**	**2E-07**	**4E-06**	**2E-07**	**2E-05**	**2E-02**	

Table J6-8
Summary of Risk Drivers for Cancer Risk
U.S. EPA (Residential)
AOC 23

Scenario Time Frame: Future
Exposure Point: Site 35
Receptor Population: Residential
Receptor Age: Child/Adult

		EPC		CANCER RISK								
Exposure Medium	**Chemical**	**Direct Contact[a]**	**Indoor Vapor[b]**	**Ingestion**	**Dermal Contact**	**Inhalation While Showering**	**Inhalation of Dust**	**Inhalation of Indoor Air**	**Inhalation of Outdoor Air**	**Ingestion of Homegrown Produce**	**Exposure Route Total**	**Percent of Total**

Notes:

[a] units for soil concentrations are milligrams per kilogram (mg/kg) and units for groundwater concentrations are milligrams per liter (mg/L)

[b] units for vapor phase are milligrams per cubic meter (mg/m^3)

[c] this chemical is below background

Acronyms/Abbreviations:

AOC – area of concern
bgs – below ground surface
EPC – exposure point concentration
PAH – polycyclic aromatic hydrocarbons
U.S. EPA – United States Environmental Protection Agency

Table J6-9
Summary of Risk Drivers for Cancer Risk
Cal/EPA (Residential)
AOC 23

Scenario Time Frame:	**Future**
Exposure Point:	**Site 35**
Receptor Population:	**Residential**
Receptor Age:	**Child/Adult**

		EPC		CANCER RISK								
Exposure Medium	**Chemical**	**Direct Contact[a]**	**Indoor Vapor[b]**	**Ingestion**	**Dermal Contact**	**Inhalation While Showering**	**Inhalation of Dust**	**Inhalation of Indoor Air**	**Inhalation of Outdoor Air**	**Ingestion of Homegrown Produce**	**Exposure Route Total**	**Percent of Total**
0–6 feet bgs	**Volatile Organic Compounds**											
Soil	vinyl chloride	1.44E-02	4.52E-05	6E-09	2E-09			2E-06	6E-07	—	2E-06	0.008%
	Semivolatile Organic Compounds											
	benz(a)anthracene	2.82E-01	—	6E-07	3E-07		1E-11			6E-08	1E-06	0.003%
	benzo(b)fluoranthene	4.11E-01	—	7E-07	3E-07		2E-11			1E-07	1E-06	0.004%
	benzo(k)fluoranthene	3.82E-01	—	7E-07	3E-07		2E-11			9E-08	1E-06	0.004%
	benzo(a)pyrene	2.73E-01	—	6E-06	3E-06		1E-10			6E-07	1E-05	0.03%
	Pesticides/Polychlorinated Biphenyls											
	Aroclor-1254	5.00E-02	—	4E-07	2E-07		1E-11			1E-05	1E-05	0.05%
	Aroclor-1260	6.88E-02	—	6E-07	3E-07		2E-11			1E-05	1E-05	0.04%
	Metals											
	arsenic[c]	3.87E+00	—	6E-05	5E-06		5E-09			4E-05	1E-04	0.3%
	cadmium[c]	1.10E+00	—	7E-07	2E-09		2E-09			6E-06	7E-06	0.02%
	Risk Drivers Across Soil			**7E-05**	**9E-06**	**0E+00**	**7E-09**	**2E-06**	**6E-07**	**7E-05**	**2E-04**	
Groundwater	**Volatile Organic Compounds**											
	benzene	3.79E-04	1.65E-05	6E-07	1E-07	8E-08		3E-07			1E-06	0.004%
	naphthalene	2.08E-03	4.72E-06	3E-06	3E-06	6E-07		8E-08			7E-06	0.02%
	tetrachloroethene	3.95E-04	4.59E-05	3E-06	3E-06	2E-08		1E-07			6E-06	0.02%
	vinyl chloride	6.67E-04	1.86E-04	3E-06	3E-07	4E-07		8E-06			1E-05	0.04%
	Semivolatile Organic Compounds											
	benz(a)anthracene	2.00E-03	—	3E-05	9E-04						9E-04	3%
	benzo(b)fluoranthene	2.48E-03	—	5E-05	1E-03						1E-03	4%
	benzo(a)pyrene	2.48E-03	—	5E-04	2E-02						2E-02	55%
	chrysene	2.00E-03	—	3E-06	1E-04						1E-04	0.4%
	indeno(1,2,3-cd)pyrene	2.00E-03	—	3E-05	3E-03						3E-03	10%
	Pesticides/Polychlorinated Biphenyls											
	Aroclor-1016	2.40E-04	—	2E-05	3E-04						3E-04	1%
	Aroclor-1260	2.55E-04	—	2E-05	9E-03						9E-03	30%

Table J6-9
Summary of Risk Drivers for Cancer Risk
Cal/EPA (Residential)
AOC 23

Scenario Time Frame:	**Future**
Exposure Point:	**Site 35**
Receptor Population:	**Residential**
Receptor Age:	**Child/Adult**

Exposure Medium	Chemical	EPC: Direct Contact[a]	EPC: Indoor Vapor[b]	CANCER RISK: Ingestion	Dermal Contact	Inhalation While Showering	Inhalation of Dust	Inhalation of Indoor Air	Inhalation of Outdoor Air	Ingestion of Homegrown Produce	Exposure Route Total	Percent of Total
	Metals											
	arsenic[c]	1.24E-02	—	2E-03	2E-05						2E-03	5%
	cadmium	2.30E-04	—	1E-06	2E-09						1E-06	0.004%
Risk Drivers Across Groundwater				**2E-03**	**3E-02**	**1E-06**	**0E+00**	**9E-06**	**0E+00**	**0E+00**	**3E-02**	
Total Risk Across All Media				**2E-03**	**3E-02**	**1E-06**	**3E-07**	**1E-05**	**6E-07**	**7E-05**	**3E-02**	

Notes:

[a] units for soil concentrations are milligrams per kilogram (mg/kg) and units for groundwater concentrations are milligrams per liter (mg/L)

[b] units for vapor phase are milligrams per cubic meter (mg/m^3)

[c] this chemical is below background

Acronyms/Abbreviations:

AOC – area of concern
bgs – below ground surface
Cal/EPA – California Environmental Protection Agency
EPC – exposure point concentration

Table J6-10
Summary of Risk Drivers for Hazard Index
U.S. EPA (Residential)
AOC 23

Scenario Time Frame: Future
Exposure Point: Site 35
Receptor Population: Residential
Receptor Age: Child

		EPC		HAZARD INDEX								
Exposure Medium	Chemical	Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation While Showering	Inhalation of Dust	Inhalation of Indoor Air	Inhalation of Outdoor Air	Ingestion of Homegrown Produce	Exposure Route Total	Percent of Total
0–6 feet bgs	**Pesticides/Polychlorinated Biphenyls**											
Soil	Aroclor-1254	5.00E-02	—	3E-02	1E-02		1E-06			3E-01	3E-01	0.08%
	Aroclor-1260	6.88E-02	—	4E-02	2E-02		2E-06			2E-01	3E-01	0.06%
	Metals											
	aluminum[c]	9.91E+03	—	1E-01	4E-03		3E-03			—	1E-01	0.03%
	arsenic[c]	3.87E+00	—	2E-01	1E-02		—			3E-02	2E-01	0.06%
	cadmium[c]	1.10E+00	—	3E-02	8E-05		—			7E-02	1E-01	0.02%
	chromium[c]	3.79E+01	—	2E-01	5E-03		8E-03			—	2E-01	0.05%
	iron	1.84E+04	—	8E-01	2E-02		—			—	8E-01	0.2%
	manganese[c]	3.21E+02	—	2E-01	5E-03		1E-02			—	2E-01	0.05%
	thallium	1.20E+00	—	2E-01	7E-03		—			—	2E-01	0.05%
	vanadium[c]	3.24E+01	—	4E-01	1E-02		—			—	4E-01	0.1%
	Risk Drivers Across Soil			**2E+00**	**9E-02**	**0E+00**	**2E-02**	**0E+00**	**0E+00**	**6E-01**	**3E+00**	
Groundwater	**Volatile Organic Compounds**											
	benzo(g,h,i)perylene	2.00E-03	6.08E-08	4E-03	3E-01	9E-04		1E-06			3E-01	0.07%
	trichloroethene	4.32E-04	3.16E-05	9E-02	2E-02	6E-04		2E-03			1E-01	0.03%
	Semivolatile Organic Compounds											
	benzo(a)pyrene	2.48E-03	—	5E-03	2E-01						2E-01	0.05%
	indeno(1,2,3-cd)pyrene	2.00E-03	—	3E-03	3E-01						3E-01	0.07%
	Pesticides/Polychlorinated Biphenyls											
	Aroclor-1016	2.40E-04	—	2E-01	4E+00						4E+00	1%
	Aroclor-1260	2.55E-04	—	8E-01	3.90E+02						3.91E+02	96%
	Metals											
	arsenic[c]	1.24E-02	—	3E+00	3E-02						3E+00	0.7%
	chromium	1.01E-02	—	2E-01	2E-03						2E-01	0.05%
	iron	2.22E+00	—	5E-01	8E-04						5E-01	0.1%
	manganese	5.29E-01	—	1E+00	1E-02						1E+00	0.2%
	molybdenum	1.05E-02	—	1E-01	6E-04						1E-01	0.02%

Table J6-10
Summary of Risk Drivers for Hazard Index
U.S. EPA (Residential)
AOC 23

Scenario Time Frame: Future
Exposure Point: Site 35
Receptor Population: Residential
Receptor Age: Child

Exposure Medium	Chemical	EPC		HAZARD INDEX								
		Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation While Showering	Inhalation of Dust	Inhalation of Indoor Air	Inhalation of Outdoor Air	Ingestion of Homegrown Produce	Exposure Route Total	Percent of Total
	selenium	8.80E-03	—	1E-01	7E-04						1E-01	0.02%
	thallium[c]	3.40E-03	—	3E+00	2E-02						3E+00	0.7%
	vanadium	6.31E-03	—	4E-01	4E-03						4E-01	0.1%
Risk Drivers Across Groundwater				**9E+00**	**3.95E+02**	**2E-03**	**0E+00**	**2E-03**	**0E+00**	**0E+00**	**4.04E+02**	
Total Hazard Index Across All Media				**1.2E+01**	**3.95E+02**	**6E-02**	**2E-02**	**8E-02**	**3E-03**	**6E-01**	**4.08E+02**	

Notes:

[a] units for soil concentrations are milligrams per kilogram (mg/kg) and units for groundwater concentrations are milligrams per liter (mg/L)

[b] units for vapor phase are milligrams per cubic meter (mg/m^3)

[c] this chemical is below background

Acronyms/Abbreviations:

AOC – area of concern
bgs – below ground surface
EPC – exposure point concentration
U.S. EPA – United States Environmental Protection Agency

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Table J7-1
Chemicals of Potential Concern
EBS 205

Chemical	CAS Number	Vadose Zone Soil (0–3 feet bgs)	Groundwater
Volatile Organic Compounds			
acenaphthylene	208-96-8	✔	
anthracene	120-12-7	✔	
benzene	71-43-2		✔
benzo(g,h,i)perylene	191-24-2	✔	
tert-butylbenzene	98-06-6		✔
cis-1,2-dichloroethene	156-59-2	✔	✔
isopropylbenzene	98-82-8		✔
methylene chloride	75-09-2	✔	
2-methylnaphthalene	91-57-6	✔	
phenanthrene	85-01-8	✔	
pyrene	129-00-0	✔	
tetrachloroethene	127-18-4		✔
toluene	108-88-3		✔
trichloroethene	79-01-6		✔
vinyl chloride	75-01-4		✔
m,p-xylene	7816-60-0		✔
Semivolatile Organic Compounds			
benz(a)anthracene	56-55-3	✔	
benzo(b)fluoranthene	205-99-2	✔	
benzo(k)fluoranthene	207-08-9	✔	
benzo(a)pyrene	50-32-8	✔	
chrysene	218-01-9	✔	
fluoranthene	206-44-0	✔	
indeno(1,2,3-cd)pyrene	193-39-5	✔	
Metals			
aluminum	7429-90-5	✔	
arsenic	7440-38-2	✔	✔
barium	7440-39-3	✔	✔
beryllium	7440-41-7	✔	
chromium	7440-47-3	✔	
cobalt	7440-48-4	✔	
copper	7440-50-8	✔	
iron	7439-89-6	✔	✔
lead	7439-92-1	✔	
manganese	7439-96-5	✔	✔
mercury	7439-97-6	✔	✔
nickel	7440-02-0	✔	
vanadium	7440-62-2	✔	✔
zinc	7440-66-6	✔	

Acronyms/Abbreviations:
bgs – below ground surface
CAS – Chemical Abstract Service
EBS – environmental baseline survey

Table J7-2
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Vadose Zone Soil (0–3 feet bgs)
EBS 205

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–3 feet bgs)

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value[b]	COPC Flag (Y/N)	Selection or Deletion[c]
Volatile Organic Compounds													
acenaphthylene	208-96-8	4.60E-04	J	6.80E-04	J	mg/kg	C0592926	2/12	Not Available	6.80E-04	NA	Y	FD
anthracene	120-12-7	2.20E-04	J	3.70E-04	J	mg/kg	C0592926	4/12	Not Available	3.70E-04	NA	Y	FD
benzo(g,h,i)perylene	191-24-2	1.20E-03	J	6.30E-03		mg/kg	C0592943	5/12	Not Available	6.30E-03	NA	Y	FD
cis-1,2-dichloroethene	156-59-2	2.80E-04	J	3.70E-04	J	mg/kg	C077S545	2/3	0.00024 - 0.00025	3.70E-04	NA	Y	FD
methylene chloride	75-09-2	6.80E-03	J	6.80E-03	J	mg/kg	C077S544	1/3	0.0051 - 0.0053	6.80E-03	NA	Y	FD
2-methylnaphthalene	91-57-6	2.70E-04	J	4.30E-04	J	mg/kg	C0592932	4/12	Not Available	4.30E-04	NA	Y	FD
phenanthrene	85-01-8	3.30E-04	J	1.20E-03	J	mg/kg	C0592926	6/12	Not Available	1.20E-03	NA	Y	FD
pyrene	129-00-0	8.80E-04	J	4.10E-03	J	mg/kg	C0592926	7/12	Not Available	4.10E-03	NA	Y	FD
Semivolatile Organic Compounds													
benz(a)anthracene	56-55-3	2.80E-04	J	1.50E-03	J	mg/kg	C0592926	6/12	Not Available	1.50E-03	NA	Y	FD
benzo(b)fluoranthene	205-99-2	2.70E-04	J	2.50E-03	J	mg/kg	C0592926	5/12	Not Available	2.50E-03	NA	Y	FD
benzo(k)fluoranthene	207-08-9	2.90E-04	J	2.10E-03	J	mg/kg	C0592926	5/12	Not Available	2.10E-03	NA	Y	FD
benzo(a)pyrene	50-32-8	2.20E-03	J	2.50E-03	J	mg/kg	C0592926	2/12	Not Available	2.50E-03	NA	Y	FD
chrysene	218-01-9	4.50E-04	J	2.30E-03	J	mg/kg	C0592926	6/12	Not Available	2.30E-03	NA	Y	FD
fluoranthene	206-44-0	2.30E-03	J	2.60E-03	J	mg/kg	C0592926	3/12	Not Available	2.60E-03	NA	Y	FD
indeno(1,2,3-cd)pyrene	193-39-5	1.00E-03	J	5.00E-03	J	mg/kg	C0592943	4/12	Not Available	5.00E-03	NA	Y	FD
Metals													
aluminum	7429-90-5	5.42E+03		6.24E+03		mg/kg	C077S545	3/3	22 - 23	6.24E+03	1.40E+04	Y	BKG[d]
arsenic	7440-38-2	2.10E+00		4.20E+00		mg/kg	C077S545	3/3	0.19 - 0.2	4.20E+00	9.14E+00	Y	BKG[d]
barium	7440-39-3	3.82E+01		5.05E+01		mg/kg	C077S544	3/3	0.052 - 0.054	5.05E+01	9.37E+01	Y	BKG[d]
beryllium	7440-41-7	1.50E-01	J	1.90E-01	J	mg/kg	C077S545	3/3	0.049 - 0.05	1.90E-01	1.27E+00	Y	BKG[d]
chromium	7440-47-3	3.19E+01		4.48E+01		mg/kg	C077S545	3/3	0.032 - 0.033	4.48E+01	5.48E+01	Y	BKG[d]
cobalt	7440-48-4	5.00E+00	J	7.20E+00	J	mg/kg	C077S545	3/3	0.056 - 0.058	7.20E+00	1.43E+01	Y	BKG[d]
copper	7440-50-8	6.70E+00		9.70E+00		mg/kg	C077S545	3/3	0.1 - 0.11	9.70E+00	3.91E+01	Y	BKG[d]
iron	7439-89-6	1.09E+04		1.29E+04		mg/kg	C077S545	3/3	9 - 9.4	1.29E+04	2.23E+04	Y	BKG[d]
lead	7439-92-1	3.40E+00		8.80E+00		mg/kg	C077S545	3/3	0.1 - 0.11	8.80E+00	3.77E+01	Y	BKG[d]
manganese	7439-96-5	1.17E+02	J	1.74E+02	J	mg/kg	C077S545	3/3	0.14 - 0.15	1.74E+02	3.83E+02	Y	BKG[d]
mercury	7439-97-6	6.70E-02	J	1.10E-01		mg/kg	C077S544	2/3	0.019 - 0.019	1.10E-01	5.20E-01	Y	BKG[d]
nickel	7440-02-0	3.14E+01		5.14E+01		mg/kg	C077S545	3/3	0.075 - 0.078	5.14E+01	5.57E+01	Y	BKG[d]
vanadium	7440-62-2	2.05E+01		2.31E+01		mg/kg	C077S545	3/3	0.062 - 0.064	2.31E+01	4.73E+01	Y	BKG[d]

Table J7-2
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Vadose Zone Soil (0–3 feet bgs)
EBS 205

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–3 feet bgs)

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value[b]	COPC Flag (Y/N)	Selection or Deletion[c]
zinc	7440-66-6	1.95E+01		2.45E+01		mg/kg	C077S545	3/3	1.3 - 1.3	2.45E+01	6.75E+01	Y	BKG[d]

Notes:
[a] minimum and maximum detected concentrations
[b] 95th Quantile from Tetra Tech EM Inc. 2004. Remedial Investigation Report, Sites 6, 7, 8, and 16, Alameda Point, Alameda, California. Final. November 18.
[c] rationale codes:
selection reason:
frequency of detection (FD)
deletion reason:
low frequency of detection (LFD)
background comparison (BKG)
[d] although this chemical was found to be below background levels, it was retained as a COPC at the direction of U.S. EPA

Acronyms/Abbreviations:
bgs – below ground surface
BKG – background comparison
CAS – Chemical Abstract Service
COPC – chemical of potential concern
EBS – Environmental baseline survey
FD – frequency of detection
LFD – low frequency of detection
mg/kg – milligrams per kilogram
NA – not applicable
U.S. EPA – United States Environmental Protection Agency
(Y/N) – yes/no

Review Qualifiers:
J – indicates a value estimated by the laboratory

Table J7-3
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Groundwater
EBS 205

Scenario Time Frame: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value	COPC Flag (Y/N)	Selection or Deletion[b]
Volatile Organic Compounds													
benzene	71-43-2	4.80E-04	J	4.80E-04	J	mg/L	C077G202	1/2	0.00016 - 0.00016	4.80E-04	NA	Y	FD
tert-butylbenzene	98-06-6	2.60E-04	J	2.60E-04	J	mg/L	C077G202	1/2	0.00013 - 0.00013	2.60E-04	NA	Y	FD
cis-1,2-dichloroethene	156-59-2	8.30E-03		8.30E-03		mg/L	C077G202	1/2	0.00016 - 0.00016	8.30E-03	NA	Y	FD
isopropylbenzene	98-82-8	2.00E-04	J	2.00E-04	J	mg/L	C077G202	1/2	0.00016 - 0.00016	2.00E-04	NA	Y	FD
tetrachloroethene	127-18-4	2.10E-04	J	1.40E-03		mg/L	C077G202	2/2	0.00015 - 0.00015	1.40E-03	NA	Y	FD
toluene	108-88-3	1.80E-04	J	1.80E-04	J	mg/L	C077G202	1/2	0.00017 - 0.00017	1.80E-04	NA	Y	FD
trichloroethene	79-01-6	2.80E-03		2.80E-03		mg/L	C077G202	1/2	0.00016 - 0.00016	2.80E-03	NA	Y	FD
vinyl chloride	75-01-4	1.80E-03		1.80E-03		mg/L	C077G202	1/2	0.00023 - 0.00023	1.80E-03	NA	Y	FD
m,p-xylene	7816-60-0	2.30E-04	J	2.30E-04	J	mg/L	C077G202	1/2	0.00019 - 0.00019	2.30E-04	NA	Y	FD
Metals													
arsenic	7440-38-2	1.57E-02		1.57E-02		mg/L	C077G202	1/2	0.00245 - 0.00245	1.57E-02	2.07E-02	Y	BKG[c]
barium	7440-39-3	2.45E-02		6.18E-02		mg/L	C077G202	2/2	0.00075 - 0.00075	6.18E-02	5.70E-01	Y	BKG[c]
iron	7439-89-6	4.47E-02	J	4.47E-02	J	mg/L	C077G202	1/2	0.0258 - 0.0258	4.47E-02	6.59E+00	Y	BKG[c]
manganese	7439-96-5	2.04E-02		5.19E-02		mg/L	C077G202	2/2	0.00123 - 0.00123	5.19E-02	1.74E+00	Y	BKG[c]
mercury	7439-97-6	5.30E-07		1.08E-06		mg/L	C077G202	2/2	0.0000001 - 0.0000001	1.08E-06	NA	Y	FD
vanadium	7440-62-2	1.50E-03	J	2.70E-03	J	mg/L	C077G201	2/2	0.00097 - 0.00097	2.70E-03	2.63E-02	Y	BKG[c]

Notes:

[a] minimum and maximum detected concentrations

[b] rationale codes:

selection reason:

frequency of detection (FD)

deletion reason:

low frequency of detection (LFD)

[c] although this chemical was found to be below background levels, it was retained as a COPC at the direction of U.S. EPA

Table J7-3
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Groundwater
EBS 205

Acronyms/Abbreviations:

CAS – Chemical Abstract Service
COPC – chemical of potential concern
EBS – Environmental baseline survey
FD – frequency of detection
LFD – low frequency of detection
mg/L – milligrams per liter
NA – not applicable
U.S. EPA – United States Environmental Protection Agency
(Y/N) – yes/no

Review Qualifiers:

J – indicates a value estimated by the laboratory

Table J7-4
Exposure Point Concentration Summary
Vadose Zone Soil (0–3 feet bgs)
EBS 205

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–3 feet bgs)

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Statistic	Rationale*
Volatile Organic Compounds							
acenaphthylene	mg/kg	2.48E-03	3.61E-03	6.80E-04	6.80E-04	Maximum	U.S. EPA guidance
anthracene	mg/kg	2.02E-03	3.61E-03	3.70E-04	3.70E-04	Maximum	U.S. EPA guidance
benzo(g,h,i)perylene	mg/kg	3.13E-03	3.89E-03	6.30E-03	3.89E-03	Data follow gamma distribution (0.05)	U.S. EPA guidance
cis-1,2-dichloroethene	mg/kg	NA	NA	3.70E-04	3.70E-04	Maximum	U.S. EPA guidance
methylene chloride	mg/kg	NA	NA	6.80E-03	6.80E-03	Maximum	U.S. EPA guidance
2-methylnaphthalene	mg/kg	2.03E-03	3.59E-03	4.30E-04	4.30E-04	Maximum	U.S. EPA guidance
phenanthrene	mg/kg	1.77E-03	3.20E-03	1.20E-03	1.20E-03	Maximum	U.S. EPA guidance
pyrene	mg/kg	2.64E-03	3.22E-03	4.10E-03	3.22E-03	Data are normal (0.05)	U.S. EPA guidance
Semivolatile Organic Compounds							
benz(a)anthracene	mg/kg	1.89E-03	3.32E-03	1.50E-03	1.50E-03	Maximum	U.S. EPA guidance
benzo(b)fluoranthene	mg/kg	2.03E-03	3.49E-03	2.50E-03	2.50E-03	Maximum	U.S. EPA guidance
benzo(k)fluoranthene	mg/kg	1.97E-03	3.46E-03	2.10E-03	2.10E-03	Maximum	U.S. EPA guidance
benzo(a)pyrene	mg/kg	2.78E-03	2.92E-03	2.50E-03	2.50E-03	Maximum	U.S. EPA guidance
chrysene	mg/kg	2.06E-03	3.35E-03	2.30E-03	2.30E-03	Maximum	U.S. EPA guidance
fluoranthene	mg/kg	2.78E-03	2.89E-03	2.60E-03	2.60E-03	Maximum	U.S. EPA guidance
indeno(1,2,3-cd)pyrene	mg/kg	2.85E-03	4.08E-03	5.00E-03	4.08E-03	Data are Non-parametric (0.05)	U.S. EPA guidance
Metals							
aluminum	mg/kg	NA	NA	6.24E+03	6.24E+03	Maximum	U.S. EPA guidance
arsenic	mg/kg	NA	NA	4.20E+00	4.20E+00	Maximum	U.S. EPA guidance
barium	mg/kg	NA	NA	5.05E+01	5.05E+01	Maximum	U.S. EPA guidance
beryllium	mg/kg	NA	NA	1.90E-01	1.90E-01	Maximum	U.S. EPA guidance
chromium	mg/kg	NA	NA	4.48E+01	4.48E+01	Maximum	U.S. EPA guidance
cobalt	mg/kg	NA	NA	7.20E+00	7.20E+00	Maximum	U.S. EPA guidance
copper	mg/kg	NA	NA	9.70E+00	9.70E+00	Maximum	U.S. EPA guidance
iron	mg/kg	NA	NA	1.29E+04	1.29E+04	Maximum	U.S. EPA guidance
lead	mg/kg	NA	NA	8.80E+00	8.80E+00	Maximum	U.S. EPA guidance
manganese	mg/kg	NA	NA	1.74E+02	1.74E+02	Maximum	U.S. EPA guidance
mercury	mg/kg	NA	NA	1.10E-01	1.10E-01	Maximum	U.S. EPA guidance
nickel	mg/kg	NA	NA	5.14E+01	5.14E+01	Maximum	U.S. EPA guidance
vanadium	mg/kg	NA	NA	2.31E+01	2.31E+01	Maximum	U.S. EPA guidance
zinc	mg/kg	NA	NA	2.45E+01	2.45E+01	Maximum	U.S. EPA guidance

Table J7-4
Exposure Point Concentration Summary
Vadose Zone Soil (0–3 feet bgs)
EBS 205

Notes:
* the maximum positive detection was used as the exposure point concentration when the 95% UCL exceeded the maximum positive detection

Acronyms/Abbreviations:
bgs – below ground surface
EBS – Environmental baseline survey
mg/kg – milligrams per kilogram
NA – not applicable
UCL – upper confidence limit
U.S. EPA – United States Environmental Protection Agency

Table J7-5
Exposure Point Concentration Summary
Groundwater
EBS 205

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Groundwater

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Statistic	Rationale*
Volatile Organic Compounds							
benzene	mg/L	NA	NA	4.80E-04	4.80E-04	Maximum	U.S. EPA guidance
tert-butylbenzene	mg/L	NA	NA	2.60E-04	2.60E-04	Maximum	U.S. EPA guidance
cis-1,2-dichloroethene	mg/L	NA	NA	8.30E-03	8.30E-03	Maximum	U.S. EPA guidance
isopropylbenzene	mg/L	NA	NA	2.00E-04	2.00E-04	Maximum	U.S. EPA guidance
tetrachloroethene	mg/L	NA	NA	1.40E-03	1.40E-03	Maximum	U.S. EPA guidance
toluene	mg/L	NA	NA	1.80E-04	1.80E-04	Maximum	U.S. EPA guidance
trichloroethene	mg/L	NA	NA	2.80E-03	2.80E-03	Maximum	U.S. EPA guidance
vinyl chloride	mg/L	NA	NA	1.80E-03	1.80E-03	Maximum	U.S. EPA guidance
m,p-xylene	mg/L	NA	NA	2.30E-04	2.30E-04	Maximum	U.S. EPA guidance
Metals							
arsenic	mg/L	NA	NA	1.57E-02	1.57E-02	Maximum	U.S. EPA guidance
barium	mg/L	NA	NA	6.18E-02	6.18E-02	Maximum	U.S. EPA guidance
iron	mg/L	NA	NA	4.47E-02	4.47E-02	Maximum	U.S. EPA guidance
manganese	mg/L	NA	NA	5.19E-02	5.19E-02	Maximum	U.S. EPA guidance
mercury	mg/L	NA	NA	1.08E-06	1.08E-06	Maximum	U.S. EPA guidance
vanadium	mg/L	NA	NA	2.70E-03	2.70E-03	Maximum	U.S. EPA guidance

Notes:
* the maximum positive detection was used as the exposure point concentration when the 95% UCL exceeded the maximum positive detection

Acronyms/Abbreviations:
EBS – Environmental baseline survey
mg/L – micrograms per liter
NA – not applicable
UCL – upper confidence limit
U.S. EPA – United States Environmental Protection Agency

Table J7-6
Human-Health Risk Assessment by Exposure Group
EBS 205

Exposure Group	U.S. EPA Cancer	Cal/EPA Cancer	Hazard Index
Residential			
All soil and groundwater exposure pathways			
Total	4E-04	2E-03	6
Without metals below background	8E-05	6E-05	0.9
Exposure pathways for soil and vapors from VOCs in groundwater			
Total	4E-05	1E-04	1
Without metals below background	2E-05	3E-05	0.07
Without metals below background and PAHs in soil	2E-05	3E-05	0.07
Exposure pathways for residential use of groundwater			
Total	3E-04	2E-03	4
Without metals below background	8E-05	6E-05	0.9

Acronyms/Abbreviations:
Cal/EPA – California Environmental Protection Agency
EBS – environmental baseline survey
U.S. EPA – United States Environmental Protection Agency

Table J7-7
Human-Health Risk Assessment by Pathway
EBS 205

Exposure Pathway	U.S. EPA Cancer	Cal/EPA Cancer	Hazard Index
Ingestion of soil	1E-05	6E-05	1
Dermal contact with soil	1E-06	6E-06	0.06
Direct Contact with Soil Subtotal	**1E-05**	**7E-05**	**1**
Inhalation of vapors in indoor air from soil	2E-09	5E-09	0.0002
Inhalation of vapors in indoor air from groundwater	2E-05	3E-05	0.07
Indoor Air Subtotal	**2E-05**	**3E-05**	**0.07**
Inhalation of vapors in outdoor air from soil	7E-10	1E-09	0.00002
Inhalation of particulates in outdoor air from soil	2E-07	3E-07	0.02
Outdoor Air Subtotal	**2E-07**	**3E-07**	**0.02**
Ingestion of Homegrown Produce	7E-06	4E-05	0.05
Total without residential use of groundwater	**4E-05**	**1E-04**	**1**
Ingestion of groundwater	3E-04	2E-03	4
Dermal contact while showering	2E-05	3E-05	0.2
Inhalation of vapors while showering	2E-06	1E-06	0.02
Residential Use of Groundwater Subtotal	**3E-04**	**2E-03**	**4**
Total with residential use of groundwater	**4E-04**	**2E-03**	**6**

Acronyms/Abbreviations:
Cal/EPA – California Environmental Protection Agency
EBS – environmental baseline survey
U.S. EPA – United States Environmental Protection Agency

Table J7-8
Summary of Risk Drivers for Cancer Risk
U.S. EPA (Residential)
EBS 205

Scenario Time Frame: Future
Exposure Point: Site 35
Receptor Population: Residential
Receptor Age: Child/Adult

Exposure Medium	Chemical	EPC		CANCER RISK								
		Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation While Showering	Inhalation of Dust	Inhalation of Indoor Air	Inhalation of Outdoor Air	Ingestion of Homegrown Produce	Exposure Route Total	Percent of Total
0–3 feet bgs	**Metals**											
Soil	arsenic[c]	4.20E+00	—	1E-05	1E-06		7E-09			7E-06	2E-05	4%
	Risk Drivers Across Soil			**1E-05**	**1E-06**	**0E+00**	**7E-09**	**0E+00**	**0E+00**	**7E-06**	**2E-05**	
Groundwater	**Volatile Organic Compounds**											
	tetrachloroethene	1.40E-03	2.11E-04	1E-05	1E-05	6E-08		6E-07			2E-05	5%
	trichloroethene	2.80E-03	2.63E-04	2E-05	4E-06	2E-06		2E-05			4E-05	9%
	vinyl chloride	1.80E-03	6.31E-04	2E-05	3E-06	9E-08		2E-06			2E-05	6%
	Metals											
	arsenic[c]	1.57E-02	—	3E-04	4E-06						3E-04	75%
	Risk Drivers Across Groundwater			**3E-04**	**2E-05**	**2E-06**	**0E+00**	**2E-05**	**0E+00**	**0E+00**	**3E-04**	
	Total Risk Across All Media			**3E-04**	**2E-05**	**2E-06**	**2E-07**	**2E-05**	**7E-10**	**7E-06**	**4E-04**	

Notes:
[a] units for soil concentrations are milligrams per kilogram (mg/kg) and units for groundwater concentrations are milligrams per liter (mg/L)
[b] units for vapor phase are milligrams per cubic meter (mg/m^3)
[c] this chemical is below background

Acronyms/Abbreviations:
bgs – below ground surface
EBS – environmental baseline survey
EPC – exposure point concentration
U.S. EPA – United States Environmental Protection Agency

Table J7-9
Summary of Risk Drivers for Cancer Risk
Cal/EPA (Residential)
EBS 205

Scenario Time Frame:	**Future**
Exposure Point:	**Site 35**
Receptor Population:	**Residential**
Receptor Age:	**Child/Adult**

		EPC		CANCER RISK								
Exposure Medium	**Chemical**	**Direct Contact[a]**	**Indoor Vapor[b]**	**Ingestion**	**Dermal Contact**	**Inhalation While Showering**	**Inhalation of Dust**	**Inhalation of Indoor Air**	**Inhalation of Outdoor Air**	**Ingestion of Homegrown Produce**	**Exposure Route Total**	**Percent of Total**
0–3 feet bgs	**Metals**											
Soil	arsenic[c]	4.20E+00		6E-05	6E-06		6E-09			4E-05	1E-04	5%
	Risk Drivers Across Soil			**6E-05**	**6E-06**	**0E+00**	**6E-09**	**0E+00**	**0E+00**	**4E-05**	**1E-04**	
Groundwater	**Volatile Organic Compounds**											
	benzene	4.80E-04	2.66E-05	8E-07	1E-07	1E-07		3E-07			1E-06	0.1%
	tetrachloroethene	1.40E-03	2.11E-04	1E-05	9E-06	6E-08		6E-07			2E-05	1%
	trichloroethene	2.80E-03	2.63E-04	5E-07	1E-07	4E-08		3E-07			1E-06	0.05%
	vinyl chloride	1.80E-03	6.31E-04	8E-06	8E-07	1E-06		3E-05			4E-05	2%
	Metals											
	arsenic[c]	1.57E-02		2E-03	2E-05						2E-03	92%
	Risk Drivers Across Groundwater			**2E-03**	**3E-05**	**1E-06**	**0E+00**	**3E-05**	**0E+00**	**0E+00**	**2E-03**	
	Total Risk Across All Media			**2E-03**	**4E-05**	**1E-06**	**3E-07**	**3E-05**	**1E-09**	**4E-05**	**2E-03**	

Notes:

[a] units for soil concentrations are milligrams per kilogram (mg/kg) and units for groundwater concentrations are milligrams per liter (mg/L)

[b] units for vapor phase are milligrams per cubic meter (mg/m^3)

[c] this chemical is below background

Acronyms/Abbreviations:

bgs – below ground surface
Cal/EPA – California Environmental Protection Agency
EBS – environmental baseline survey
EPC – exposure point concentration

Table J7-10
Summary of Risk Drivers for Hazard Index
U.S. EPA (Residential)
EBS 205

Scenario Time Frame:	**Future**
Exposure Point:	**Site 35**
Receptor Population:	**Residential**
Receptor Age:	**Child**

Exposure Medium	Chemical	EPC		HAZARD INDEX							Exposure Route Total	Percent of Total
		Direct Contact[a]	Indoor Vapor[b]	Ingestion	Dermal Contact	Inhalation While Showering	Inhalation of Dust	Inhalation of Indoor Air	Inhalation of Outdoor Air	Ingestion of Homegrown Produce		
0–3 feet bgs	**Metals**											
Soil	arsenic[c]	4.20E+00		2E-01	2E-02		—			4E-02	3E-01	4%
	chromium[c]	4.48E+01		2E-01	5E-03		1E-02			—	2E-01	4%
	iron[c]	1.29E+04		5E-01	2E-02		—			—	5E-01	9%
	manganese[c]	1.74E+02		9E-02	3E-03		6E-03			—	1E-01	2%
	vanadium[c]	2.31E+01		3E-01	8E-03		—			—	3E-01	5%
	Risk Drivers Across Soil			**1E+00**	**6E-02**	**0E+00**	**2E-02**	**0E+00**	**0E+00**	**4E-02**	**1E+00**	
Groundwater	**Volatile Organic Compounds**											
	trichloroethene	2.80E-03	2.63E-04	6E-01	1E-01	4E-03		2E-02			7E-01	12%
	Metals											
	arsenic[c]	1.57E-02		3E+00	4E-02						3E+00	52%
	manganese[c]	5.19E-02		1E-01	1E-03						1E-01	2%
	vanadium[c]	2.70E-03		2E-01	2E-03						2E-01	3%
	Risk Drivers Across Groundwater			**4E+00**	**1E-01**	**4E-03**	**0E+00**	**2E-02**	**0E+00**	**0E+00**	**4E+00**	
	Total Hazard Index Across All Media			**5E+00**	**3E-01**	**2E-02**	**2E-02**	**7E-02**	**2E-05**	**5E-02**	**6E+00**	

Notes:

[a] units for soil concentrations are milligrams per kilogram (mg/kg) and units for groundwater concentrations are milligrams per liter (mg/L)

[b] units for vapor phase are milligrams per cubic meter (mg/m^3)

[c] this chemical is below background

Acronyms/Abbreviations:

bgs – below ground surface
EBS – environmental baseline survey
EPC – exposure point concentration
U.S. EPA – United States Environmental Protection Agency

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Table J8-1
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Vadose Zone Soil (0–9 feet bgs)
AOC 10

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–9 feet bgs)

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value[b]	COPC Flag (Y/N)	Selection or Deletion[c]
Metals													
lead (all samples)	7439-92-1	1.40E+00		8.19E+02		mg/kg	SS-36B-S25-A	132/133	0.096 - 0.11	8.19E+02	3.77E+01	Yes	FD
lead (hot spot evaluation)	7439-92-1	4.16E+01		8.19E+02		mg/kg	SS-36B-S25-A	15/15	Not Available	8.19E+02	3.77E+01	Yes	FD

Notes:

[a] minimum and maximum detected concentrations

[b] 95th Quantile from Tetra Tech EM Inc. 2004. Remedial Investigation Report, Sites 6, 7, 8, and 16, Alameda Point, Alameda, California. Final. November 18.

[c] rationale codes:

selection reason:

frequency of detection (FD)

deletion reason:

low frequency of detection (LFD)

background comparison (BKG)

[d] although this chemical was found to be below background levels, it was retained as a COPC at the direction of U.S. EPA

Acronyms/Abbreviations:

AOC – Area of concern
bgs – below ground surface
BKG – background comparison
CAS – Chemical Abstract Service
COPC – chemical of potential concern
FD – frequency of detection
LFD – low frequency of detection
mg/kg – milligrams per kilogram
NA – not applicable
U.S. EPA – United States Environmental Protection Agency
(Y/N) – yes/no

Table J8-2
Exposure Point Concentration Summary
Vadose Zone Soil (0–9 feet bgs)
AOC 10

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–9 feet bgs)

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Statistic	Rationale*
Metals							
lead (all samples)	mg/kg	6.43E+01	1.05E+02	8.19E+02	1.05E+02	Data are Non-parametric (0.05)	U.S. EPA guidance
lead (hot spot evaluatic	mg/kg	2.53E+02	3.85E+02	8.19E+02	3.85E+02	Data follow gamma distribution (0.05)	U.S. EPA guidance

Notes:
* the maximum positive detection was used as the exposure point concentration when the 95% UCL exceeded the maximum positive detection

Acronyms/Abbreviations:
AOC – Area of concern
bgs – below ground surface
mg/kg – milligrams per kilogram
UCL – upper confidence limit
U.S. EPA – United States Environmental Protection Agency

Table J8-3
Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Vadose Zone Soil (0–6 feet bgs)
AOC 12

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–6 feet bgs)

Chemical	CAS Number	Minimum Concentration[a] (Qualifier)		Maximum Concentration[a] (Qualifier)		Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (Qualifier)	Screening Background Value[b]	COPC Flag (Y/N)	Selection or Deletion[c]
lead (all samples)	7439-92-1	1.10E+00		6.66E+02		mg/kg	SS-33-S50-A	221/226	0.095 - 0.15	6.66E+02	3.77E+01	Y	FD
lead (hot spot evaluation)	7439-92-1	1.10E+01		6.66E+02		mg/kg	SS-33-S50-A	36/36	Not Available	6.66E+02	3.77E+01	Y	FD

Notes:
[a] minimum and maximum detected concentrations
[b] 95th Quantile from Tetra Tech EM Inc. 2004. Remedial Investigation Report, Sites 6, 7, 8, and 16, Alameda Point, Alameda, California. Final. November 18.
[c] rationale codes:
selection reason:
frequency of detection (FD)
deletion reason:
low frequency of detection (LFD)
background comparison (BKG)
[d] although this chemical was found to be below background levels, it was retained as a COPC at the direction of U.S. EPA

Acronyms/Abbreviations:
AOC – area of conern
bgs – below ground surface
BKG – background comparison
CAS – Chemical Abstract Service
COPC – chemical of potential concern
FD – frequency of detection
LFD – low frequency of detection
mg/kg – milligrams per kilogram
NA – not applicable
U.S. EPA – United States Environmental Protection Agency
(Y/N) – yes/no

Review Qualifiers:
J – indicates a value estimated by the laboratory

Table J8-4
Exposure Point Concentration Summary
Vadose Zone Soil (0–6 feet bgs)
AOC 12

Scenario Time Frame: Current/Future
Medium: Soil
Exposure Medium: Vadose Zone Soil (0–6 feet bgs)

Chemical	Units	Arithmetic Mean	95% UCL	Maximum Concentration	EXPOSURE POINT CONCENTRATION		
					Value	Statistic	Rationale*
lead (all samples)	mg/kg	5.19E+01	7.75E+01	6.66E+02	7.75E+01	Data are Non-parametric (0.05)	U.S. EPA guidance
lead (hot spot evaluation)	mg/kg	1.39E+02	2.67E+02	6.66E+02	2.67E+02	Data are Non-parametric (0.05)	U.S. EPA guidance

Notes:
* the maximum positive detection was used as the exposure point concentration when the 95% UCL exceeded the maximum positive detection

Acronyms/Abbreviations:
AOC – area of conern
bgs – below ground surface
mg/kg – milligrams per kilogram
UCL – upper confidence limit
U.S. EPA – United States Environmental Protection Agency

N00236.002712
ALAMEDA POINT
SSIC NO. 5090.3

ATTACHMENT J1 – TOXICITY ASSESSMENT FILES IS CONTAINED IN ELECTRONIC FORMAT ONLY

TO VIEW THE DATA, CONTACT:

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ATTACHMENT J2 – CALCULATION OF A SITE-SPECIFIC PRG FOR LEAD IS CONTAINED IN ELECTRONIC FORMAT ONLY

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ATTACHMENT J3 – AOC 1
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ATTACHMENT J4 – AOC 3
IS CONTAINED IN ELECTRONIC FORMAT ONLY

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ATTACHMENT J5 – AOC 11/EBS PARCELS 78-79 IS CONTAINED IN ELECTRONIC FORMAT ONLY

TO VIEW THE DATA, CONTACT:

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ALAMEDA POINT
SSIC NO. 5090.3

ATTACHMENT J6 – AOC 23
IS CONTAINED IN ELECTRONIC FORMAT ONLY

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ATTACHMENT J7 – EBS PARCEL 205 IS CONTAINED IN ELECTRONIC FORMAT ONLY

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ATTACHMENT J8 – AOC 10 AND AOC 12 IS CONTAINED IN ELECTRONIC FORMAT ONLY

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APPENDIX K

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

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K2 LETTER OF MAY 22, 2006, FROM NAVY TO DTSC CONCERNING IDENTIFICATION OF STATE ARARs

K3 LETTER OF JULY 21, 2003, FROM RWQCB TO NAVY

K4 LETTER OF JUNE 23, 2006, FROM DTSC TO NAVY

K5 1999 MEMORANDUM OF AGREEMENT BETWEEN THE NAVY, CALIFORNIA STATE HISTORIC PRESERVATION OFFICER, AND ADVISORY COUNCIL ON ALAMEDA HISTORIC DISTRICT

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ACRONYMS/ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
AOC	area of concern
ARAR	applicable or relevant and appropriate requirement
BAAQMD	Bay Area Air Quality Management District
Basin Plan	Water Quality Control Plan for the San Francisco Bay Basin
BAT	best available technology
BCDC	(San Francisco) Bay Conservation and Development Commission
BCT	best control technology
CAA	Clean Air Act
Cal. Civ. Code	*California Civil Code*
Cal. Code Regs.	*California Code of Regulations*
Cal. Health & Safety Code	*California Health and Safety Code*
Cal. Water Code	*California Water Code*
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R.	*Code of Federal Regulations*
ch.	chapter
COC	chemical of concern
CTR	California Toxics Rule
CWA	Clean Water Act
div.	division
DOI	(United States) Department of the Interior
DTSC	(California Environmental Protection Agency) Department of Toxic Substances Control
EP	extraction procedures
ESA	Endangered Species Act
Exec. Order No.	Executive Order Number
Fed. Reg.	*Federal Regulation*
FS	feasibility study
FWBZ	first water-bearing zone
IR	Installation Restoration (Program)
ISB	*in situ* bioremediation
ISCO	*in situ* chemical oxidation
LDR	land-disposal restriction

MCL	maximum contaminant level
MCLG	maximum contaminant level goal
mg/L	milligrams per liter
MNA	monitored natural attenuation
MOA	memorandum of agreement
MOU	memorandum of understanding
MUN	municipal and domestic water supply
NAAQS	National Ambient Air Quality Standards
NAS	Naval Air Station
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NRWQC	National Recommended Water Quality Criteria
NTR	National Toxics Rule
PAH	polynuclear aromatic hydrocarbon
POC	point of compliance
Porter-Cologne Act	Porter-Cologne Water Quality Control Act
pt.	part
RAW	remedial action work plan
RCRA	Resource Conservation and Recovery Act
Res.	resolution
RI	remedial investigation
ROD	record of decision
RWQCB	(California) Regional Water Quality Control Board
§	section
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
STLC	soluble threshold limit concentration
subdiv.	subdivision
SWRCB	(California) State Water Resources Control Board
TBC	to be considered
TCLP	toxicity characteristic leaching procedure
TDS	total dissolved solids
tit.	title
TTLC	total threshold limit concentration

U.S.C.	*United States Code*
U.S. EPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
WET	(California) Waste Extraction Test
WQO	water quality objective

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Section K1
INTRODUCTION

This appendix identifies and evaluates potential federal and state of California applicable or relevant and appropriate requirements (ARARs) from the universe of regulations, requirements, and guidance. This appendix sets forth the Navy determinations regarding these potential ARARs for each remedial action alternative retained for detailed analysis in this Remedial Investigation (RI)/Feasibility Study (FS) Report for Installation Restoration (IR) Program Site 35, Alameda Point, Alameda, California. Tables for this appendix are located behind a separate tab at the end of the appendix.

This evaluation includes an initial determination of whether the potential ARARs actually qualify as ARARs and a comparison for stringency between the federal and state regulations to identify the controlling ARARs. The identification of ARARs is an iterative process. The final determination of ARARs will be made by the Navy in the record of decision (ROD), after public review, as part of the remedial action selection process.

K1.1 SUMMARY OF CERCLA AND NCP REQUIREMENTS

Section 121(d) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (Title 42 *United States Code* [U.S.C.] Section [§] 9621[d]), as amended, states that remedial actions on CERCLA sites must attain (or the decision document must justify the waiver of) any federal or more stringent state environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate.

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address the situation at a CERCLA site. The requirement is applicable if the jurisdictional prerequisites of the standard show a direct correspondence when objectively compared to the conditions at the site. An applicable federal requirement is an ARAR. An applicable state requirement is an ARAR only if it is more stringent than the federal ARAR.

If the requirement is not legally applicable, then the requirement is evaluated to determine whether it is relevant and appropriate. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not applicable, address problems or situations similar to the circumstances of the proposed remedial action and are well suited to the conditions of the site (U.S. EPA 1988a). A requirement must be determined to be both relevant and appropriate to be considered an ARAR.

The criteria for determining relevance and appropriateness are listed in Title 40 *Code of Federal Regulations* (C.F.R.) § 300.400(g)(2) and include the following:

- the purpose of the requirement and the purpose of the CERCLA action
- the medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site

- the substances regulated by the requirement and the substances found at the CERCLA site
- the actions or activities regulated by the requirement and the remedial action contemplated at the CERCLA site
- any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site
- the type of place regulated and the type of place affected by the release or CERCLA action
- the type and size of structure or facility regulated and the type and size of structure or facility affected by the release or proposed in the CERCLA action
- any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resources at the CERCLA site

According to CERCLA ARARs guidance (U.S. EPA 1988a), a requirement may be "applicable" or "relevant and appropriate," but not both. Identification of ARARs must be done on a site-specific basis and involve a two-part analysis: first, a determination of whether a given requirement is applicable; then, if it is not applicable, a determination of whether it is both relevant and appropriate. It is important to explain that some regulations may be applicable or, if not applicable, may still be relevant and appropriate. When the analysis determines that a requirement is both relevant and appropriate, such a requirement must be complied with to the same degree as if it were applicable (U.S. EPA 1988a).

Tables included at the end of this appendix present each potential ARAR with an initial determination of ARAR status (i.e., applicable, relevant and appropriate, or not an ARAR). For the determination of relevance and appropriateness, the pertinent criteria are examined to determine whether the requirements addressed problems or situations sufficiently similar to the circumstances of the remedial action contemplated, and whether the requirement was well suited to the site. A negative determination of relevance and appropriateness indicates that the requirement did not meet the pertinent criteria. Negative determinations are documented in the tables of this appendix but are discussed in the text only for specific cases.

To qualify as a state ARAR under CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), a state requirement must be:

- a state law or regulation,
- an environmental or facility siting law or regulation,
- promulgated (of general applicability and legally enforceable),
- substantive (not procedural or administrative),
- more stringent than federal requirements,
- identified in a timely manner, and
- consistently applied.

To constitute an ARAR, a requirement must be substantive. Therefore, only the substantive provisions of requirements identified as ARARs in this analysis are considered to be ARARs. Permits are considered to be procedural or administrative requirements. Provisions of generally relevant federal and state statutes and regulations that were determined to be procedural or nonenvironmental, including permit requirements, are not considered to be ARARs. CERCLA Section 121(e)(1), 42 U.S.C. § 9621(e)(1), states that "No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely on-site, where such remedial action is selected and carried out in compliance with this section." The term *on-site* is defined for purposes of this ARARs discussion as "the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action" (40 C.F.R. § 300.5).

Nonpromulgated advisories or guidance issued by federal or state governments are not legally binding and do not have the status of ARARs. Such advisories or guidance may, however, be useful and are "to be considered" (TBC). TBC requirements (40 C.F.R. § 300.400[g][3]) complement ARARs but do not override them. They are useful for guiding decisions regarding cleanup levels or methodologies when regulatory standards are not available.

Pursuant to United States Environmental Protection Agency (U.S. EPA) guidance (U.S. EPA 1988a), ARARs are generally divided into three categories: chemical-, location-, and action-specific requirements. This classification was developed to aid in the identification of ARARs; some ARARs do not fall precisely into one group or another. ARARs are identified on a site-specific basis for remedial actions where CERCLA authority is the basis for cleanup.

As the lead federal agency, the Navy has primary responsibility for identifying federal ARARs at Alameda Point. Potential federal ARARs that have been identified for this RI/FS Report are discussed in Section K1.2.1. Pursuant to the definition of the term "on-site" in 40 C.F.R. § 300.5, the contaminated soil and groundwater and adjacent areas necessary for implementing the selected remedial actions at IR Site 35 are considered to be the on-site boundaries for purposes of this ARARs analysis. Regulatory requirements that apply to off-site actions are not ARARs. Off-site actions (e.g., off-site disposal) are required to comply with applicable requirements only and are not required to comply with relevant and appropriate requirements identified as ARARs for on-site actions.

Identification of potential state ARARs was initiated through Navy requests that the California Environmental Protection Agency Department of Toxic Substances Control (DTSC) identify potential state ARARs, an action described in more detail in Section K1.2.2.

K1.2 METHODOLOGY DESCRIPTION

As the lead federal agency, the Navy has primary responsibility for identification of potential ARARs for IR Site 35. In preparing this ARARs analysis, the Navy undertook the following measures, consistent with CERCLA and the NCP:

- identified federal ARARs for each remedial action alternative addressed in the main RI/FS Report, taking into account site-specific information for IR Site 35
- reviewed potential ARARs identified by the state to determine whether they satisfy CERCLA and NCP criteria that must be met in order to constitute state ARARs
- evaluated and compared federal ARARs and their state counterparts to determine whether state ARARs are more stringent than the federal ARARs or are in addition to the federally required actions
- reached a conclusion as to which federal and state ARARs are the most stringent and/or are "controlling" ARARs for each alternative

Remedial action objectives are identified in Section 8 of the main RI/FS Report.

K1.2.1 Identifying and Evaluating Federal ARARs

As the lead federal agency under CERCLA and the NCP, the Navy is responsible for identifying federal ARARs. The final determination of federal ARARs will be made when the Navy issues the ROD. The federal government implements a number of federal environmental statutes that are the source of potential federal ARARs, either in the form of the statutes or regulations promulgated thereunder. Examples include the Resource Conservation and Recovery Act (RCRA), the Clean Water Act (CWA), the Safe Drinking Water Act (SDWA), the Toxic Substances Control Act, and their implementing regulations. See the NCP preamble in 55 *Federal Register* (Fed. Reg.) 8764–8765 (1990) for a more complete listing.

The proposed remedial action and alternatives were reviewed against all potential federal ARARs, including but not limited to those set forth in 55 Fed. Reg. 8764–8765 (1990), to determine whether they were applicable or relevant and appropriate using the CERCLA and NCP criteria and procedures for ARARs identification issued by lead federal agencies.

K1.2.2 Identifying and Evaluating State ARARs

The process of identifying and evaluating potential state ARARs by the state and the Navy is described in this subsection.

K1.2.2.1 SOLICITATION OF STATE ARARs UNDER NCP

U.S. EPA guidance (U.S. EPA 1988b) recommends that the lead federal agency consult with the state when identifying state ARARs for remedial actions. In essence, the CERCLA/NCP requirements at 40 C.F.R. § 300.515 for remedial actions provide that the lead federal agency request that the state identify chemical- and location-specific state ARARs upon completion of site characterization. The requirements also provide that the lead federal agency request identification of all categories of state ARARs (chemical-, location-, and action-specific) upon completion of identification of remedial alternatives for detailed analysis. The state must respond within 30 days of receipt of the lead federal agency requests. The remainder of this subsection documents the Navy's efforts to date to identify and evaluate state ARARs.

The Navy followed the procedures of the process set forth in 40 C.F.R. § 300.515 and Section 7.6 of the Federal Facilities Agreement for remedial actions in seeking state assistance in identifying state ARARs.

K1.2.2.2 CHRONOLOGY OF EFFORTS TO IDENTIFY STATE ARARs

The following chronology summarizes the Navy's efforts to obtain state assistance in identifying state ARARs for the remedial action at IR Site 35. Key correspondence between the Navy and the state agencies related to this effort has been included in the Administrative Record for this RI/FS Report.

In a letter dated September 12, 1996, the Navy requested identification of potential state ARARs for the RI/FS effort at Naval Air Station (NAS) Alameda. The state of California responded in a DTSC letter to the Navy dated November 13, 1996. The response from the DTSC is included as Attachment K1.

The Navy requested identification of chemical-, location-, and action- specific ARARs for IR Site 35 from DTSC in a letter dated May 22, 2006 (Attachment K2).

In a response dated June 23, 2006 (Attachment K4), DTSC stated that the California laws, regulations, and policies identified in the November 13, 1996 letter (Attachment K1) are appropriate for use by the Navy in consideration of ARAR selection.

K1.3 REQUIREMENTS OF THE FEDERAL RESOURCE CONSERVATION AND RECOVERY ACT

RCRA is a federal statute passed in 1976 to meet four goals: protection of human health and the environment, reduction of waste, conservation of energy and natural resources, and elimination of the generation of hazardous waste as expeditiously as possible. The Hazardous and Solid Waste Amendments of 1984 significantly expanded the scope of RCRA by adding new corrective action requirements, land-disposal restrictions, and technical requirements. RCRA, as amended, contains several provisions that are potential ARARs for CERCLA sites.

Substantive RCRA requirements are applicable to remedial actions on CERCLA sites if the waste is a RCRA hazardous waste, and either:

- the waste was initially treated, stored, or disposed after the effective date of the particular RCRA requirement; or
- the activity at the CERCLA site constitutes treatment, storage, or disposal, as defined by RCRA (U.S. EPA 1988a).

The preamble to the NCP indicates that state regulations that are components of a federally authorized or delegated state program are generally considered federal requirements and potential federal ARARs for the purposes of ARARs analysis (55 Fed. Reg. 8666, 8742 [1990]). The state of California received approval for its base RCRA hazardous waste management program on July 23, 1992 (57 Fed. Reg. 32726 [1992]). The state of California "Environmental Health Standards for the Management of Hazardous Waste," set forth in *California Code of Regulations* (Cal. Code Regs.)

Title (tit.) 22, Division (div.) 4.5 were approved by the U.S. EPA as a component of the federally authorized state of California RCRA program. On September 26, 2001, California received final authorization of its revised State Hazardous Waste Management Program from U.S. EPA (63 Fed. Reg. 49118 [2001]).

The regulations of Cal. Code Regs. tit. 22, div. 4.5 are therefore a source of potential federal ARARs for CERCLA remedial actions. The exception is when a state regulation is "broader in scope" than the corresponding federal RCRA regulations. In that case, such regulations are not considered part of the federally authorized program or potential federal ARARs. Instead, they are purely state law requirements and potential state ARARs.

The U.S. EPA notice of July 23, 1992, approving the state of California RCRA program (57 Fed. Reg. 32726 [1992]) specifically indicated that the state regulations addressed certain non-RCRA, state-regulated hazardous wastes that fell outside the scope of federal RCRA requirements. Cal. Code Regs. tit. 22, div. 4.5 requirements would be potential state ARARs for such non-RCRA, state-regulated wastes.

A key threshold question for the ARARs analysis is whether the contaminants at IR Site 35 could constitute federal hazardous waste as defined under RCRA and the state's authorized program, or qualify as non-RCRA, state-regulated hazardous waste. A discussion of waste characterization is presented in Section K1.4.

K1.4 WASTE CHARACTERIZATION

Selection of ARARs for IR Site 35 involves the characterization of wastes as RCRA hazardous, California-regulatory non-RCRA hazardous, and other California waste classifications.

K1.4.1 RCRA Hazardous Waste Determination

Federal RCRA hazardous waste determination is necessary to determine whether a waste is subject to RCRA requirements at Cal. Code Regs. tit. 22, div. 4.5 and other state requirements at Cal. Code Regs. tit. 23, div. 3, Chapter (ch.) 15. The first step in the RCRA hazardous waste characterization process is to evaluate contaminated media at the site(s) and determine whether the contaminant constitutes a "listed" RCRA waste. The preamble to the NCP states that ". . . it is often necessary to know the origin of the waste to determine whether it is a listed waste and that, if such documentation is lacking, the lead agency may assume it is not a listed waste" (55 Fed. Reg. 8666, 8758 [1990]).

This approach is confirmed in U.S. EPA guidance for CERCLA compliance with other laws (U.S. EPA 1988a), as follows:

> To determine whether a waste is a listed waste under RCRA, it is often necessary to know the source. However, at many Superfund sites, no information exists on the source of wastes. The lead agency should use available site information, manifests, storage records, and vouchers in an effort to ascertain the nature of these contaminants. When this documentation is not available, the lead agency may assume that the wastes are not listed RCRA hazardous wastes, unless further

> analysis or information becomes available that allows the lead agency to determine that the wastes are listed RCRA hazardous wastes.

RCRA hazardous wastes that have been assigned U.S. EPA hazardous waste numbers (or codes) are listed in Cal. Code Regs. tit. 22, § 66261.30–66261.33. The lists include hazardous waste codes beginning with the letters "F," "K," "P," and "U."

Knowledge of the exact source of a waste is required for source-specific listed wastes (K waste code). Some knowledge of the nature or source of the waste is required even for listed wastes from nonspecific sources, such as spent solvents (F waste code) or commercial chemical products (P and U waste codes). These listed RCRA hazardous wastes are restricted to commercially pure chemicals used in particular processes such as degreasing.

P and U wastes cover only unused and unmixed commercial chemical products, particularly spilled or off-specification products (U.S. EPA 1991a). Not every waste containing a P or U chemical is a hazardous waste. To determine whether a CERCLA investigation-derived waste contains a P or U waste, there must be direct evidence of product use. In particular, all the following criteria must be met. The chemicals must be:

- discarded (as described in 40 C.F.R. § 261.2[a][2]),
- either off-specification commercial products or a commercially sold grade,
- not used (soil contaminated with spilled unused wastes is a P or U waste), and
- the sole active ingredient in a formulation.

No documentation of past waste disposal practices was found that would serve to classify the sources of soil and groundwater contamination at IR Site 35 with respect to the RCRA waste listings. Therefore, the Navy has made the determination that the mere presence of chemicals of concern (COCs) in the soil and groundwater should not classify IR Site 35 contaminated soil or groundwater as RCRA-listed hazardous wastes. By extension of this reasoning, any residuals generated during treatment of IR Site 35 soil and groundwater will also not be classified as RCRA-listed hazardous wastes.

The second step in the RCRA hazardous waste characterization process is to evaluate potential hazardous characteristics of the waste. The evaluation of characteristic waste is described in U.S. EPA guidance as follows (U.S. EPA 1988a):

> Under certain circumstances, although no historical information exists about the waste, it may be possible to identify the waste as RCRA characteristic waste. This is important in the event that (1) remedial alternatives under consideration at the site involve on-site treatment, storage, or disposal, in which case RCRA may be triggered as discussed in this section; or (2) a remedial alternative involves off-site shipment. Since the generator (in this case, the agency or responsible party conducting the Superfund action) is responsible for determining whether the wastes exhibit any of these characteristics (defined in 40 C.F.R. § 261.21–261.24), testing may be required. The lead agency must use best professional judgment to determine, on a site-specific basis, if testing for hazardous characteristics is necessary.

> In determining whether to test for the toxicity characteristic using the extraction procedures (EP) toxicity test, it may be possible to assume that certain low concentrations of waste are not toxic. For example, if the total waste concentration in soil is 20 times or less the EP toxicity concentration, the waste cannot be characteristic hazardous waste. In such a case, RCRA requirements would not be applicable. In other instances, where it appears that the substances may be characteristic hazardous waste (ignitable, corrosive, reactive, or EP toxic), testing should be performed.

Hazardous waste characteristics, as defined in 40 C.F.R. § 261.21–261.24, are commonly referred to as ignitability, corrosivity, reactivity, and toxicity. California environmental health standards for the management of hazardous waste set forth in Cal. Code Regs. tit. 22, div. 4.5 were approved by the U.S. EPA as a component of the federally authorized California RCRA program. Therefore, the characterization of RCRA waste is based on the state requirements.

The characteristics of ignitability, corrosivity, reactivity, and toxicity are defined in Cal. Code Regs. tit. 22, § 66261.21–66261.24. According to Cal. Code Regs. tit. 22, § 66261.24(a)(1)(A), "A waste that exhibits the characteristic of toxicity pursuant to subsection (a)(1) of this section has the EPA Hazardous Waste Number specified in Table I of this section which corresponds to the toxic contaminant causing it to be hazardous." Table I assigns hazardous waste codes beginning with the letter "D" to wastes that exhibit the characteristic of toxicity; D waste codes are limited to "characteristic" hazardous wastes.

According to Cal. Code Regs. tit. 22, § 66261.10, waste characteristics can be measured by an available standardized test method or be reasonably classified by generators of waste based on their knowledge of the waste, provided that the waste has already been reliably tested or that there is documentation of chemicals used. Contaminants at IR Site 35 are not likely to be ignitable, corrosive, or reactive, as defined in Cal. Code Regs. tit. 22, § 66261.21–66261.23. This determination was based on knowledge of the nature and concentrations of contaminants at IR Site 35.

The requirements at Cal. Code Regs. tit. 22, § 66261.24 list the toxic contaminant concentrations that determine the characteristic of toxicity. The concentration limits are in milligrams per liter (mg/L). These units are directly comparable to total concentrations in waste groundwater and surface water. For waste soils, these concentrations apply to the extract or leachate produced by the toxicity characteristic leaching procedure (TCLP).

A waste is considered hazardous if the contaminants in the wastewater or in the soil TCLP extract equal or exceed the TCLP limits. TCLP testing is required only if total contaminant concentrations in soil equal or exceed 20 times the TCLP limits because TCLP uses a 20-to-1 dilution for the extract (U.S. EPA 1988a).

Total concentrations of contaminants in soil samples, taken from RI statistical summaries, were compared to the TCLP limits at Cal. Code Regs. tit. 22, § 66261.24(a)(1). Based on this comparison, some soil sample results exceeded (by more than 20 times) the TCLP limit for lead and heptachlor. Therefore, there is a potential for

contaminated soil within IR Site 35 to exhibit the RCRA hazardous waste toxicity characteristic.

The analytical data reported for groundwater samples were evaluated to determine whether there is a potential for classification of groundwater at IR Site 35 as a characteristic hazardous waste. Analytical results do not indicate that groundwater at IR Site 35 would meet the characteristic of hazardous waste.

K1.4.2 California-Regulated Non-RCRA Hazardous Waste

A waste determined not to exhibit the RCRA toxicity characteristic may still be considered a state-regulated non-RCRA hazardous waste. The state's RCRA program is broader in scope in its hazardous waste determination. Cal. Code Regs. tit., 22, § 66261.24(a)(2) lists the total threshold limit concentrations (TTLCs) and soluble threshold limit concentrations (STLCs) for non-RCRA hazardous waste. The state applies its own leaching procedure, the Waste Extraction Test (WET), which uses a different acid reagent and has a different dilution factor (tenfold). There are other state requirements that may be broader in scope than federal ARARs for identifying non-RCRA wastes regulated by the state. These may be potential ARARs for wastes not covered under federal ARARs. See additional subsections of Cal. Code Regs. tit. 22, § 66261.24. A waste is considered hazardous if total concentrations exceed the TTLCs or if the extract concentrations from the WET exceed the STLCs. A WET is required when the total concentrations exceed ten times the STLC but are less than the TTLCs (Cal. Code Regs. tit. 22, div. 4.5, ch. 11, Appendix II [b]).

Since the contaminated soil at IR Site 35 is already presumed to exhibit the RCRA toxicity characteristic, comparisons of the total concentrations of chemical compounds reported in soil samples to the TTLCs for non-RCRA hazardous waste at Cal. Code Regs. tit. 22, § 66261.24(a)(2) were not necessary.

Groundwater at IR Site 35 does meet the standard for classification as a non-RCRA hazardous waste.

K1.4.3 Other California Waste Classifications

For waste discharged after July 18, 1997, solid waste classifications at Cal. Code Regs. tit. 27, §§ 20210, 20220, and 20230 are used to determine applicability of waste management requirements. These may be potential ARARs for characterizing waste prior to off-site disposal, and are summarized below.

A "designated waste" under Cal. Code Regs. tit. 27, § 20210 is defined at *California Water Code* (Cal. Water Code) § 13173. Under Cal. Water Code § 13173, designated waste is hazardous waste that has been granted a variance from hazardous waste management requirements or nonhazardous waste that consists of or contains pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives (WQOs) or that could reasonably be expected to affect beneficial uses of the waters of the state.

A "nonhazardous solid waste" under Cal. Code Regs. tit. 27, § 20220 is all putrescible and nonputrescible solid, semisolid, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and semisolid wastes, and other discarded waste (whether of solid or semisolid consistency), provided that such wastes do not contain wastes that must be managed as hazardous wastes or wastes that contain soluble pollutants in concentrations that exceed applicable WQOs or could cause degradation of waters of the state.

Under Cal. Code Regs. tit. 27, § 20230, "inert waste" is that subset of solid waste that does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable WQOs and does not contain significant quantities of decomposable waste.

Section K2
CHEMICAL-SPECIFIC ARARs

Chemical-specific ARARs are generally health- or risk-based numerical values or methodologies applied to site-specific conditions that result in the establishment of a cleanup level. Many potential ARARs associated with particular remedial alternatives (such as closure or discharge) can be characterized as action-specific, but include numerical values or methodologies to establish them; therefore, they fit into both categories (chemical- and action-specific). To simplify the comparison of numerical values, most action-specific requirements that include numerical values are included in this chemical-specific section and, if repeated in the action-specific section, the discussion refers back to this section.

This section presents a detailed discussion and a summary of conclusions regarding chemical-specific ARARs by medium. Potential federal and state chemical-specific ARARs are summarized in Tables K2-1 and K2-2, respectively.

K2.1 SUMMARY OF ARARs CONCLUSIONS BY MEDIUM

Groundwater, surface water, soil, and air are the environmental media potentially affected by the envisioned remedial actions. The conclusions for ARARs pertaining to these media are presented in the following sections.

K2.1.1 Groundwater ARARs Conclusions

Two groundwater areas of concern (AOCs) at IR Site 35 were carried forward to the FS portion of this RI/FS Report: AOC 1 and AOC 23. Some of the ARARs conclusions are based on whether groundwater is a potential source of drinking water. Groundwater beneath AOC 1 has been determined not to be a potential source of drinking water for CERCLA decision-making purposes. In a letter dated July 21, 2003, the Navy received concurrence from the San Francisco Bay Water Board that groundwater west of Saratoga Street meets exemption criteria for the municipal and domestic water supply (MUN) designation in the California State Water Resources Control Board (SWRCB) Sources of Drinking Water Policy, Resolution (Res.) 88-63 (SWRCB 1988) and California Regional Water Quality Control Board (RWQCB) Res. 89-39 (RWQCB 2003). While considered unlikely, AOC 23 is considered a potential source of drinking water for CERCLA decision-making purposes because it is east of Saratoga Street. The potential federal and state chemical-specific ARARs for remediation of IR Site 35 groundwater are as follows:

- federal primary maximum contaminant level (MCL) for vinyl chloride at 40 C.F.R. § 141.61(a)
- state primary MCL for vinyl chloride (for AOC 23 only) at Cal. Code Regs. tit. 22, § 64444
- RCRA standards in Cal. Code Regs. tit. 22, §§ 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), 66261.100, and 66264.94(a)(1), (a)(3), (c), (d), and (e)

- Comprehensive Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan), Chapter 2, Beneficial Uses (except MUN for AOC 1); and Chapter 3, Water Quality Objectives
- SWRCB Res. 88-63

K2.1.2 Surface Water ARARs Conclusions

There are no natural streams, rivers, ponds, lakes, or other surface water bodies located within IR Site 35. The areas of IR Site 35 identified for remedial action are inland of the San Francisco Bay. Discharges to surface water resulting from remedial activities at IR Site 35 may be a concern if a remedial action is selected that treats the groundwater and discharges treated water to the Oakland Inner Harbor or Seaplane Lagoon. Therefore, surface water requirements were identified for planned discharges associated with IR Site 35 remedial action alternatives.

The following potential federal and state chemical-specific ARARs were identified:

- water quality standards in the National Toxics Rule (NTR) and California Toxics Rule (CTR) standards at 40 C.F.R. § 131.36 and 131.38
- CWA 301(b) best control technology (BCT) and best available technology (BAT) economically achievable at 40 C.F.R. § 125.3, and water quality–based effluent limits at CWA 30(b)(1)(C)
- Basin Plan, Chapters 2 (Beneficial Uses) and 3 (Water Quality Objectives) for lower San Francisco Bay

K2.1.3 Soil ARARs Conclusions

Based on hazardous waste characterization and risk-based evaluations in this RI/FS Report, the COCs in soil at IR Site 35 include lead, heptachlor, and polynuclear aromatic hydrocarbons (PAHs). The following potential chemical-specific ARARs were identified for remediation of soil at the site:

- RCRA protection standards in Cal. Code Regs. tit. 22, §§ 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), 66261.100, and 66264.94(a)(1), (a)(3), (c), (d), and (e)
- definitions of designated waste, nonhazardous waste, and inert waste at Cal. Code Regs. tit. 27, §§ 20210, 20220, and 20230

K2.1.4 Air ARARs Conclusions

The construction of a soil cover and excavation of soil require soil handling that could result in particulate dust emissions. Since the potential for release to air may occur during the implementation of alternatives that include excavation or cover, these requirements are addressed in Section K4, Action-Specific ARARs.

K2.2 DETAILED DISCUSSION OF ARARs BY MEDIUM

The following subsections provide a detailed discussion of federal and state ARARs by medium.

K2.2.1 Groundwater ARARs

The two groundwater AOCs at IR Site 35 carried forward to the FS portion of this RI/FS Report are AOCs 1 and 23.

K2.2.1.1 FEDERAL ARARs

One of the significant issues in identifying ARARs for groundwater under the SDWA and RCRA is whether the groundwater at the site can be classified as a source of drinking water. The U.S. EPA groundwater policy is set forth in the preamble to the NCP (55 Fed. Reg. 8666, 8752–8756 [1990]). This policy uses the groundwater classification system set forth in the draft U.S. EPA Guidelines for Groundwater Classification (U.S. EPA 1986). Under this policy, groundwater is classified in one of three categories (Class I, II, or III) based on ecological importance, replaceability, and vulnerability considerations. Irreplaceable groundwater that is currently used by a substantial population, or groundwater that supports a vital habitat, is considered to be Class I. Groundwater that is currently being used or that might be used as a source of drinking water in the future is considered to be Class II. Groundwater that cannot be used for drinking water due to insufficient quality (e.g., high salinity or widespread, naturally occurring contamination) or quantity is considered to be Class III. U.S. EPA guidelines define Class III groundwater as groundwater with total dissolved solids (TDS) concentrations above 10,000 mg/L and a yield of less than 150 gallons per day (U.S. EPA 1986). Class III groundwater can also be classified on the basis of economic or technological treatability tests as well as on quality or quantity (both sets of criteria are not needed, just one or the other).

The final Determination of the Beneficial Uses of Groundwater report was prepared for Alameda Point in 2000 (TtEMI 2000). As stated in the report, the groundwater in the first water-bearing zone (FWBZ) underlying the central region of Alameda Point is a Class II aquifer, based on TDS and yield criteria. Groundwater that is currently being used or that might be used as a source of drinking water in the future is considered to be Class II groundwater. The second water-bearing zone is a Class III aquifer because TDS concentrations exceed 10,000 mg/L. Class III groundwater is not a potential source of drinking water and is of limited beneficial use.

Groundwater beneath AOC 1 is not expected to meet the criteria for yield and TDS to be a potential source of drinking water and is expected to be a Class III groundwater. AOC 1 is west of Saratoga Street, and therefore MCLs are not considered ARARs for purposes of this RI/FS Report. AOC 23 is east of Saratoga Street and therefore, for purposes of this RI/FS Report, shallow groundwater at AOC 23 is assumed to meet the criteria to be considered a potential drinking water source not currently used, a Class II groundwater. These determinations will be used for ARARs determinations that are based on whether the groundwater is a potential drinking water source. See Section 2.7 of the RI/FS Report for more information about groundwater use and beneficial uses.

Safe Drinking Water Act

Federal MCLs and maximum contaminant level goals (MCLGs) developed by U.S. EPA under the SDWA are considered potentially relevant and appropriate requirements for aquifers with Class I and Class II characteristics. The point of contact for MCLs and MCLGs under the SDWA is at the tap. Therefore, the MCLs and MCLGs are not applicable ARARs for Navy sites. However, MCLs and non-zero MCLGs are generally considered relevant and appropriate as remediation goals for current or potential drinking water sources. The COC for AOC 23 is vinyl chloride. There is no non-zero MCLG for vinyl chloride. The MCL for vinyl chloride is a potential federal ARAR for AOC 23. MCLGs and MCLs are not potential ARARs for AOC 1 groundwater since it is not considered a potential drinking water source.

RCRA Hazardous Waste

The federal RCRA requirements at 40 C.F.R. Part (pt.) 261 do not apply in California because the state RCRA program is authorized. The authorized state RCRA requirements are therefore considered potential federal ARARs (Section K1.3). The applicability of RCRA requirements depends on whether the waste is a RCRA hazardous waste; whether the waste was initially treated, stored, or disposed after the effective date of the particular RCRA requirement; and whether the activity at the site constitutes treatment, storage, or disposal as defined by RCRA. However, RCRA requirements may be relevant and appropriate even if they are not applicable. Examples include activities that are similar to the definition of RCRA treatment, storage, or disposal for waste that is similar to RCRA hazardous waste.

The determination of whether a waste is a RCRA hazardous waste can be made by comparing the site waste to the definition of RCRA hazardous waste. The RCRA requirements at Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100 are potential ARARs because they define RCRA hazardous waste. A waste can meet the definition of hazardous waste if it has the toxicity characteristic of hazardous waste. This determination is made by using the TCLP. The maximum concentrations allowable for the TCLP listed in Cal. Code Regs. tit. 22, § 66261.24(a)(1)(B) are potential federal ARARs for determining whether the site has hazardous waste. If the site waste has concentrations exceeding these values, it is determined to be a characteristic RCRA hazardous waste (Section K1.4.1).

RCRA Groundwater Protection Standards

Groundwater concentration limits for RCRA-regulated units are promulgated at Cal. Code Regs. tit. 22, § 66264.94. For corrective action programs, Cal. Code Regs. tit. 22, § 66264.94(a)(1) and (3) states that for each COC, the facility owner or operator shall propose, for each medium (groundwater, surface water, and the unsaturated zone) monitored, a concentration limit not to exceed the background value or a concentration limit greater than background established for a corrective action program.

Cal. Code Regs. tit. 22, § 66264.94(c) states that a concentration limit that is greater than the background value can be used only if it is technologically or economically infeasible

to achieve the background value and the COC will not pose a substantial present or potential hazard to human health or the environment.

Cal. Code Regs. tit. 22, § 66264.94(e) states that in no event shall a concentration limit greater than background exceed other applicable statutes or regulations (e.g., an MCL) or the lowest concentration demonstrated to be technologically and economically achievable. Since shallow groundwater at AOC 1 is not a potential source of drinking water, MCLs have been determined not to be potential ARARs for AOC 1. The lowest concentration demonstrated to be technologically and economically achievable is a potential ARAR for the AOC 1 groundwater. In general, economic feasibility is an objective balancing of the incremental benefit of attaining further reductions in the concentrations of COCs with the incremental cost of achieving those reductions. For AOC 23, MCLs have been identified as ARARs.

Because IR Site 35 does not contain a RCRA waste management unit, the above groundwater protection standards are not applicable. However, the Navy has determined that the substantive provisions of Cal. Code Regs. tit. 22, § 66264.94(a)(1) and (3), (c), (d), and (e) are potentially relevant and appropriate ARARs for remedial actions at IR Site 35 because the wastes at the site are similar or identical to RCRA hazardous waste constituents.

The RCRA groundwater protection standard provisions of Cal. Code Regs. tit. 22, § 66264.95 indicate that the point of compliance (POC) at which the protection standards apply is a vertical surface located at the hydraulically downgradient limit of the waste management area that extends through the uppermost aquifer underlying the regulated unit. This POC requirement is not applicable since the waste was placed before these requirements were promulgated. However, the POC was evaluated to determine whether it is potentially relevant and appropriate for the proposed remedial action at IR Site 35.

The CERCLA NCP preamble provides that compliance with groundwater cleanup standards should be attained throughout the affected area of the aquifer or at and beyond the downgradient edge of the waste management area when the waste is left in place (the POC). (See the NCP preamble in 55 Fed. Reg. 8753, March 8, 1990.) Adequate containment of the contamination by the remedial actions applied upgradient of the POC may adequately protect human health and the environment.

The NCP preamble states that there may be certain circumstances where a plume of groundwater contamination is caused by releases from several distinct sources that are in close geographical proximity. The NCP preamble provides that, in such cases, the most cost-effective groundwater cleanup strategy may be to address the problem as a whole rather than on a source-by-source basis, and to draw a common POC that encompasses all the sources of release (55 Fed. Reg. 8753, March 8, 1990).

National Recommended Water Quality Criteria

Section 304(a)(1) of the CWA (33 U.S.C. § 1314[a][1]) directs U.S. EPA to publish and periodically update the National Recommended Water Quality Criteria (NRWQC). These standards are intended to protect humans and aquatic life organisms from

contaminants in surface water. The current NRWQC standards were published in a report dated November 2002. These criteria, updated periodically in the *Federal Register*, reflect the latest scientific knowledge on the identifiable effects of pollutants on public health and welfare (related to the use of shoreline for recreational purposes) and the health of aquatic life populations. These criteria serve as guidance to states in adopting water quality standards, under Section 303(c) (33 U.S.C. § 1313[c]) of the CWA, that protect aquatic life from acute and chronic effects of pollutants.

The applicability of surface water criteria to groundwater is discussed in CERCLA Section 121(d)(2)(B)(i) (42 U.S.C. § 9621[d][2][B][i]), 40 C.F.R. § 300.430(e), and the NCP preamble (55 Fed. Reg. 8666, 8754–8755 [1990]). Although the NRWQC are nonenforceable guidelines, they may be potentially relevant and appropriate for groundwater where MCLs are not available. In such cases, the NRWQC may be adjusted to reflect only drinking water use and may be used as cleanup goals for the remedial actions. Since AOC 23 is a potential source of drinking water, in the absence of a MCLG or MCL, the NRWQC may be a potential ARAR for COCs in groundwater.

K2.2.1.2 STATE ARARs

The Navy requested ARARs from the state of California in a letter dated May 22, 2006 (Attachment K2). The state responded in a letter dated June 23, 2006 (Attachment K4). The state's response stated that the California laws, regulations, and policies identified in the November 13, 1996 letter (Attachment K1) are appropriate for use by the Navy in consideration of ARAR selection. Based on this response, the following requirements were evaluated:

- the Basin Plan (RWQCB 1995)
- SWRCB Res. 68-16, Res. 88-63, and Res. 92-49
- Cal. Code Regs. tit. 23, div. 3, ch. 15, § 2550(a), 2550.4(d), (e), and (f), and 2550.5
- Cal. Code Regs. tit. 22, §§ 64431 and 64444

Primary State Maximum Contaminant Levels

The following primary state MCLs are set forth in Cal. Code Regs. tit. 22:

- § 64431 (MCLs – inorganic chemicals)
- § 64444 (MCLs – organic chemicals)

Shallow groundwater at AOC 1 is not considered a potential drinking water source and MCLs are not potential ARARs for AOC 1. The state MCL for vinyl chloride at Cal. Code Reg. tit. 22, § 64444 is a potentially relevant and appropriate state requirement for AOC 23 because it is more stringent than federal ARARs.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) became Division 7 of the Cal. Water Code in 1969. The Porter-Cologne Act requires each regional board to formulate and adopt Basin Plans for all areas within the region (Cal. Water Code § 13240). It also requires each regional board to establish WQOs that will protect the beneficial uses of the water basin (Cal. Water Code § 13241) and to prescribe waste discharge requirements that would implement the Basin Plan for any discharge of waste to the waters of the state (Cal. Water Code § 13263[a]).

Other sections of the Porter-Cologne Act include Cal. Water Code § 13243, which allows regional boards to specify conditions or areas where waste discharge is not permitted. Cal. Water Code § 13269 provides the board's authority for waivers for reports or compliance with requirements as long as it is not against the public interest. Cal. Water Code § 13360 specifies circumstances under which regional boards may order compliance in a specific manner.

The Navy accepts the substantive provisions of Cal. Water Code §§ 13241, 13243, 13263(a), 13269, and 13360 of the Porter-Cologne Act as enabling legislation as implemented through the beneficial uses, WQOs, waste discharge requirements, promulgated policies of the Basin Plan, SWRCB Res. 68-16 and Res. 88-63, and state primary MCLs as potential state ARARs. Where waste discharge requirements are specified in general permits, the Navy considers the substantive requirements, as well as the permits themselves, to be TBC guidance, although on-site CERCLA response actions are exempt from permit requirements under Section 121(e) of CERCLA. These TBCs would be used as a means of assuring compliance with the potential ARARs, such as the MCLs, and promulgated policy of the Basin Plan and SWRCB Res. 68-16.

Cal. Water Code § 13304 sets forth enforcement authority and an enforcement process (orders issued by the state) and is procedural in nature. It does not constitute an ARAR because it does not itself establish or contain substantive environmental "standards, requirements, criteria, or limitations" (CERCLA Section 121 [42 U.S.C. § 9621]) and is not in itself directive in intent. Through its enforcement authority and procedures, substantive state environmental standards set forth in other statutes, regulations, plans, and orders are enforced. In addition, Cal. Water Code § 13304 is not more stringent than the substantive requirements of the potential state ARARs identified in the above paragraphs or the potential federal ARARs for groundwater.

Comprehensive Water Quality Control Plan for San Francisco Bay Basin

The Navy accepts the substantive provisions in the Basin Plan (RWQCB 1995), including beneficial uses (Chapter 2) and WQOs (Chapter 3). The WQOs and uses designated for the groundwater underlying IR Site 35 are potential ARARs for this RI/FS Report.

The Basin Plan was prepared and implemented by the San Francisco Bay Water Board to protect and enhance the quality of the waters in the basin. The Basin Plan establishes location-specific beneficial uses and WQOs for the surface water and groundwater of the region and is the basis of the RWQCB's San Francisco Bay Basin regulatory programs.

The Basin Plan includes both numeric and narrative WQOs for specific groundwater subbasins. The WQOs are intended to protect the beneficial uses of the waters of the region and to prevent nuisance.

Beneficial use and reuse of water are key aspects of the Basin Plan for the San Francisco Bay Basin. IR Site 35 is located in the East Bay Plain groundwater subbasin. This subbasin has the following beneficial use designations (RWQCB 1995):

- MUN
- agricultural supply
- industrial service supply
- industrial process supply

The groundwater beneficial use evaluation report (TtEMI 2000) states that for purposes of CERCLA cleanup decisions, groundwater in the central region of Alameda Point is unlikely to be used as a potential drinking water source. The report summarized the following factors indicating that the Class II groundwater in the central region should not be considered a potential drinking water source for CERCLA cleanup decisions:

- safe yield and maximum pumping rates that are inadequate to support common uses of water as well as multiple domestic users
- existing saltwater intrusion at the base of the FWBZ that would be accelerated by groundwater extraction
- absence of supply wells currently within or downgradient of contaminated groundwater
- state and county limitations that exist on well construction because of a thin, vulnerable aquifer

The Basin Plan allows for exceptions from MUN designation (see Chapter 2 of the Basin Plan: Beneficial Uses and Present and Potential Beneficial Uses, Groundwater). The Navy considers the substantive provisions of this chapter to be a potential ARAR and, therefore, the criterion for excepting a MUN designation is either of the following.

- The TDS exceed 3,000 mg/L (electrical conductivity 5,000 micromhos per centimeter) and the RWQCB does not reasonably expect the groundwater to supply a public water system.

or

- The groundwater does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day.

Shallow groundwater beneath AOC 1 is not considered a potential source of drinking water because of the generally low yield and high TDS expected west of Saratoga Street.

In a letter to the Navy dated July 21, 2003, (RWQCB 2003) (Attachment K3), the RWQCB concurred that groundwater west of Saratoga Street (which would include AOC 1) meets the exemption criteria in the SWRCB Source of Drinking Water Policy Res. 88-63. In light of this determination and the site-specific conditions, the MUN beneficial use is not

considered a potential ARAR for AOC 1. Therefore, only the agricultural and industrial beneficial uses are applicable to the AOC 1 groundwater.

AOC 23 is considered a potential source of drinking water since it is east of Saratoga Street. The beneficial uses of the East Bay Plain are potentially applicable state ARARs for AOC 23 groundwater.

WQOs for groundwater in the Basin Plan consist primarily of narrative objectives with a limited number of numerical objectives. Remediation of naturally occurring concentrations of inorganic constituents that may exceed WQOs established by the RWQCB for the regional aquifer to below background water-quality conditions is not required by the SWRCB under the Porter-Cologne Act, SWRCB Res. 68-16 of the State Water Board, or the basin plans of the state and RWQCBs.

State Water Resources Control Board Res. 92-49 and 68-16

SWRCB Res. 92-49, as amended on April 21, 1994, and October 2, 1996, is titled Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Cal. Water Code § 13304. It contains policies and procedures for the regional boards that apply to all investigations and cleanup and abatement activities for all types of discharges subject to Cal. Water Code § 13304.

SWRCB Res. 68-16, Statement of Policy With Respect to Maintaining High Quality of Waters in California, establishes the policy that high-quality waters of the state "shall be maintained to the maximum extent possible" consistent with the "maximum benefit to the people of the state." It provides that whenever the existing quality of water is better than the required applicable water quality policies, such existing high-quality water will be maintained until it has been demonstrated to the state that any change will be consistent with maximum benefit to the people of the state, will not unreasonably affect present and anticipated beneficial use of such water, and will not result in water quality less than that prescribed in the policies. It also states that any activity that produces or may produce a waste or increased volume or concentration of waste and that discharges or proposes to discharge to existing high-quality waters will be required to meet waste-discharge requirements that will result in the best practicable treatment or control of the discharge necessary to assure that 1) pollution or a nuisance will not occur and 2) the highest water quality consistent with maximum benefit to the people of the state will be maintained (SWRCB 1968). The SWRCB considers both Res. 92-49 and Res. 68-16 ARARs.

Cleanup to below background water quality conditions is not required by the SWRCB under the Porter-Cologne Act. SWRCB Res. 92-49 II.F.1 (SWRCB 1992) provides that regional boards may require cleanup and abatement to "conform to the provisions of the Resolution No. 68-16 of the State Water Board, and the Water Quality Control Plans of the State and Regional Water Quality Control Boards, provided that under no circumstances shall these provisions be interpreted to require cleanup and abatement which achieves water quality conditions that are better than background conditions."

The Navy Position Regarding SWRCB Res. 92-49 and 68-16

The Navy recognizes that the key substantive requirements of Cal. Code Regs. tit. 22, § 66264.94 (and the identical requirements of Cal. Code Regs tit. 23, § 2550.4 and Section III.G of SWRCB Res. 92-49) require cleanup of COCs to background levels unless such restoration proves to be technologically or economically infeasible and an alternative cleanup level for COCs will not pose a substantial present or potential hazard to human health or the environment. In addition, the Navy recognizes that these provisions are more stringent than corresponding provisions of 40 C.F.R. § 264.94, and although they are federally enforceable through the RCRA program authorization, they are also independently based on state law to the extent that they are more stringent than the federal regulations.

The Navy also determined that SWRCB Res. 68-16 is not a potential chemical-specific ARAR for determining remedial action goals. The Navy determined that further migration of already contaminated groundwater is not a discharge governed by the language in Res. 68-16. More specifically, the language of SWRCB Res. 68-16 indicates that it is prospective in intent, applying to new discharges in order to maintain existing high-quality waters. It is not intended to apply to restoration of waters that are already degraded.

The Navy's position is that SWRCB Res. 68-16 and 92-49 and Cal. Code Regs. tit. 23, § 2550.4 do not constitute chemical-specific ARARs for this remedial action because they are state requirements and are not more stringent than federal ARAR provisions of Cal. Code Regs. tit. 22, § 66264.94. The NCP at 40 C.F.R. § 300.400(g)(4) provides that only state standards more stringent than federal standards may be ARARs (see also CERCLA Section 121, 42 U.S.C. § 9621[d][2][A][ii]).

The substantive technical standard in the equivalent state requirements (i.e., Cal. Code Regs. tit. 23, div. 3, ch. 15, and SWRCB Res. 92-49 and 68-16) is identical to the substantive technical standard in Cal. Code Regs. tit. 22, § 66264.94. This section of Cal. Code Regs. tit. 22 will likely be applied in a manner consistent with equivalent provisions of other regulations, including SWRCB Res. 92-49 and 68-16.

Remedial action alternatives for groundwater include the addition of chemical oxidation and iron substances into the groundwater for *in situ* treatment. It was determined in the ARARs evaluation that SWRCB Res. 92-49 is not more stringent than federal ARARs. *In situ* chemical oxidation (ISCO) and injection of microscale iron are not activities addressed by SWRCB Res. 68-16. SWRCB Res. 68-16 addresses "Any activity which produces or may produce a waste or increased volume or concentration of waste . . ." The injection of iron or ISCO are not remedial activities expected to produce a waste or increase the volume or concentration of waste. These treatment technologies are proposed to accomplish the opposite.

State Water Resources Control Board Res. 88-63

SWRCB Res. 88-63, Adoption of Policy Entitled "Sources of Drinking Water," establishes criteria to help the RWQCB identify potential sources of drinking water (SWRCB 1988). According to this resolution, all groundwater in California is considered

suitable or potentially suitable for domestic or municipal freshwater supply except in cases where any one of the following water quality and production criteria cannot be met.

- TDS exceed 3,000 mg/L (or electrical conductivity is greater than 5,000 micromhos per centimeter) and the RWQCB does not reasonably expect the groundwater to supply a public supply system.
- Groundwater is contaminated, either by natural processes or by human activity unrelated to a specific pollution incident, and cannot reasonably be treated for domestic use either by best management practices or best economically available treatment practices.
- The groundwater does not provide sufficient water to supply a single well capable of producing an average sustained yield of 200 gallons per day.

SWRCB Res. 88-63 has been incorporated by reference into the Basin Plan (RWQCB 1995). The Navy has determined that SWRCB Res. 88-63 is a potential ARAR for IR Site 35. Under these criteria, AOC 23 is a potential drinking water source and AOC 1 is not.

Cal. Code Regs. tit. 23, div. 3, ch. 15, § 2550(a), 2550.4(d), (e), and (f), and 2550.5.

The Cal. Code Regs. tit. 23, div. 3, ch. 15 regulations address hazardous waste discharges to land. Other waste classifications are addressed under Cal. Code Regs. tit. 27, div. 2, subdivision (subdiv.) 1. Cal. Code Regs. tit. 23, § 2550(a) addresses the general applicability of other technical standards in Chapter 15 and does not contain standards itself. Therefore, Cal. Code Regs. tit. 23, § 2550(a) is not an ARAR. Cal. Code Regs. tit. 23, § 2550.4(d), (e), and (f) address concentration limits for monitoring and cleanup programs at hazardous waste management units. Because the site was not a hazardous waste management unit, these requirements are not potentially applicable. The Navy has also determined that the requirements contained in these sections are identical to those found in Cal. Code Regs. tit. 22, § 66264.94(d)(1), (2), and (4), and (e)(1) and (2). Since they are not more stringent than the corresponding federal ARARs, these regulations are therefore not potential ARARs for IR Site 35.

RCRA Requirements

State RCRA requirements included in the U.S. EPA-authorized RCRA program for California are considered to be potential federal ARARs and are discussed above. When state regulations are broader in scope than their federal counterparts, they are considered potential state ARARs. State requirements such as the non-RCRA, state-regulated hazardous waste requirements may be potential state ARARs because they are not within the scope of the federal ARARs (57 Fed. Reg. 60848). The Cal. Code Regs. tit. 22, div. 4.5 requirements that are part of the state-approved RCRA program would be potential state ARARs for non-RCRA, state-regulated hazardous wastes.

K2.2.2 Surface Water ARARs

Surface water is not a medium being addressed by this RI/FS Report as no surface water body is located within the boundaries of IR Site 35. However, discharges resulting from

remedial activities at IR Site 35 may be a concern if a remedial action is selected that discharges treated water to Oakland Inner Harbor or Seaplane Lagoon. Therefore, potential federal and state ARARs for surface water are detailed in the following subsections.

K2.2.2.1 FEDERAL ARARs

Federal requirements evaluated as potential ARARs for surface water are discussed in the following subsections.

RCRA Land Disposal Restrictions

Discharge of treated groundwater to San Francisco Bay is not prohibited under the RCRA land-disposal restrictions (LDRs) because the groundwater could only be a RCRA hazardous waste because of a toxic characteristic, and after treatment the groundwater would no longer exhibit toxicity. The LDRs exempt such a discharge (Cal. Code Regs. tit. 22, § 66268.1[c][4][D]).

Safe Drinking Water Act

Federal MCLs and MCLGs developed by U.S. EPA under the SDWA are generally considered relevant and appropriate as remediation goals for current or potential drinking water sources, including surface water bodies (see Section K2.2.1.1). Since Oakland Inner Harbor and Seaplane Lagoon are not existing or potential sources of drinking water, the MCLs and MCLGs are not ARARs for potential groundwater discharges to surface water.

Water Quality Standards

On December 22, 1992, U.S. EPA promulgated federal water quality standards under the authority of the federal CWA Section 303(c)(4)(B), 33 U.S.C. ch. 26, § 1313(c)(2)(B), in order to establish water quality standards required by the CWA where the state of California and other states had failed to do so (57 Fed. Reg. 60848 [1992]). These standards have been amended over the years in the *Federal Register*, including amendments of the NTR (60 Fed. Reg. 22228 [1995]). These water quality standards, as amended, are codified at 40 C.F.R. § 131.36.

U.S. EPA promulgated a rule on May 18, 2000, to fill a gap in California's water quality standards. The gap was created in 1994 when a state court overturned the state's water quality control plans that contained water quality criteria for priority toxic pollutants. The rule, commonly called the CTR, is codified at 40 C.F.R. § 131.38. These federal criteria are legally applicable in the state of California for inland surface waters and enclosed bays and estuaries for all purposes and programs under the CWA.

The water quality standards contained in 40 C.F.R. § 131.36 and 131.38 are potential applicable federal ARARs for IR Site 35 groundwater cleanup remedial actions that discharge to surface water.

Other Clean Water Act Requirements

CWA 301(b) requires that all direct discharges meet technology-based requirements, including the BCT and BAT, to the extent economically achievable. The regulations at 40 C.F.R. § 125.3 codify the CWA 301(b)(2) technology-based treatment requirements. These requirements are made on a case-by-case basis using best professional judgment. Under CWA 301(b)(1)(C), effluent limits must meet any more stringent limitation, including those necessary to meet water quality standards, treatment standards, or schedules of compliance. These are generally water quality–based effluent limitations. If the remedial actions at IR Site 35 include direct point source discharge to Oakland Inner Harbor or Seaplane Lagoon, the BCT and BAT effluent limits and water quality–based effluent limits would be potentially applicable federal ARARs.

National Recommended Water Quality Criteria

See discussions in Section K2.2.1.1. The NRWQC may be potentially relevant and appropriate for surface water in the absence of promulgated state standards. However, as discussed in the CERCLA Compliance With Other Laws Manual (U.S. EPA 1988a), "If the state has promulgated a numerical water quality standard for a given chemical and use, the state standard would generally be relevant and appropriate rather than a water quality criterion, because it essentially represents a site-specific adaptation of a water quality criterion." Since water quality standards have been promulgated in the CTR, the CTR standards, not the NRWQC, would be considered potential chemical-specific ARARs for this site.

RCRA Hazardous Waste and Groundwater Protection Standards

See discussions in Section K2.2.1.1.

K2.2.2.2 STATE ARARs

State requirements evaluated as potential ARARs for surface water are discussed in the following subsections.

Comprehensive Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan)

See discussion in Section K2.2.1.2. The substantive provisions of the Basin Plan for beneficial uses (Chapter 2) and WQOs (Chapter 3) are potential state ARARs for discharges of groundwater to surface water.

The beneficial uses for the surface waters that may potentially be affected by migrating groundwater are potential ARARs. The Oakland Inner Harbor and Seaplane Lagoon are included in the upper end of the lower San Francisco Bay and their beneficial uses are as follows:

- ocean, commercial, and sport fishing
- estuarine habitat
- industrial service supply

- fish migration
- navigation
- preservation of rare and endangered species
- water contact recreation
- noncontact water recreation
- shellfish harvesting
- wildlife habitat

Chapter 3 of the Basin Plan lists several narrative WQOs. The toxicity narrative WQO requires, in substantive part, that all waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms. It further states that there shall be no acute toxicity or chronic toxicity in ambient waters. Based on COCs in the groundwater, the toxicity WQO is a potentially applicable ARAR for IR Site 35 groundwater discharged to surface water (e.g., from dewatering activities).

State Water Resources Control Board Res. 92-49 and 68-16

See discussion in Section K2.2.1.2, including the positions of the Navy and the state of California on these resolutions for cleanup at the site.

Some of the alternatives proposed will discharge dewatered groundwater into nearby surface water such as Seaplane Lagoon or the Oakland Inner Harbor. SWRCB Res. 68-16 is an action-specific ARAR for regulating discharged treated groundwater to surface water applying to new discharges in order to maintain existing high-quality waters. The Navy intends to comply with SWRCB Res. 68-16 for discharges to surface water by treating the water to protect the surface water beneficial uses as discussed above.

State Water Resources Control Board Res. 88-63

See discussion in Section K2.2.1.2. SWRCB Res. 88-63 states that water sources that contain TDS exceeding 3,000 mg/L (or having an electrical conductivity of greater than 5,000 micromhos per centimeter) or a single well with a yield of less than 200 gallons per day are not reasonably expected by the RWQCB to supply a public water system (SWRCB 1988). San Francisco Bay is not an existing or potential source of drinking water due to the TDS exceeding 3,000 mg/L. SWRCB Res. 88-63 is a potential state ARAR for determining whether water is a potential source of drinking water.

K2.2.3 Soil ARARs

The key threshold question for soil ARARs is whether the wastes located at IR Site 35 would be classified as hazardous waste. The soil may be classified as a federal hazardous waste as defined by RCRA and the state-authorized program, or as non-RCRA, state-regulated hazardous waste. If the soil is determined to be hazardous waste, the RCRA requirements may be applicable. If the soil contains chemicals with concentrations below

hazardous waste criteria but similar to concentrations in hazardous waste, the RCRA requirements may be relevant and appropriate.

K2.2.3.1 FEDERAL ARARs

Federal requirements evaluated as potential ARARs for soil are discussed in the following subsections.

RCRA Hazardous Waste and Groundwater Protection Standards

The federal RCRA requirements at 40 C.F.R. pt. 261 do not apply in California because the state RCRA program is authorized. The authorized state RCRA requirements are therefore considered potential federal ARARs (see Section K1.3). The applicability of RCRA requirements depends on whether the waste is a RCRA hazardous waste; whether the waste was initially treated, stored, or disposed after the effective date of the particular RCRA requirement; and whether the activity at the site constitutes treatment, storage, or disposal as defined by RCRA. However, RCRA requirements may be relevant and appropriate even if they are not applicable. Examples include activities that are similar to the definition of RCRA treatment, storage, or disposal for waste that is similar to RCRA hazardous waste.

The determination of whether a waste is a RCRA hazardous waste can be made by comparing the site waste to the definition of RCRA hazardous waste. RCRA requirements at Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100 are potential ARARs because they define RCRA hazardous waste. A waste can meet the definition of hazardous waste if it has the toxicity characteristic of hazardous waste. This determination is made by using the TCLP. The concentrations in a TCLP extract at which a waste becomes hazardous, listed in Cal. Code Regs. tit. 22, § 66261.24(a)(1)(B), are potential federal ARARs for determining whether the site has hazardous waste. If the site waste has concentrations exceeding these values, it is determined to be a characteristic RCRA hazardous waste (see Section K1.4.1).

The requirements at Cal. Code Regs. tit. 22, § 66264.94(a)(1), (a)(3), (c), (d), and (e) are potential federal ARARs for contamination in the vadose zone (i.e., the unsaturated zone). These sections set concentration limits for the unsaturated zone as well as for groundwater and surface water. These requirements are considered to be potential federal ARARs because they are part of the approved state RCRA program.

RCRA LDRs at Cal. Code Regs. tit. 22, § 66268.1(f) are potential federal ARARs for discharging waste to land. This section prohibits the disposal of hazardous waste to land unless 1) it is treated in accordance with the treatment standards of Cal. Code Regs. tit. 22, § 66268.40 and the underlying hazardous constituents meet the Universal Treatment Standards at Cal. Code Regs. tit. 22, § 66268.48; 2) it is treated to meet the alternative soil treatment standards of Cal. Code Regs. tit. 22, § 66268.49; or 3) a treatability variance is obtained under Cal. Code Regs. tit. 22, § 66268.44. The LDRs are potentially applicable for the proposed on-site treatment of groundwater if it is

determined to be a hazardous waste. The groundwater is not expected to contain COCs above hazardous waste levels.

Off-site treatment and disposal must comply with all applicable laws and regulations that are both substantive and procedural requirements.

K2.2.3.2 STATE ARARs

State requirements evaluated as potential ARARs for soil are discussed in the following subsections.

RCRA Requirements

State RCRA requirements included in the U.S. EPA-authorized RCRA program for California are considered to be potential federal ARARs and are discussed above. When state regulations are either broader in scope or more stringent than their federal counterparts, they are considered potential state ARARs. State requirements such as the non-RCRA, state-regulated hazardous waste requirements may be potential state ARARs because they are not within the scope of the federal ARARs (57 Fed. Reg. 60848). The Cal. Code Regs. tit. 22, div. 4.5 requirements that are part of the state-approved RCRA program would be potential state ARARs for non-RCRA, state-regulated hazardous wastes.

The site waste characteristics need to be compared to the definition of non-RCRA, state-regulated hazardous waste. The non-RCRA, state-regulated waste definition requirements at Cal. Code Regs. tit. 22, § 66261.24(a)(2) are potential state ARARs for determining whether other RCRA requirements are potential state ARARs. This section lists the TTLCs and STLCs. The site waste may be compared to these thresholds to determine whether it meets the characteristics for a non-RCRA, state-regulated hazardous waste.

State Water Resources Control Board Res. 92-49

See discussions in Section K2.2.1.2, including the positions of the Navy and the state of California on this resolution.

Cal. Code Regs. tit. 23, div. 3, ch. 15

Section 2550.4 of Chapter 15 has also been identified by the state as a potential ARAR for soil cleanup levels for hazardous waste. This section is essentially the same as federal ARARs identified at Cal. Code Regs. tit. 22, § 66264.94(a)(1)(3), (c), (d), and (e). Therefore, Section 2550.4 is not an ARAR for soil cleanup levels at IR Site 35.

Cal. Code Regs. tit. 27, div. 2, subdiv. 1

For former Cal. Code Regs. tit. 23, div. 3, ch. 15 requirements for waste other than hazardous waste that were repealed and subsequently went into effect under Cal. Code Regs. tit. 27, div. 2, subdiv. 1 on July 18, 1997, the following sections define waste characteristics for discharge of waste to land. These requirements may be applicable for soil left in place that was discharged after the effective date of the requirements. They

are not potentially applicable to discharges before that date but may be relevant and appropriate.

Cal. Code Regs. tit. 27, § 20230(a) defines inert waste as waste "that does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives, and does not contain significant quantities of decomposable waste." Cal. Code Regs. tit. 27, § 20230(b) states that "inert wastes do not need to be discharged at classified waste management units." Cal. Code Regs. tit. 27, § 20230(a) and (b) may be potential state ARARs for soil that meets the definition of inert waste.

Cal. Code Regs. tit. 27, §§ 20210 and 20220 are state definitions for designated waste and nonhazardous waste, respectively. These may be potential ARARs for soil that meets the definitions. These soil classifications determine state classification and siting requirements for discharging waste to land.

The waste definitions at Cal. Code Regs. tit. 27, §§ 20230(a), 20210, and 20220 are potentially applicable ARARs for characterizing waste prior to off-site disposal.

K2.2.4 Air ARARs

For this RI/FS Report, the COCs in soil and groundwater include chemicals that may be a concern if they are emitted to the atmosphere. ARARs for air will be discussed in greater detail under action-specific requirements after the remedial alternatives have been identified.

K2.2.4.1 FEDERAL ARARs

The Clean Air Act (CAA) and RCRA air emission requirements are discussed below.

Clean Air Act

The CAA establishes the National Ambient Air Quality Standards (NAAQS) in 40 C.F.R. § 50.4–50.12. NAAQS are not enforceable in and of themselves; they are translated into source-specific emissions limitations by the state (U.S. EPA 1990). Substantive requirements of the Bay Area Air Quality Management District (BAAQMD) rules that have been approved by U.S. EPA as part of the State Implementation Plan (SIP) under the CAA are potential federal ARARs for air emissions (CAA Section 110). The SIP includes rules for emissions restrictions for particulates, organic compounds, and hazardous air pollutants, as well as standards of performance for new sources.

K2.2.4.2 STATE ARARs

RCRA requirements for non-RCRA, state-regulated hazardous wastes and BAAQMD rules are described below.

Bay Area Air Quality Management District Regulations

BAAQMD regulations may be potentially applicable ARARs. More specific information will be provided in the discussion of action-specific ARARs (Section K4).

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Section K3

LOCATION-SPECIFIC ARARs

Potential location-specific ARARs are identified and discussed in this section. The discussions are presented on the basis of various attributes of the site location, such as whether it is within a floodplain. Additional surveys will be performed in connection with the remedial actions to confirm location-specific ARARs where inadequate siting information currently exists, or in the event of changes to planned facility locations.

K3.1 LOCATION-SPECIFIC ARARs CONCLUSIONS

Cultural resources, wetlands protection, floodplain management, hydrologic resources, biological resources, coastal resources, and geologic characteristics as appropriate for the site are the resource categories relating to location-specific requirements potentially affected by the IR Site 35 remedial actions. The conclusions for ARARs pertaining to these resources are presented in the following sections.

K3.1.1 Cultural Resource ARARs Conclusions

The Navy entered into a Memorandum of Agreement (MOA) (Attachment K5) with the California State Historic Preservation Officer (SHPO) and Advisory Council on Historic Preservation (ACHP) in 1999 concerning the overall disposal of former NAS Alameda. The 1999 MOA identifies the Alameda Historic District as a historic property determined eligible for listing on the National Register of Historic Places (NRHP). Section 106 of the National Historic Preservation Act (NHPA) (16 U.S.C. § 470–470x-6 and its implementing regulations [36 C.F.R. pt. 800]), as amended, is a potentially relevant and appropriate cultural resource ARAR.

K3.1.2 Wetlands Protection and Floodplain Management ARARs Conclusions

IR Site 35 is not located in a floodplain, and there are no naturally occurring streams or ponds at Alameda Point. Also, no wetlands have been identified at the site. Therefore, no potential wetlands or floodplain management ARARs were identified.

K3.1.3 Hydrologic Resource ARARs Conclusions

IR Site 35 contains no designated hydrologic resources, nor would the IR Site 35 remedial actions affect any such resource. Therefore, no potential hydrologic resources ARARs were identified.

K3.1.4 Biological Resource ARARs Conclusions

Most of IR Site 35 is developed and does not offer habitat for endangered or threatened species. However, it was determined that migratory birds may occasionally stop at the site. Therefore, the substantive provisions of the Migratory Bird Treaty Act (16 U.S.C. § 703) are potentially relevant and appropriate for the IR Site 35 remedial action, and the alternatives would be implemented in a manner protective of migratory birds.

K3.1.5 Coastal Resource ARARs Conclusions

Since areas of IR Site 35 considered in the FS portion of this RI/FS Report are not adjacent to the San Francisco Bay, no coastal zone management ARARs were identified.

K3.1.6 Geologic Characteristics ARARs Conclusions

There are no known faults directly at or near IR Site 35. The nearest active fault is the Hayward Fault, which is approximately 6.5 miles (10.5 kilometers) east of Alameda Point (FWEC 2002). Therefore, no potential geologic characteristics ARARs were identified.

K3.2 DETAILED DISCUSSION OF ARARs

The following subsections provide a detailed discussion of federal and state ARARs by location-specific resources. Pertinent and substantive provisions of the potential ARARs listed and described below were reviewed to determine whether they are potential federal or state ARARs for this RI/FS Report.

Requirements that are determined to be federal and state ARARs or TBCs are identified in Tables K3-1 and K3-2, respectively. ARARs determinations are presented in the "ARAR Determination" column. Determinations of status for location-specific ARARs were generally based on consultation of maps or lists included in the regulation or prepared by the administering agency. References to the document or agency consulted are provided in the "Comments" column and may be provided in footnotes to the table. Specific issues concerning some of the requirements are discussed in the following sections.

K3.2.1 Cultural Resource ARARs

IR Site 35 is generally developed on top of fill, and there is no potential for encountering previously undisturbed areas. The site does include the Big Whites, which are a potential cultural resource.

K3.2.1.1 NATIONAL HISTORIC PRESERVATION ACT OF 1966, AS AMENDED

Pursuant to Section 106 of the NHPA (16 U.S.C. § 470–470x-6, and its implementing regulations [36 C.F.R. pt. 800]), as amended, CERCLA remedial actions are required to take into account the effects of remedial activities on any historic properties included on or eligible for inclusion on the NRHP. The NRHP is a list of districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and culture. Section 110(f) of the NHPA of 1966, as amended, requires that before approval of any federal undertaking that may directly and adversely affect any national historic landmark, the head of the responsible federal agency will, to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to the landmark, and will afford the SHPO and ACHP a reasonable opportunity to comment on the undertaking.

The substantive requirements of 36 C.F.R. pt. 800 are summarized below:

1. Identify cultural resources included on (or eligible for inclusion based on the criteria set forth at 36 C.F.R. § 800.4) the NRHP that are located at or near the area under study. Portions of the Alameda Historic District and buildings identified as "contributors" that made the Historic District eligible for listing on the NRHP (Page & Turnbull 2005) are near or above some of the areas of IR Site 35. AOC 1 (Alternative AOC 1-5) and the PAH areas (Alternatives PAH-3a, PAH-3b, PAH-4a, and PAH-4b) include activities under or adjacent to buildings identified as contributors. The area under study is identified and documented as the area of potential effects per 36 C.F.R. § 800.4(a)(1).

2. Identify and take into account the possible effects of proposed alternatives on historic properties included in or eligible for inclusion in the NRHP.

   If the proposed response action will have no effect on historic properties, document a finding of "no historic properties affected" (36 C.F.R. § 800.4[d]).

3. Identify and take into account adverse effects of proposed alternatives on historic properties.

   If the proposed alternatives will have an effect on such resources, apply the Criteria of Adverse Effect and determine whether or not such effects are adverse effects (36 C.F.R. § 800.5). If it is determined that the effects are not adverse, document a "finding of no adverse effect" (36 C.F.R. § 800.5[b]).

   If it is determined that there will be adverse effects to historic properties, document a "finding of adverse effect" and take into account measures that would avoid, minimize, or mitigate adverse effects in accordance with the substantive requirements of 36 C.F.R. § 800.6. More specifically, the Navy will identify adverse effects and evaluate alternatives that can avoid, minimize, or mitigate adverse effects discussed in the ROD and subsequent remedial action work plan (RAW).

4. Resolution of Adverse Effects:

   If the Navy is unable to resolve adverse effects to the satisfaction of the SHPO and ACHP, it will take their comments into account and address them in Responsiveness Summaries in a manner consistent with the substantive requirements of 36 C.F.R. § 800.6 and 800.7.

   These substantive requirements shall be addressed by the Navy in the CERCLA remedial action selection process in lieu of the procedural requirements set forth in 36 C.F.R. pt. 800. More specifically, the Navy shall focus the CERCLA process by actively seeking the expertise and comments of the following entities to ensure that the substantive requirements of the NHPA and 36 C.F.R. pt. 800 are adequately addressed: the SHPO, ACHP (when it chooses to participate), interested Native American tribes, and other interested parties.

   These entities shall be provided with the opportunity to review and comment on the portions of the following reports addressing historic and cultural resources: draft and final FS reports, the draft ROD, and draft RAW. Their comments shall be addressed in Responsiveness Summaries accompanying these CERCLA documents.

The substantive provisions of 36 C.F.R. pt. 800 are applicable requirements for the IR Site 35 remedial action. The remedial alternatives will be conducted in a manner protective of the Alameda Historic District to the extent feasible.

K3.2.1.2 ARCHAEOLOGICAL AND HISTORIC PRESERVATION ACT

The Archaeological and Historic Preservation Act, 16 U.S.C. § 469–469c-1, provides for the preservation of historical and archaeological data that might otherwise be lost as a result of dam construction or alterations of the terrain. If activities in connection with any federal construction project or federally approved project may cause irreparable loss to significant scientific, prehistorical, or archaeological data, the act requires the agency undertaking that project to preserve the data or request the Department of the Interior (DOI) to do so. This act differs from the NHPA in that it encompasses a broader range of resources than those listed on the NRHP and mandates only the preservation of the data (including analysis and publication).

The Archaeological and Historic Preservation Act requires that for federally approved projects that may cause irreparable loss to significant scientific, prehistoric, historic, or archaeological data, the data must be preserved by the agency undertaking the project, or the agency undertaking the project may request the DOI to do so. No prehistoric or historic sites were identified in existing data for the area that potentially could be impacted by the remedial action at IR Site 35.

Therefore, the Archaeological and Historic Preservation Act is not a potential ARAR for this project because none of the alternatives would involve alteration of terrain resulting in the loss or destruction of data.

K3.2.1.3 HISTORIC SITES, BUILDINGS, AND ANTIQUITIES ACT OF 1935

The purpose of the Historic Sites, Buildings, and Antiquities Act (16 U.S.C. §§ 461–467) and its implementing regulations (40 C.F.R. § 6.301[c]) is to encourage the long-term preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States, including historic landmarks (36 C.F.R. pt. 65) and natural landmarks (36 C.F.R. pt. 62). Properties designated as national historic landmarks in California are listed in the NRHP. Natural landmarks are nationally significant examples of a full range of ecological and geological features that constitute the nation's natural heritage. In conducting an environmental review of a proposed action, the responsible official considers the existence and location of natural landmarks using information provided by the National Park Service pursuant to 36 C.F.R. § 62.6(d) to avoid undesirable impacts on such landmarks.

These requirements are not potential ARARs because the Alameda Historic District is not a national historic landmark or a national natural landmark.

K3.2.1.4 ARCHAEOLOGICAL RESOURCES PROTECTION ACT OF 1979

Public Law 96-95 (16 U.S.C. § 470aa–470mm) was enacted in 1979 and amended in 1988 and applies to all lands to which the fee title is held by the United States. The purpose of this statute is to provide for the protection of archaeological resources on

federal and Indian lands. The act prohibits unauthorized excavation, removal, damage, alteration, or defacement of archaeological resources located on public lands unless such activity is pursuant to a permit issued under 16 U.S.C. § 470cc.

No archaeological sites have been identified within the boundaries of IR Site 35 or at former NAS Alameda, and therefore the Archaeological Resources Protection Act is not a potential ARAR (EFA West 1999).

K3.2.2 Wetlands Protection and Floodplains Management ARARs

IR Site 35 is not located in a floodplain, and there are no naturally occurring streams or ponds at Alameda Point. Also, no wetlands have been identified at the site. The following potential wetlands protection and floodplains management ARARs were evaluated but none were determined to be potential ARARs:

- Protection of Wetlands (Executive Order Number [Exec. Order No.] 11990, 40 C.F.R. § 6.302[a])
- Floodplain Management (Exec. Order No. 11988, 40 C.F.R. § 6.302[b])
- CWA of 1977 (33 U.S.C. § 1344)
- RCRA (42 U.S.C. §§ 6901–6991[i])

K3.2.3 Biological Resource ARARs

Most of IR Site 35 is developed and does not offer habitat to endangered or threatened species. However, it was determined that migratory birds may occasionally stop at the site. The following requirements were evaluated for potential ARAR status but only the substantive provisions of the Migratory Bird Treaty Act were determined to be potentially pertinent to the IR Site 35 remedial action. The other requirements are included in Tables 3-1 and 3-2.

The following potential biological resource ARARs were evaluated:

- Federal Endangered Species Act (ESA) of 1973 (16 U.S.C. §§ 1531–1543)
- Migratory Bird Treaty Act of 1972 (16 U.S.C. §§ 703–712)
- Marine Mammal Protection Act (16 U.S.C. §§ 1361–1421h)
- Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended (16 U.S.C. §§ 1801–1882)
- National Wildlife Refuge System Administration Act of 1996 (16 U.S.C. § 668dd–668ee, substantive provisions of 50 C.F.R. § 27.11–27.97)
- Wilderness Act (16 U.S.C. §§ 1131–1136, 50 C.F.R. § 35.1–35.14)
- California ESA (*California Fish and Game Code*, ch. 1.5, §§ 2050–2116)

K3.2.3.1 FEDERAL ARARs

Federal requirements evaluated as potential ARARs for biological resources are discussed in the following subsection.

Migratory Bird Treaty Act of 1972

The Migratory Bird Treaty Act (16 U.S.C. §§ 703–712) prohibits at any time, using any means or manner, the pursuit, hunting, capturing, or killing or attempting to take, capture, or kill any migratory bird (Section 703). This act also prohibits the possession, sale, export, and import of any migratory bird or any part of a migratory bird, as well as nests and eggs. A list of migratory birds for which this requirement applies is found at 50 C.F.R. § 10.13. It is the Navy's position that this act is not legally applicable to Navy actions; however, Exec. Order No. 13186 (dated January 10, 2001) requires each federal agency taking actions that have or are likely to have a measurable effect on migratory bird populations to develop and implement, within 2 years, a memorandum of understanding (MOU) with the United States Fish and Wildlife Service (USFWS) to promote the conservation of such populations. The Department of Defense and the USFWS are in the process of negotiating this MOU. In the meantime, the Migratory Bird Treaty Act will continue to be evaluated as a potentially relevant and appropriate requirement for Navy CERCLA remedial actions.

Portions of the site could serve as a corridor between other habitats or as a place of brief resting for migratory birds. Therefore, the substantive provisions of the Migratory Bird Treaty Act (16 U.S.C. § 703) are potentially relevant and appropriate for remedial actions at IR Site 35. The remedial action alternatives will be implemented in a manner protective of migratory birds.

K3.2.4 Coastal Resource ARARs

The San Francisco Bay Conservation and Development Commission (BCDC) is responsible for implementing the coastal zone regulations within San Francisco Bay. The BCDC regulations at *California Government Code* § 66610(b) define their jurisdiction as within 100 feet of the shoreline. The areas of IR Site 35 considered in the FS portion of this RI/FS Report are not within 100 feet of the San Francisco Bay. Therefore, the following potential coastal resource ARARs were evaluated but were not determined to be pertinent to IR Site 35 remedial action:

- Coastal Zone Management Act (16 U.S.C. §§ 1451–1464, 15 C.F.R. § 930)
- California Coastal Act of 1976 (*California Public Resources Code* §§ 30000–30900, Cal. Code Regs. tit. 14, §§ 13001–13666.4)

Section K4
ACTION-SPECIFIC ARARs

This RI/FS Report evaluates groundwater and soil remedial action alternatives for identified areas of IR Site 35. The alternatives include no action and combinations of the following actions: institutional controls, monitored natural attenuation (MNA), *in situ* biodegradation (ISB), *in situ* chemical oxidation (ISCO), asphalt or soil cover, and soil excavation. The ISB includes source removal by excavation, mixing of treatment materials into backfill material near the water table, and off-site disposal. Excavation includes dewatering as necessary since the groundwater is shallow at the site. The excavated soil will be characterized on-site and then disposed off-site.

Tables K4-1 and K4-2 present and evaluate federal and state potential action-specific ARARs for IR Site 35, respectively. Table K4-3 summarizes the components of each soil and groundwater alternative. A discussion of the requirements determined to be pertinent to each alternative being evaluated for IR Site 35 remedial action(s) is presented in this section. A discussion of how the alternatives comply with each identified ARAR is also provided.

K4.1 NO FURTHER ACTION

There is no need to identify ARARs for the no further action alternatives for soil (Alternatives AOC 3-1, AOC 10/12-1, and PAH 1) or groundwater (AOC 1-1 and AOC 23-1) because ARARs apply to "any removal or remedial action conducted entirely on-site" and "no action" is not a removal or remedial action (CERCLA Section 121[e], 42 U.S.C. § 9621[e]). CERCLA Section 121 (42 U.S.C. § 9621) cleanup standards for selection of a Superfund remedy, including the requirement to meet ARARs, are not triggered by the no action alternative (U.S. EPA 1991b). Therefore, a discussion of compliance with action-specific ARARs is not appropriate for this alternative.

K4.2 INSTITUTIONAL CONTROLS

Institutional controls would be put in place to prohibit extraction of groundwater for domestic purposes (at AOC 23), mitigate potential vapor intrusion risk (at AOC 1), restrict soil excavation and protect a soil cover, or impose soil management requirements as applicable.

Institutional controls would involve a layered implementation of land-use restriction, a land-use covenant, and a deed notice. No federal ARARs were identified for institutional controls.

State statutes that have been accepted by the Navy as ARARs for implementing institutional controls and entering into an Environmental Restriction Covenant and Agreement with DTSC include substantive provisions of the *California Civil Code* (Cal. Civ. Code) § 1471 and *California Health and Safety Code* (Cal. Health & Safety Code) §§ 25202.5, 25222.1, 25233(c), 25234, and 25355.5. DTSC promulgated a regulation on 19 April 2003 regarding "Requirements for Land Use Covenants" at Cal. Code Regs. tit. 22, § 67391.1. The substantive provisions of this regulation have been determined to be "relevant and appropriate" state ARARs by the Navy.

The substantive provisions of Cal. Civ. Code § 1471 are the following general narrative standard: ". . . to do or refrain from doing some act on his or her own land . . . where . . . : (c) Each such act relates to the use of land and each such act is reasonably necessary to protect present or future human health or safety or the environment as a result of the presence on the land of hazardous materials, as defined in Section 25260 of the Health and Safety Code." This narrative standard would be implemented through incorporation of restrictive environmental covenants in the deed at the time of transfer. These covenants would be recorded with the environmental restriction covenant and agreement and run with the land.

The substantive provisions of Cal. Health & Safety Code § 25202.5 are the general narrative standard to restrict "present and future uses of all or part of the land on which the . . . facility . . . is located . . . ." These substantive provisions will be implemented by incorporation of restrictive environmental covenants in the Environmental Restriction Covenant and Agreement at the time of transfer for purposes of protecting present and future public health and safety.

Actual land-use restriction requirements are set forth in Cal. Health & Safety Code § 25232(b)(1)(A)–(E). These include prohibitions on construction of residences, hospitals for humans, schools for persons under 21 years of age, day care centers, or any permanently occupied human habitation on hazardous waste property. Cal. Health & Safety Code § 25233(c) sets forth substantive criteria for granting variances from the uses prohibited in Cal. Health & Safety Code § 25232(b)(1)(A)–(E) based on specified environmental and health criteria.

Cal. Health & Safety Code §§ 25222.1 and 25355.5(a)(1)(C) provide the authority for the state to enter into voluntary agreements to establish land-use covenants with the owner of property. The substantive requirements of the following Cal. Health & Safety Code § 25222.1 provisions are "relevant and appropriate": (1) the general narrative standard: "restricting specified uses of the property, . . . " and (2) ". . . the agreement is irrevocable, and shall be recorded by the owner, . . . as a hazardous waste easement, covenant, restriction or servitude, or any combination thereof, as appropriate, upon the present and future uses of the land." The substantive requirements of the following Cal. Health & Safety Code § 25355.5(a)(1)(C) provisions are "relevant and appropriate": ". . . execution and recording of a written instrument that imposes an easement, covenant, restriction, or servitude, or combination thereof, as appropriate, upon the present and future uses of the land." The Navy will comply with the substantive requirements of Cal. Health & Safety Code §§ 25222.1 and 25355.5(a)(1)(C) by incorporating the CERCLA use restrictions into the Navy's deed of conveyance in the form of restrictive covenants under the authority of Cal. Civ. Code § 1471 and into the environmental restriction covenant and agreement. The substantive provisions of Cal. Health & Safety Code §§ 25222.1 and 25355.5(a)(1)(C) may be interpreted in a manner that is consistent with the substantive provisions of Cal. Civ. Code § 1471. The covenants shall be recorded with the deed and run with the land.

Cal. Health & Safety Code § 25233(c) sets forth "relevant and appropriate" substantive criteria for granting variances from prohibited uses based upon specified environmental

and health criteria. Cal. Health & Safety Code § 25234 sets forth the following "relevant and appropriate" substantive criteria for the removal of a land-use restriction on the grounds that ". . . the waste no longer creates a significant existing or potential hazard to present or future public health or safety."

In addition to being implemented through the Environmental Restriction Covenant and Agreement between the Navy and DTSC, the appropriate and relevant portions of Cal. Health & Safety Code §§ 25202.5, 25222.1, 25233(c), 25234, and 25355.5(a)(1)(C) and Cal. Civ. Code § 1471 shall also be implemented through the deed between the Navy and the transferee.

DTSC promulgated a regulation on April 19, 2003, regarding requirements for land-use covenants at Cal. Code Regs. tit. 22, § 67391.1. U.S. EPA agrees that the substantive portions of the state statutes and regulations referenced in this section are ARARs. U.S. EPA considers the following provisions of Cal. Code Regs. tit. 22, § 67391.1 to be relevant and appropriate for IR Site 35: (a)(1), (a)(2), (d), (e)(1), and (e)(2). DTSC's position is that all of the state statutes and regulations referenced in this section are ARARs.

K4.3 MONITORED NATURAL ATTENUATION

Action-specific ARARs for MNA apply to groundwater monitoring activities. Portions of the RCRA groundwater protection standards contained in Cal. Code Regs. tit. 22 are considered to be relevant and appropriate for the groundwater potentially impacted by releases from IR Site 35 because the hazardous constituents being addressed by this action are similar or identical to those found in RCRA hazardous wastes.

Chemicals of Concern

Cal. Code Regs. tit. 22, § 66264.93 defines COCs as the waste constituents, reaction products, and hazardous constituents that are reasonably expected to be in or derived from waste contained in the regulated unit. The Navy has determined the reasonable COCs for the proposed remedial alternatives discussed in the main RI/FS Report.

Concentration Limits

Cal. Code Regs. tit. 22, § 66264.94(a)(1) and (3), (c), and (e) addresses concentration limits. See Section K2.2.1.1.

Groundwater Monitoring ARARs

For CERCLA sites where it has already been determined that a remediation decision on contaminated groundwater must be made, the guidance is clear that only the requirements of the corrective action program under RCRA are potential ARARs and not the detection or evaluation monitoring (U.S. EPA 1988a). Cal. Code Regs. tit. 22, § 66264.100 requires that a water-quality monitoring program be established to demonstrate the effectiveness of a corrective action program. Since some residual chemicals may be left in place at IR Site 35, postclosure monitoring requirements identified in Cal. Code Regs. tit. 22, § 66264.117(b)(1)(A) and (b)(2)(A) and 66264.310(b)(3) are potentially relevant

and appropriate ARARs for groundwater monitoring for groundwater underlying AOCs 1 and 23.

Identification and Management of Solid and Hazardous Wastes

RCRA requirements for identification and management of solid and hazardous wastes are potential federal action-specific ARARs identified for MNA. Soil cuttings and water generated in the course of installing and developing monitoring wells would be subject to RCRA requirements at Cal. Code Regs. tit. 22, § 66262.10(a) and 66262.11 to determine whether such wastes should be classified as hazardous.

K4.4 *IN SITU* BIODEGRADATION

This alternative involves injection or placement of chemicals into groundwater for *in situ* biological treatment. The Safe Drinking Water Act Underground Injection Control Program regulations at 40 C.F.R. pt. 144 were evaluated as potential ARARs for this alternative. The injection wells for this alternative would be considered Class V wells under these regulations. The substantive provisions of 40 C.F.R. § 144.12 (a) and § 144.82 (a)(1) are potentially applicable for the injection of treatment chemicals for this alternative. Section 144.12 (a) prohibits injections that allow movement of fluids containing contaminants into underground sources of drinking water in violation of primary drinking water standards or that could adversely affect human health. Section 144.82 (a)(1) states that the injection "cannot allow the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of the primary drinking water standards under 40 C.F.R. pt. 141, other health based standards, or may adversely affect the health of persons." The injection of treatment chemicals under this alternative is not expected to result in a violation of primary drinking water standards or to adversely affect human health. The treatment chemicals will treat VOCs and reduce the threat to water quality and human health.

RCRA Section 3020(a), which bans hazardous waste disposal by underground injection above a formation that contains an underground source of drinking water, does not apply to this action because commercial chemical products injected into groundwater for *in situ* treatment are not considered hazardous waste (U.S. EPA 2000).

This groundwater alternative would be combined with soil source removal by excavation and dewatering. These are discussed along with other soil excavation activities below in Section K4.7.

K4.5 *IN SITU* CHEMICAL OXIDATION

ISCO involves injection of chemicals into groundwater for *in situ* chemical treatment. The same underground injection requirements identified for ISB (Section K4.4) are potential ARARs for ISCO as well.

There is some potential that the ISCO process will generate off-gas emissions. Prior to implementation of the process, it is unknown what the off-gas emissions will be composed of; therefore, action-specific air ARARs are identified for this process.

Off-gas from any venting through monitoring wells resulting from the ISCO process may need to comply with air emissions requirements of the BAAQMD. Requirements that have been incorporated into the SIP are considered to be a source of federal ARARs. Rule 2-1-103 exempts sources from Rules 2-1-301 and -302 if the source meets all the following criteria.

- 103.1 The source is not subject to any of the provisions of Regulation 6*, Regulation 8**, excluding Rules 1 through 4, and Regulations 9 through 12.
- 103.2 The source is not subject to any of the provision of Sections 2-1-316 through 319.
- 103.3 Actual emissions of precursor organic compounds, nonprecursor organic compounds, nitrogen oxides, sulfur dioxide, PM_{10}, and carbon monoxide from the source are each less than 10 pounds per highest day. A source also satisfies this criterion if actual emissions of each pollutant are greater than 10 pounds per highest day, but total emissions are less than 150 pounds per year, per pollutant.
- 103.4 The source is not an ozone generator (a piece of equipment designed to generate ozone) emitting 1 pound per day or more of ozone.

* Typically, any source may be subject to Regulation 6, Particulate Matter and Visible Emissions. For the purposes of this section, Regulation 6 shall be limited to the following types of sources that emit PM_{10}: combustion source; material handling/processing; sand, gravel, or rock processing; cement, concrete, and asphaltic concrete production; tub grinder; or similar PM_{10}-emitting source.

** If an exemption in a Regulation 8 rule indicates that the source is subject to Regulation 8, Rules 1 through 4, then the source must comply with all applicable provisions of Regulation 8, Rules 1 through 4, to qualify for this exemption.

Any potential emissions from the ISCO process would be exempt from BAAQMD Rules 2-1-301 (Authority to Construct) and -302 (Permit to Operate) for the following reasons.

- The ISCO process would not emit particulate matter or visible emissions, as defined in BAAQMD Regulation 6.
- The ISCO process is not specifically identified as a regulated process in BAAQMD Regulation 8.
- It is unlikely the ISCO process would generate emissions in excess of Toxic Air Contaminant Trigger Levels specified in Rule 2-1-316.
- It is unlikely that any ISCO process emissions would constitute a Public Nuisance source per Rule 2-1-317.
- The ISCO process would not likely emit hazardous substances at levels above the thresholds specified in Rule 2-1-318.

- The ISCO process is not a source expressly subject to permitting requirements, pursuant to Rule 2-1-319.
- It is very unlikely that actual emissions of precursor organic compounds, non-precursor organic compounds, nitrogen oxides, sulfur dioxide, PM_{10}, and carbon monoxide from the ISCO process would exceed 10 pounds per highest day.
- The potential ISCO emissions would not be defined as an ozone generator (a piece of equipment designed to generate ozone) emitting 1 pound per day or more of ozone.

Although not specifically identified as a regulated process under Regulation 8, Rule 47 of that regulation was further evaluated as potentially relevant and appropriate for the ISCO process. The purpose of Rule 47 is to limit emissions of organic compounds from contaminated groundwater and soil. The provisions of this rule apply to new and modified air stripping and soil vapor extraction equipment used for the treatment of groundwater or soil contaminated with organic compounds. Substantive provisions of Rule 47 are at 8-47-301 and 8-47-302, which require a 90 percent reduction by weight. An exemption from emission control requirements is provided for operations that satisfy both the following requirements.

- Operations emit no more than one of the following compounds: benzene, vinyl chloride, trichloroethene, perchloroethene, or methylene chloride.

and

- Benzene emissions do not exceed 0.05 pound per day, vinyl chloride emissions do not exceed 0.2 pound per day, and trichloroethene, perchloroethene, or methylene chloride emissions do not exceed 0.5 pound per day.

An exemption from emission control requirements is provided for operations with total emissions of less than 1 pound per day of benzene, vinyl chloride, perchloroethene, methylene chloride and/or trichloroethene.

The ISCO process does not employ air stripping and soil vapor extraction equipment, and therefore BAAQMD Regulation 8, Rule 47 is not a potentially applicable state ARAR. However, because the intent of this rule is to limit emissions of organic compounds from contaminated groundwater and soil, substantive requirements of Rule 47 may be potentially relevant and appropriate for implementation of ISCO at IR Site 35, although, it is very unlikely that the potential emissions from the ISCO process would exceed the threshold quantities necessitating emissions control. Furthermore, because the ISCO process is a short-term *in situ* reaction that would not involve significant exposure of workers or the surrounding community, a risk analysis is not likely warranted. Monitoring of wellheads with photoionization detectors and/or flame ionization detectors would be conducted to verify these assumptions.

K4.6 ASPHALT OR SOIL COVER

This alternative includes an asphalt cover or soil cover to isolate potential receptors from ingestion of, inhalation of, and/or dermal contact with contaminated soil. The asphalt cover is already in place for several FS areas at IR Site 35.

The final cover requirements for closing a landfill at Cal. Code Regs. tit. 22, § 66264.310(a)(1) to (6) were evaluated to determine whether they are potential ARARs. These requirements are not potentially applicable since IR Site 35 is not a landfill. The substantive provisions of § 66264.310(a)(2) (for the cover to function with minimum maintenance), 66264.310(a)(3) (for the cover to promote drainage and minimize erosion or abrasion of the cover), and 66264.310(a)(4) (for the cover to accommodate settling and subsidence so that the cover's integrity is maintained) were determined to be potentially relevant and appropriate for the proposed cover alternatives at IR Site 35.

Cal. Code Regs. tit. 22, § 66264.310(a)(1) requires that a cover be designed to prevent the downward entry of water into the landfill for 100 years, and § 66264.310(a)(6) requires that the cover have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present. These requirements were further evaluated to determine whether it is potentially relevant and appropriate for the conditions at IR Site 35. The soil COCs (lead-based paint and heptachlor) have low mobility and are not expected to pose a future risk to groundwater. Therefore, groundwater protection is not an objective of the remedial action for these areas. The objective of the remedial action is to prevent contact with the underlying contaminated soil. There is no landfill gas issue and no groundwater issue, so prescriptive cap requirements are not necessary to meet the objectives of the remedial action.

The purpose of the requirements at Cal. Code Regs. tit. 22, § 66264.310(a)(1) and (a)(6) includes protection of groundwater from landfill waste. Therefore, the purpose of the landfill closure requirements to prevent downward entry of water and the purpose of the CERCLA action proposed in the main RI/FS Report are not the same. The medium regulated or affected by the requirement should match the medium contaminated or affected at the CERCLA site. Any consideration of use or potential use of affected resources in the requirement at Cal. Code Regs. tit. 22, § 66264.310(a)(1) and (a)(6) should match the use or potential use of the affected resources at the CERCLA site.

Since the requirements at Cal. Code Regs. tit. 22, § 66264.310(a)(1) and (a)(6) do not meet the criteria discussed above, they are not potentially relevant and appropriate for IR Site 35.

Cal. Code Regs. tit. 22, § 66264.310(a)(5) requires a final cover designed and constructed to accommodate lateral and vertical shear forces generated by the maximum credible earthquake so that the integrity of the cover is maintained. Landfill cover seismic requirements found in Cal. Code Regs. tit. 22, § 66264.310(a)(5) apply to a landfill designed and placed in accordance with the landfill design requirements; they do not apply to IR Site 35. The contaminated soil at IR Site 35 was not placed with the intent to have a cover installed in accordance with the landfill requirements. The following criteria for determining whether a requirement is relevant and appropriate were

evaluated: the type of place regulated and the type of place affected by the release or CERCLA action, and the type and size of structure or facility regulated and the type and size of structure or facility affected by the release or proposed by the CERCLA action. Because the waste is spread out in smaller areas at IR Site 35 than a permitted landfill and does not match the type and size of place or facility regulated, the seismic design and construction standards were determined not to be appropriate and therefore, not ARARs.

However, the Navy would comply with the intent of the seismic design and construction requirement by providing for necessary repairs of the soil cover to maintain the cover's integrity following any significant damage by a potential future earthquake. This repair program would be documented in an operation and maintenance plan prepared during remedial design.

Protection of groundwater quality is not an objective of this alternative. Under Cal. Code Regs. tit. 22, § 66264.310(a)(7), a variance is allowed from any of the prescriptive cap requirements at Cal. Code Regs. tit. 22, § 66264.228(e) through (r) as long as it is demonstrated that the prescriptive cap is not necessary to protect public health, water quality, or other environmental quality. The requirements at § 66264.310(a)(7) are not substantive in themselves but pertain to the applicability of § 66264.228(e) through (r), which are evaluated separately. Although § 66264.310(a)(7) is not a potential ARAR, the variance will be used to determine the ARAR status of the requirements of § 66264.228(e) through (r).

The requirements of Cal. Code Regs. tit. 22, § 66264.228(e) through (r) are potentially relevant and appropriate for the cover alternative except for those provisions not necessary to protect public health, water quality, or other environmental quality. The cover will protect public health, water quality, and other environmental quality.

Substantive postclosure requirements in Cal. Code Regs. tit. 22, § 66264.310(b)(1) are potentially relevant and appropriate. These requirements include postclosure maintenance of the integrity of the soil cover, which includes repairing the soil cover as necessary to correct the effects of settling, subsidence, erosion, or other events.

Substantive security requirements for landfills at Cal. Code Regs. tit. 22, § 66264.14(a) are potentially relevant and appropriate requirements during the remedial action at IR Site 35.

Under Cal. Code Regs. tit. 27, § 20080(b) and tit. 23, § 2510(b), engineered alternatives to the prescriptive landfill cover are allowed when the discharger can demonstrate that the construction or prescriptive standard is not feasible and there is a specific engineered alternative. The specific engineered alternative must be consistent with the performance goal addressed by the particular construction or prescriptive standard and must afford equivalent protection against water quality impairment. Under Cal. Code Regs. tit. 27, § 20080(c) and tit. 23, § 2510(c), to demonstrate that compliance with prescriptive standards is not feasible, the discharger shall demonstrate that compliance with a prescriptive standard either: (1) is unreasonably and unnecessarily burdensome and will cost substantially more than engineered alternatives; or (2) is impractical and will not promote attainment of applicable performance standards considering all relevant technical and economic factors. These factors include present and projected costs of compliance,

potential costs for response action in the event that waste or leachate is released to the environment, and the extent to which groundwater resources could be affected.

Under Cal. Code Regs. tit. 27, § 21090, the RWQCB can allow any alternative final cover that it finds will continue to isolate the waste and irrigation at least as well as would a final cover built in accordance with applicable prescriptive standards.

Dust Control

Dust may be generated during site preparation, grading, and soil cover installation. The pertinent substantive provisions of BAAQMD Rules 6-301, -302, and -305 are considered potentially applicable for these activities. In accordance with these regulations, reasonably available control measures will be applied during the remedial action to minimize fugitive dust emissions.

Construction Activity Stormwater Discharge

The substantive provisions of the general requirements for stormwater plans and best management practices set forth in 40 C.F.R. § 122.44(k)(2) and (4) are potential federal ARARs for construction activities where 1 or more acres of soil will be disturbed.

K4.7 SOIL EXCAVATION AND OFF-SITE DISPOSAL

This alternative includes excavation of heptachlor-contaminated soil in AOC 3, lead-contaminated soil in AOCs 10 and 12, and PAHs from various areas throughout the site, as well as source removal for AOC 1.

Landfill Clean Closure Requirements

The substantive clean closure requirements at Cal. Code Regs. tit. 22, § 66264.114 are potentially relevant and appropriate ARARs for excavation.

Identification and Management of Solid and Hazardous Wastes

Excavated waste and dewatering water would be subject to RCRA requirements at Cal. Code Regs. tit. 22, § 66262.10(a) and 66262.11 to determine whether such wastes should be classified as hazardous.

The Navy has determined that excavated soil and dewatering water at IR Site 35 could be classified as RCRA characteristic hazardous wastes. Therefore, testing would be required to classify these materials with respect to the RCRA hazardous-waste characteristics. This determination would be made at the time the waste is generated. The appropriate requirements (outlined in Table K4-2) for storing and handling the waste until it is characterized will be followed. The waste will be disposed off-site and will be in compliance with all applicable requirements. Because the disposal will be off-site, it is not addressed by ARARs. Further description of disposal requirements is included in the main RI/FS Report and would be addressed in a RAW.

Dewatering Groundwater and Discharge to the Lower San Francisco Bay

The excavation or mixing of soil may require the dewatering of groundwater. The groundwater may be treated as necessary and discharged to the lower San Francisco Bay. The requirements for dewatering discharge effluent concentrations were identified as chemical-specific ARARs in Section K2.2.2.2. The action-specific ARARs for dewatering include storage and treatment requirements for the groundwater prior to discharge. The water will be stored and treated in a tank system temporary unit. If groundwater is determined to be a RCRA hazardous waste, the land disposal requirements for treatment may be potentially applicable.

The substantive provisions of the following RCRA tank system requirements may be applicable or relevant and appropriate for the treatment of groundwater based on whether the groundwater is determined to be a hazardous waste: Cal. Code Regs. tit. 22, § 66264.192(a), (b), (c), (e), (f) and (g); 66264.193(b), (c), (d), (e); 66264.194(a) and (b); 66264.195(a), (b), and (c); 66264.196(b) except (b)(5) and (7); and 66264.197(a) and (b). These requirements include design, secondary containment, inspection, and closure requirements. The alternative requirements for tank systems for temporary units at § 66264.553 may replace the tank system requirements as long as the system is protective of human health and the environment.

Section K5
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TABLES

Table K2-1
Potential Federal Chemical-Specific[a] ARARs by Medium

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
GROUNDWATER				
Safe Drinking Water Act (42 U.S.C., ch. 6A, § 300[f]–300[j]-26)[c]				
National primary drinking water standards are health-based standards for public water systems (MCLs).	Public water system	40 C.F.R. § 141.11, excluding 141.11(d)(3); 141.61(a) and (c); and 141.62(b)	Relevant and appropriate	Not an ARAR for AOC 1 since groundwater at this AOC is not a potential drinking water source. Potentially applicable for vinyl chloride, the only COC at AOC 23.
MCLGs pertain to known or anticipated adverse health effects (also known as recommended MCLs).	Public water system	40 C.F.R. § 141.50–141.51	Not an ARAR	Not an ARAR for AOC 1 since groundwater at this AOC is not a potential drinking water source. Not an ARAR for AOC 23 since there is not a nonzero MCLG for vinyl chloride, the only COC.
National secondary drinking water regulations are standards for the aesthetic qualities of public water systems (SMCLs).	Public water system	40 C.F.R. § 143.3	Not an ARAR	SMCLs are federal contaminant levels intended as guidelines for the states. Because they are not enforceable, federal SMCLs are not ARARs.
Resource Conservation and Recovery Act (42 U.S.C., ch. 82, §§ 6901–6991[i])[c]				
Defines RCRA hazardous waste. A solid waste is characterized as toxic, based on the TCLP, if the waste exceeds the TCLP maximum concentrations.	Waste	Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100	Applicable	Substantive provisions are applicable for determining whether waste is hazardous.
Groundwater protection standards: Owners/operators of RCRA treatment, storage, or disposal facilities must comply with conditions in this section that are designed to ensure that hazardous constituents entering the groundwater from a regulated unit do not exceed the concentration limits for contaminants of concern set forth	A regulated unit that receives or has received hazardous waste before July 26, 1982, or regulated units that ceased receiving hazardous waste prior to July 26, 1982, where constituents in or	Cal. Code Regs. tit. 22, § 66264.94, except 66264.94(a)(2) and 66264.94(b)	Relevant and appropriate	These standards are not "applicable" because IR Site 35 does not contain a RCRA waste management unit. However, substantive provisions may be potentially relevant and appropriate federal ARARs for groundwater since the wastes at the site are similar or identical to RCRA hazardous wastes.

Table K2-1 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
GROUNDWATER (continued)				
under Cal. Code Regs. tit. 22, § 66264.94 in the uppermost aquifer underlying the waste management area of concern at the POC.	derived from the waste may pose a threat to human health or the environment			
The POC is a vertical surface located at the hydraulically downgradient limit of the waste management area that extends through the uppermost aquifer underlying the regulated unit.	Hazardous waste treatment or disposal	Cal. Code Regs. tit. 22, § 66264.95	Relevant and appropriate	Substantive provisions of the POC may be potentially relevant and appropriate for the groundwater at IR Site 35.
Clean Water Act of 1977, as Amended (33 U.S.C., ch. 26, §§ 1251–1387)[c]				
National Recommended Water Quality Criteria (NRWQC).	Discharges to waters of the United States and groundwater.	33 U.S.C. § 1314(a) and 42 U.S.C. § 9621(d)(2) 64 Fed. Reg. 19781 (April 22, 1999)	Not an ARAR	Not an ARAR for AOC 1, which is not a potential source of drinking water. Not an ARAR for AOC 23 since the MCL is available for vinyl chloride, the only COC.
SURFACE WATER				
Safe Drinking Water Act (42 U.S.C., ch. 6A, § 300[f]–300[j]-26)[c]				
National primary drinking water standards are health-based standards for public water systems (MCLs).	Public water system	40 C.F.R. § 141.11, excluding 141.11(d)(3), 141.61(a) and (c), and 141.62(b)	Not an ARAR	Since the San Francisco Bay is not an existing or potential source of drinking water, MCLs are not potential ARARs.
Ensure safety of public water systems; remedial actions must meet cleanup standards; MCLGs pertain to known or anticipated health effects (also known as recommended MCLs).	Public water system; remedial activities impacting surface water; surface water that is a potential source of drinking water	40 C.F.R. § 141.50–141.51	Not an ARAR	Since the San Francisco Bay is not an existing or potential source of drinking water, MCLGs are not potential ARARs.

Table K2-1 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
SURFACE WATER (continued)				
National secondary drinking water regulations are standards for the aesthetic qualities of public water systems (SMCLs).	Public water system	40 C.F.R. § 143.3	Not an ARAR	SMCLs are federal contaminant levels intended as guidelines for the states. Because they are not enforceable, federal SMCLs are not ARARs.
Clean Water Act of 1977, as Amended (33 U.S.C., ch. 26, §§ 1251–1387)[c]				
Water quality standards.	Discharges to waters of the United States	40 C.F.R. § 131.36(b) and 131.38	Applicable	Potentially applicable for discharges to the San Francisco Bay.
Effluent limitations must meet technology-based requirements, including BCPCT and BAT to the extent economically achievable. Effluent limits must meet any more stringent limitation, including those necessary to meet water quality standards or schedules of compliance.	Discharges to groundwater and to waters of the United States	33 U.S.C., ch. 26, § 1311(b)(1)(C) and (b)(2) (CWA Section 301[b]); 40 C.F.R. § 125.3	Applicable	Potentially applicable for discharges to the San Francisco Bay.
NRWQC.		33 U.S.C. § 1314(a) and 42 U.S.C. § 9621(d)(2) 64 Fed. Reg. 19781 (April 22, 1999)	Not an ARAR	Since California has water quality standards that essentially are the same as the standards of the NRWQC, there is no reason to use the NRWQC. Therefore, the NRWQC are not potential ARARs.
SOIL				
Resource Conservation and Recovery Act (42 U.S.C., ch. 82, §§ 6901–6991[i])[c]				
Defines RCRA hazardous waste. A solid waste is characterized as toxic, based on the TCLP, if the waste exceeds the TCLP maximum concentrations.	Waste	Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100	Applicable	Applicable for determining whether waste is hazardous.

Table K2-1 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
		SOIL (continued)		
Groundwater protection standards: requirements to ensure that hazardous constituents entering the groundwater from a regulated unit do not exceed the concentration limits for contaminants of concern in the uppermost aquifer underlying the waste management area of concern at the POC.	A regulated unit that receives or has received hazardous waste before July 26, 1982, or regulated units that ceased receiving hazardous waste prior to July 26, 1982, where constituents in or derived from the waste may pose a threat to human health or the environment	Cal. Code Regs. tit. 22, § 66264.94(a)(1) and (3), (c), (d), and (e)	Relevant and appropriate	Potentially relevant and appropriate for soil cleanup.
		AIR		
Clean Air Act (42 U.S.C., ch. 85, §§ 7401–7671)[c]				
NAAQS – primary and secondary standards for ambient air quality to protect public health and welfare (including standards for particulate matter and lead).	Contamination of air affecting public health and welfare	40 C.F.R. § 50.4–50.12	Not an ARAR	Not enforceable and therefore not an ARAR.

Notes:

[a] many potential action-specific ARARs contain chemical-specific limitations and are addressed in the action-specific ARAR tables

[b] only the substantive provisions of the requirements cited in this table are potential ARARs

[c] statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the Navy accepts the statutes or policies in their entirety as potential ARARs; specific potential ARARs are addressed in the table below each general heading; only pertinent substantive requirements of the specific citations are considered potential ARARs

Table K2-1 (continued)

Acronyms/Abbreviations:
AOC – area of concern
ARAR – applicable or relevant and appropriate requirement
BAT – best available technology
BCPCT – best conventional pollution control technology
Cal. Code Regs. – *California Code of Regulations*
C.F.R. – *Code of Federal Regulations*
ch. – chapter
COC – chemical of concern
CWA – Clean Water Act
Fed. Reg. – *Federal Register*
IR – Installation Restoration (Program)
MCL – maximum contaminant level
MCLG – maximum contaminant level goal
NAAQS – National Ambient Air Quality Standards (primary and secondary)
NRWQC – National Recommended Water Quality Criteria
POC – point of compliance
RCRA – Resource Conservation and Recovery Act
§ – section
SMCL – secondary maximum contaminant level
TCLP – toxicity characteristic leaching procedure
tit. – title
U.S.C. – *United States Code*

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Table K2-2
Potential State Chemical-Specific[a] ARARs by Medium

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
GROUNDWATER				
Cal/EPA Department of Toxic Substances Control[c]				
Primary drinking water standards for public water systems (state MCLs for organic chemicals).	Public water system	Cal. Code Regs. tit. 22, § 64444	Relevant and appropriate	Not a potential ARAR for AOC 1 since the groundwater at this AOC is not considered a potential drinking water source. Potentially relevant and appropriate at AOC 23 for vinyl chloride (the only COC at AOC 23) since it is more stringent than federal MCLs.
Primary drinking water standards for public water systems (state MCLs for inorganic chemicals).	Public water system	Cal. Code Regs. tit. 22, § 64431	Not an ARAR	Not a potential ARAR for AOC 1 since the groundwater at AOC 1 is not a potential drinking water source. Not an ARAR for AOC 23 since there are no inorganic COCs.
State Water Resources Control Board and California Regional Water Quality Control Board San Francisco Bay Region[c]				
Authorizes the SWRCB and RWQCB to establish in water quality control plans beneficial uses and numerical and narrative standards to protect both surface water and groundwater quality. Authorizes regional water boards to issue permits for discharges to land or surface or groundwater that could affect water quality, including NPDES permits, and to take enforcement action to protect water quality.		Cal. Water Code, div. 7, §§ 13241, 13243, 13263(a), 13269, and 13360 (Porter-Cologne Act)	Applicable	Substantive provisions are enabling legislation as implemented through the beneficial uses, WQOs, WDRs, promulgated policies of the Basin Plan for the San Francisco Bay Basin, SWRCB Res. 68-16 and Res. 88-63, and state primary MCLs as potential state ARARs.
Describes water basins in San Francisco Bay Region. Establishes beneficial uses of groundwater and surface water. Establishes water quality objectives, including narrative and numerical standards. Establishes implementation plans to meet water quality objectives and protect beneficial uses, and incorporates statewide water quality control plans and policies.		Water Quality Control Plan for the San Francisco Bay Basin 1995 (RWQCB 1995); Cal. Water Code, div. 7, §§ 13241, 13243, 13263(a), 13269, and 13360 (Porter-Cologne Water Quality Control Act) Except MUN beneficial use for AOC 1	Applicable	Substantive provisions in Chapters 2 and 3 of the Basin Plan are potential ARARs except for the MUN beneficial use designation for AOC 1. See Section K2.2.1.2.

Table K2-2 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
Incorporated into Basin Plan. Requires that high-quality waters be maintained unless certain findings are made. Discharges to high-quality waters must comply with antidegradation provisions. At a minimum, beneficial uses must be maintained.		SWRCB Res. 68-16 (Policy With Respect to Maintaining High-Quality Waters in California)	Not an ARAR	Not an ARAR for cleanup of contaminated groundwater or potential migration of VOC-contaminated soil to groundwater. See Section K2.2.1.2. The SWRCB considers Res. 68-16 an ARAR.
Incorporated into Basin Plan. Establishes policies and procedures for oversight of cleanup and abatement activities of waste discharges that affect or threaten water quality. Authorizes RWQCB to require cleanup and restoration of affected water to background conditions. Requires cleanup and abatement actions to conform to SWRCB Res. 68-16 and applicable provisions of Cal. Code Regs. tit. 23 div. 3, ch. 15.	Discharge potentially affecting water quality	SWRCB Res. 92-49 (Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code, Section 13304)	Applicable (see comments)	Not more stringent than Cal. Code Regs. tit. 22, § 66264.94, a federal ARAR. Therefore, this requirement does not qualify as a state ARAR under 40 C.F.R. § 300.400 (g)(4) and CERCLA Section 121(d)(2)(A)(ii). See Section K2.2.1.2. The RWQCB considers Res. 92-49 an ARAR.
Incorporated into Basin Plan. Designates all ground and surface waters of the state as potential drinking water except where TDS is greater than 3,000 ppm, the well yield is less than 200 gpd from a single well, the water is a geothermal resource or in a water-conveyance facility, or the water cannot reasonably be treated for domestic use using either best management practices or best economically achievable treatment practices.		SWRCB Res. 88-63 (Sources of Drinking Water Policy)	Applicable	Substantive provisions are potentially applicable for determining whether groundwater is a potential source of drinking water. The groundwater at AOC 1 is not considered a potential source of drinking water. However, AOC 23 may be a potential source of drinking water. See Section K2.2.1.2.
Establishes water quality protection standards for corrective action, including concentration limits for COCs at background levels unless infeasible to achieve. Cleanup levels greater than background must meet all applicable water quality standards, must be the lowest levels technically and economically achievable, must consider exposure via other media, and must consider combined toxicological effects of pollutants.	Waste management unit	Cal. Code Regs. tit. 27, §§ 20380(a); 20400(a), (c), (d), (e), (f) and (g); and 20405	Not an ARAR	Not more stringent than Cal. Code Regs. tit. 22, § 66264.94, identified as a federal ARAR. Therefore, these requirements do not qualify as state ARARs under 40 C.F.R. § 300.400(g)(4) and CERCLA Section 121 (d)(2)(A)(ii).

Table K2-2 (continued)

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
SURFACE WATER				
State Water Resources Control Board and California Regional Water Quality Control Board San Francisco Bay Region[c]				
Incorporated into Basin Plan. Requires that high-quality waters be maintained unless certain findings are made. Discharges to high-quality waters must comply with antidegradation provisions. At a minimum, beneficial uses must be maintained.		SWRCB Res. 68-16 (Policy With Respect to Maintaining High-Quality Waters in California)	Applicable	Substantive provisions are potentially applicable for the discharge of dewatering effluent to surface water.
SOIL				
Cal/EPA Department of Toxic Substances Control[c]				
Definition of non-RCRA hazardous waste	Waste generation	Cal. Code. Regs. tit. 22, § 66261.3(a)(2)(C) or 66261.3(a)(2)(F), 66261.22(a)(3) and (4), 66261.24(a)(2)–(a)(8), 66261.101(a)(1) and (a)(2)	Applicable	Substantive provisions may be potentially applicable for characterizing soil prior to off-site disposal.
AIR				
Bay Area Air Quality Management District (BAAQMD)[c]				
Limits emissions of VOCs from soil and groundwater	Air stripping and soil vapor extraction operations	BAAQMD Regulation 8, Rule 47	Not a chemical-specific ARAR	See Table K4-2 for action-specific ARAR determination.

Notes:

[a] chemical-specific concentrations used for FS evaluation may not be ARARs indicated in this table but may be based upon other factors, including the following:
- human-health risk-based concentrations (40 C.F.R. § 300.430[e][2][i][A][1] and [2])
- ecological risk-based concentrations (40 C.F.R. § 300.430 [e][2][i][G])
- practical quantitation limits of contaminants (40 C.F.R. § 300.430[e][2][i][A][3])

many potential action-specific ARARs contain chemical-specific limitations and are addressed in the action-specific ARAR tables

[b] only the substantive provisions of the requirement(s) cited in this table are potential ARARs

[c] statutes and policies and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the Navy accepts the entire body of statutes or policies as potential ARARs; specific potential ARARs are addressed in the table below each general heading; only substantive requirements of specific citations are considered potential ARARs

Table K2-2 (continued)

Acronyms/Abbreviations:
AOC – area of concern
ARAR – applicable or relevant and appropriate requirement
BAAQMD – Bay Area Air Quality Management District
Basin Plan – Water Quality Control Plan for the San Francisco Bay Basin
Cal. Code Regs. – *California Code of Regulations*
Cal/EPA – California Environmental Protection Agency
Cal. Water Code – *California Water Code*
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R. – *Code of Federal Regulations*
ch. – chapter
COC – chemical of concern
div. – division
FS – feasibility study
gpd – gallons per day
MCL – maximum contaminant level
MUN – municipal and domestic water supply
NPDES – National Pollutant Discharge Elimination System
ppm – parts per million
RCRA – Resource Conservation and Recovery Act
Res. – resolution
RWQCB – (California) Regional Water Quality Control Board (Santa Ana Region)
§ – section
SWRCB – (California) State Water Resources Control Board
TDS – total dissolved solids
tit. – title
VOC – volatile organic compound
WDR – waste discharge requirement
WQO – water quality objective

Table K3-1
Potential Federal Location-Specific ARARs

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
National Historic Preservation Act of 1966, as Amended (16 U.S.C. § 470–470x-6)[b]					
Historic project owned or controlled by federal agency	Action to preserve historic properties; planning of action to minimize harm to properties listed on or eligible for listing on the National Register of Historic Places.	Property included in or eligible for the National Register of Historic Places	16 U.S.C. § 470–470x-6 36 C.F.R. pt. 800 40 C.F.R. § 6.301(b)	Relevant and appropriate	Substantive provisions are potentially relevant and appropriate for areas of the site where the Alameda Historic District may be affected. The proposed alternatives will be conducted to preserve historic resources since they are eligible or in the National Register of Historic Places.
Archaeological and Historic Preservation Act (16 U.S.C. § 469–469c-1)[b]					
Within area where action may cause irreparable harm, loss, or destruction of significant artifacts	Construction on previously undisturbed land would require an archaeological survey of the area. Data recovery and preservation would be required if significant archaeological or historical data were found on-site. The responsible official or Secretary of the Interior is authorized to undertake data recovery and preservation.	Regulated alteration of terrain caused as a result of a federal construction project or federally licensed activity or program where action may cause irreparable harm, loss, or destruction of significant artifacts	16 U.S.C. § 469–469c-1 40 C.F.R. § 6.301(c)	Not an ARAR	No archaeological or historic data are expected since the base is constructed mostly on fill.
Historic Sites, Buildings, and Antiquities Act of 1935 (16 U.S.C. §§ 461–467)[b]					
Historic sites	Avoid undesirable impacts on landmarks.	Areas designated as historic sites	16 U.S.C. §§ 461–467 40 C.F.R. § 6.301(c)	Not an ARAR	No historic properties, sites, buildings, or landmarks are located at IR Site 35.

Table K3-1 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Archaeological Resources Protection Act of 1979, as Amended (16 U.S.C. § 470aa–470mm)[b]					
Archaeological resources on federal land	Prohibits unauthorized excavation, removal, damage, alteration, or defacement of archaeological resources located on public lands unless such action is conducted pursuant to a permit.	Archaeological resources on federal land	Pub. L. No. 96-95 16 U.S.C. § 470aa–470mm	Not an ARAR	No archaeological or historic data are expected since the base is constructed mostly on fill.
Exec. Order No. 11990, Protection of Wetlands[b]					
Wetland	Action to minimize the destruction, loss, or degradation of wetlands.	Wetland as defined by Exec. Order No. 11990 Section 7	40 C.F.R. § 6.302(a)	Not an ARAR	No wetlands have been identified at IR Site 35 nor would wetlands potentially be affected by the proposed alternatives.
Exec. Order No. 11988, Floodplain Management[b]					
Within floodplain	Actions taken should avoid adverse effects, minimize potential harm, and restore and preserve natal and beneficial values.	Action that will occur in a floodplain (i.e., lowlands) and relatively flat areas adjoining inland and coastal waters and other flood-prone areas	40 C.F.R. § 6.302(b)	Not an ARAR	No floodplains have been identified at IR Site 35 nor would floodplains potentially be affected by the proposed alternatives.
Clean Water Act of 1977, as Amended, Section 404 (33 U.S.C. § 1344)[b]					
Wetland	Action to prohibit discharge of dredged or fill material into wetland without permit.	Wetland as defined by Exec. Order No. 11990 Section 7	33 U.S.C. § 1344	Not an ARAR	Discharge of dredged or fill material to a wetland is not planned as part of the proposed alternatives.
Resource Conservation and Recovery Act (42 U.S.C. §§ 6901–6991[i])[b]					
Within 100-year floodplain	Facility must be designed, constructed, operated, and maintained to avoid washout.	RCRA hazardous waste; treatment, storage, or disposal of hazardous waste	Cal. Code Regs. tit 22, § 66264.18(b)	Not an ARAR	IR Site 35 is not within a floodplain.

Table K3-1 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Wild and Scenic Rivers Act (16 U.S.C. §§ 1271–1287)[b]					
Within area affecting national wild, scenic, or recreational river	Avoid taking or assisting in action that will have direct adverse effect on scenic river.	Activities that affect or may affect any of the rivers specified in 16 U.S.C. §1276(a)	16 U.S.C. §§ 1271–1287	Not an ARAR	No wild, scenic, or recreational rivers are at or in the vicinity of IR Site 35.
Fish and Wildlife Coordination Act (16 U.S.C. §§ 661–666c)[b]					
Area affecting stream or other water body	Action taken should protect fish or wildlife.	Diversion, channeling, or other activity that modifies a stream or other water body and affects fish or wildlife	16 U.S.C. pt. 662	Not an ARAR	Remedial alternatives are not anticipated to control or modify a stream or other water body.
Rivers and Harbors Act of 1899 (33 U.S.C. §§ 401–413)[b]					
Navigable waters	Permits required for structures or work in or affecting navigable waters.	Activities affecting navigable waters	33 U.S.C. § 403 33 C.F.R. pt. 322	Not an ARAR	There are no navigable waters at IR Site 35.
Endangered Species Act of 1973 (16 U.S.C. §§ 1531–1543)[b]					
Habitat upon which endangered species or threatened species depend	Federal agencies may not jeopardize the continued existence of any listed species or cause the destruction or adverse modification of critical habitat. The Endangered Species Committee may grant an exemption for agency action if reasonable mitigation and enhancement measures	Determination of effect upon endangered or threatened species or its habitat. Critical habitat upon which endangered species or threatened species depend	16 U.S.C. § 1536(a), (h)(1)(B)	Not an ARAR	There are no known critical habitats for threatened or endangered species present within IR Site 35.

Table K3-1 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Habitat upon which endangered species or threatened species depend (continued)	such as propagation, transplantation, and habitat acquisition and improvement are implemented.				
Migratory Bird Treaty Act of 1972 (16 U.S.C. §§ 703–712)[b]					
Migratory bird area	Protects almost all species of native migratory birds in the U.S. from unregulated "take," which can include poisoning at hazardous waste sites.	Presence of migratory birds	16 U.S.C. § 703	Relevant and appropriate	There are no known habitats for migratory birds present at IR Site 35. However, it may serve as a corridor between other habitats or as a place of brief resting for migratory birds.
Marine Mammal Protection Act (16 U.S.C. §§ 1361–1421h)[b]					
Marine mammal area	Protects any marine mammal in the U.S., except as provided by international treaties, from unregulated "take."	Presence of marine mammals	16 U.S.C. § 1372(a)(2)	Not an ARAR	No marine mammals are expected at IR Site 35.
Magnuson-Stevens Fishery Conservation and Management Act of 1976, as Amended (16 U.S.C. §§ 1801–1882)[b]					
Fishery under management	Provides for conservation and management of specified fisheries within specified fishery conservation zones.	Presence of managed fisheries	16 U.S.C. §§ 1801–1882	Not an ARAR	There is no fishery at IR Site 35.

Table K3-1 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. § 668dd–668ee)[b]					
Wildlife refuge	No person shall take any animal or plant from any national wildlife refuge, except as authorized under 50 C.F.R. § 27.51. The disposing or dumping of wastes is prohibited.	Area designated as part of National Wildlife Refuge System	16 U.S.C § 668dd–668ee Substantive provisions of 50 C.F.R. § 27.11–27.97	Not an ARAR	There is no wildlife refuge present at IR Site 35 nor would a wildlife refuge potentially be affected by remedial alternatives.
Wilderness Act (16 U.S.C. §§ 1131–1136)[b]					
Wilderness area	Area must be administered in such a manner as will leave it unimpaired as wilderness and preserve its wilderness character.	Federally owned area designated as wilderness area	16 U.S.C. §§ 1131–1136 50 C.F.R. § 35.1–35.14	Not an ARAR	There is no federally owned wilderness area at Alameda Point.
Coastal Zone Management Act (16 U.S.C. §§ 1451–1464)[b]					
Within coastal zone	Conduct activities in a manner consistent with approved state management programs.	Activities affecting the coastal zone including lands thereunder and adjacent shore land	16 U.S.C. § 1456(c) 15 C.F.R. pt. 930	Not an ARAR	The CZMA specifically excludes federal lands from the coastal zone (16 U.S.C. § 1453[1]). Therefore, the CZMA is not potentially applicable. The areas considered in the FS are not within the coastal zone defined by the state (see Table K3-2). Therefore, this requirement is not an ARAR.
Resource Conservation and Recovery Act (42 U.S.C. §§ 6901–6991[i])[b]					
Within 61 meters (200 feet) of a fault displaced in Holocene time	New treatment, storage, or disposal of hazardous waste prohibited.	RCRA hazardous waste; treatment, storage, or disposal of hazardous waste	Cal. Code Regs. tit. 22, § 66264.18(a)	Not an ARAR	IR Site 35 is not located within 61 meters of a Holocene fault.

Table K3-1 (continued)

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Within salt dome formation, underground mine, or cave	Placement of noncontainerized or bulk liquid hazardous waste prohibited.	RCRA hazardous waste; placement	Cal. Code Regs. tit. 22, § 66264.18(c)	Not an ARAR	No discharge is proposed to a salt dome formation, a salt bed formation, underground mines, or caves as part of the remedial alternatives.

Notes:

[a] only the substantive provisions of the requirements cited in this table are potential ARARs

[b] statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the Navy accepts the entire statutes or policies as potential ARARs; specific potential ARARs are addressed in the table below each general heading; only substantive requirements of the specific citations are considered potential ARARs

Acronyms/Abbreviations:

ARAR – applicable or relevant and appropriate requirement
Cal. Code Regs. – *California Code of Regulations*
C.F.R. – *Code of Federal Regulations*
CZMA – Coastal Zone Management Act
Exec. Order No. – Executive Order Number
FS – feasibility study
IR – Installation Restoration (Program)
pt. – part
Pub. L. No. – Public Law Number
RCRA – Resource Conservation and Recovery Act
§ – section
tit. – title
U.S. – United States
U.S.C. – *United States Code*

Table K3-2
Potential State Location-Specific ARARs

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
California Endangered Species Act (Cal. Fish & Game Code §§ 2050–2116)[b]					
Endangered species habitat	No person shall import, export, take, possess, or sell any endangered or threatened species or part or product thereof.	Threatened or endangered species determination on or before January 1, 1985, or a candidate species with proper notification	Cal. Fish & Game Code § 2080	Not an ARAR	Most of IR Site 35 is developed, and endangered or threatened species are not expected to be affected by proposed remedial actions.
California Coastal Act of 1976[b]					
Coast	Regulates activities associated with development to control direct significant impacts on coastal waters and to protect state and national interests in California coastal resources.	Any activity that could impact coastal waters and resources	Cal. Pub. Res. Code §§ 30000–30900; Cal. Code Regs. tit. 14, §§ 13001–13666.4	Not an ARAR	Shoreline areas regulated by the California Coastal Act are not potentially affected by the proposed actions. The San Francisco BCDC is the state agency responsible for regulating the coastal zone in San Francisco Bay. BCDC regulations at Cal. Gov't Code § 66610(b) define the 100-foot shoreline band as its jurisdiction, and areas considered for remedial action in the FS portion of this RI/FS are not within 100 feet of the shoreline.

Notes:
[a] only the substantive provisions of the requirements cited in this table are potential ARARs
[b] statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the Navy accepts the entire statutes or policies as potential ARARs; specific potential ARARs are addressed in the table below each general heading; only substantive requirements of the specific citations are considered potential ARARs

Acronyms/Abbreviations:
ARAR – applicable or relevant and appropriate requirement
BCDC – Bay Conservation Development Commission
Cal. Code Regs. – *California Code of Regulations*
Cal. Fish & Game Code – *California Fish and Game Code*
Cal. Gov't Code – *California Government Code*
Cal. Pub. Res. Code – *California Public Resources Code*
IR – Installation Restoration (Program)
§ – section
tit. – title

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Table K4-1
Potential Federal Action-Specific ARARs

Alternatives: No Action, Institutional Controls (ICs), Monitored Natural Attenuation (MNA), *In Situ* Chemical Oxidation (ISCO), *In Situ* Biodegradation (ISB), Soil Excavation (EXC) (includes source removal, soil excavation, and dewatering), Asphalt Cap or Soil Cover (Cover)

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
Resource Conservation and Recovery Act (42 U.S.C. §§ 6901–6991[i])*							
On-site waste generation	Person who generates waste shall determine if that waste is a hazardous waste.	Generator of waste	Cal. Code Regs. tit. 22, § 66262.10(a), and 66262.11	MNA, ISCO, ISB, EXC			Potentially applicable for any excavated soils, soil cuttings, or wastewater that is generated.
	Requirements for analyzing waste for determining whether waste is hazardous.	Generator of waste	Cal. Code Regs. tit. 22, § 66264.13(a) and (b)	MNA, ISCO, ISB, EXC			Potentially applicable for any excavated soils, soil cuttings, or wastewater that is generated.
Hazardous waste accumulation	On-site hazardous waste accumulation is allowed for up to 90 days as long as the waste is stored in containers in accordance with § 66262.171–178 or in tanks, on drip pads, inside buildings, and is labeled and dated.	Accumulate hazardous waste	Cal. Code Regs. tit. 22, § 66262.34	MNA, ISCO, ISB, EXC			Potentially applicable for temporary storage of excavated soils, soil cuttings, or wastewater.
Site closure	Minimize the need for further maintenance controls and minimize or eliminate, to the extent necessary to protect human health and the environment, postclosure escape of hazardous waste, hazardous constituents, leachate, contaminated rainfall or runoff, or waste decomposition products to groundwater or surface water or to the atmosphere.	Hazardous waste management facility	Cal. Code Regs. tit. 22, § 66264.111(a) and (b)		Cover		Potentially relevant and appropriate for asphalt cover and soil cover.

Table K4-1 (continued)

Alternatives: No Action, Institutional Controls (ICs), Monitored Natural Attenuation (MNA), *In Situ* Chemical Oxidation (ISCO), *In Situ* Biodegradation (ISB), Soil Excavation (EXC) (includes source removal, soil excavation, and dewatering), Asphalt Cap or Soil Cover (Cover)							
				ARAR Determination			
Action	**Requirement**	**Prerequisite**	**Citation**	**A**	**RA**	**TBC**	**Comments**
Clean closure	During the partial and final closure periods, all contaminated equipment, structures, and soils shall be properly disposed or decontaminated by removing all hazardous wastes and residues.	Hazardous waste management facility	Cal. Code Regs. tit. 22, § 66264.114		EXC		Potentially relevant and appropriate for excavation.
Container storage	Containers of RCRA hazardous waste must be: • maintained in good condition, • compatible with hazardous waste to be stored, and • closed during storage except to add or remove waste.	Storage (in a container) of RCRA hazardous waste not meeting small-quantity generator criteria before treatment, disposal, or storage elsewhere	Cal. Code Regs. tit. 22, § 66264.171–173	MNA, ISCO, ISB, EXC			Potentially applicable for any excavated soils, soil cuttings, or wastewater that is generated.
	Inspect container storage areas weekly for deterioration.		Cal. Code Regs. tit. 22, § 66264.174	MNA, ISCO, ISB, EXC			Potentially applicable for any excavated soils, soil cuttings, or wastewater that is generated.
	Place containers on a sloped, crack-free base, and protect from contact with accumulated liquid. Provide containment system with a capacity of 10 percent of the volume of containers of free liquids. Remove spilled or leaked waste in a timely manner to prevent overflow of the containment system.	Storage (in a container) of RCRA hazardous waste not meeting small-quantity generator criteria before treatment, disposal, or storage elsewhere	Cal. Code Regs. tit. 22, § 66264.175 (a) and (b)	MNA, ISCO, ISB, EXC			Potentially applicable for any excavated soils, soil cuttings, or wastewater that is generated.
	Keep incompatible materials separate. Separate incompatible materials stored near each other by a dike or other barrier.		Cal. Code Regs. tit. 22, § 66264.177	MNA, ISCO, ISB, EXC			Potentially applicable for any excavated soils, soil cuttings, or wastewater that is generated.

Table K4-1 (continued)

Alternatives: No Action, Institutional Controls (ICs), Monitored Natural Attenuation (MNA), *In Situ* Chemical Oxidation (ISCO), *In Situ* Biodegradation (ISB), Soil Excavation (EXC) (includes source removal, soil excavation, and dewatering), Asphalt Cap or Soil Cover (Cover)							
				ARAR Determination			
Action	**Requirement**	**Prerequisite**	**Citation**	**A**	**RA**	**TBC**	**Comments**
Container storage (continued)	At closure, remove all hazardous waste and residues from the containment system, and decontaminate or remove all containers and liners.		Cal. Code Regs. tit. 22, § 66264.178	MNA, ISCO, ISB, EXC			Potentially applicable for any excavated soils, soil cuttings, or wastewater that is generated.
Temporary Unit Alternatives	Alternative requirements that are protective of human health or the environment may replace design, operating, or closure standards for temporary tanks and container storage areas.		Cal. Code Regs. tit. 22, § 66264.553(b), (d), (e), and (f)	MNA, ISCO, ISB, EXC			Potentially applicable for excavated soils prior to off-site disposal or for temporarily stored waste.
Staging Pile	Allows generators to accumulate solid remediation wastes during remedial operations in a U.S. EPA-designated pile for storage only, up to 2 years, without triggering LDRs.	Hazardous remediation waste temporarily stored in piles	40 C.F.R. § 264.554(d)(1) (i–ii) and (d)(2), (e), (f), (h), (i), (j), and (k)	ISB, EXC			Potentially applicable for excavated soils prior to off-site disposal.
Use of tank systems	Requirements for the design and installation of new tank systems including strength, tightness testing, damage control, support, corrosion control, etc.	Tank systems for transferring, storing, or treating hazardous waste	Cal. Code Regs. tit. 22, § 66264.192(a), (b), (c), (e), (f), and (g)	ISB, EXC			Potentially applicable for dewatering treatment if groundwater is determined to be hazardous.
	Requirements for secondary containment of tank systems.	Tank systems for transferring, storing, or treating hazardous waste	Cal. Code Regs. tit. 22, § 66264.193(b), (c), (d), and (e)	ISB, EXC			Potentially applicable for dewatering treatment if groundwater is determined to be hazardous.
	Requirements for secondary containment of ancillary equipment.	Tank systems for transferring, storing, or treating hazardous waste	Cal. Code Regs. tit. 22, § 66264.193(f)	ISB, EXC			Potentially applicable for dewatering treatment if groundwater is determined to be hazardous.

Table K4-1 (continued)

Alternatives: No Action, Institutional Controls (ICs), Monitored Natural Attenuation (MNA), *In Situ* Chemical Oxidation (ISCO), *In Situ* Biodegradation (ISB), Soil Excavation (EXC) (includes source removal, soil excavation, and dewatering), Asphalt Cap or Soil Cover (Cover)							
				ARAR Determination			
Action	**Requirement**	**Prerequisite**	**Citation**	**A**	**RA**	**TBC**	**Comments**
Use of tank systems (continued)	Requirements for operation of tank systems including spill prevention and prohibitions of material that could cause failure.	Tank systems for transferring, storing, or treating hazardous waste	Cal. Code Regs. tit. 22, § 66264.194(a) and (b)	ISB, EXC			Potentially applicable for dewatering treatment if groundwater is determined to be hazardous.
	Requirements for inspection of tank systems including inspection of overflow protection, corrosion, release, detection equipment, and cathodic protection.	Tank systems for transferring, storing, or treating hazardous waste	Cal. Code Regs. tit. 22, § 66264.195(a), (b), and (c)	ISB, EXC			Potentially applicable for dewatering treatment if groundwater is determined to be hazardous.
	Requirements for response to leaks and spills from tank systems including removal of system from use if appropriate, containment, cleanup, emergency procedures, etc.	Tank systems for transferring, storing, or treating hazardous waste	Cal. Code Regs. tit. 22, § 66264.196(b) except (b)(5) and (b)(7)	ISB, EXC			Potentially applicable for dewatering treatment if groundwater is determined to be hazardous.
	Requirements for closure and postclosure care of tank systems decontamination, clean closure, and leaving waste in place at closure.	Tank systems for transferring, storing, or treating hazardous waste	Cal. Code Regs. tit. 22, § 66264.197(a) and (b)	ISB, EXC			Potentially applicable for dewatering treatment if groundwater is determined to be hazardous.
Closure of waste pile	At closure, owner shall remove or decontaminate all waste residues, contaminated containment system components, contaminated subsurface soils, and structures and equipment contaminated with wastes and leachate, and manage them as hazardous wastes. If wastes are left on-site, perform postclosure care in accordance with the closure and postclosure care requirements that apply to landfills.	Waste pile used to store hazardous waste	Cal. Code Regs. tit. 22, § 66264.258(a) and (b) except references to procedural requirements	EXC			Potentially applicable for excavated soils.

Table K4-1 (continued)

Alternatives: No Action, Institutional Controls (ICs), Monitored Natural Attenuation (MNA), *In Situ* Chemical Oxidation (ISCO), *In Situ* Biodegradation (ISB), Soil Excavation (EXC) (includes source removal, soil excavation, and dewatering), Asphalt Cap or Soil Cover (Cover)							
				ARAR Determination			
Action	**Requirement**	**Prerequisite**	**Citation**	**A**	**RA**	**TBC**	**Comments**
Monitoring	The owner or operator shall establish and implement, in conjunction with the corrective action measures, a water quality monitoring program that will demonstrate the effectiveness of the corrective action program and be effective in determining compliance with the water quality protection standard and in determining the success of the corrective action measures under subsection (c) of this section.	Hazardous waste treatment, storage, and disposal facility	Cal. Code Regs. tit. 22, § 66264.100(d)		MNA, ISCO, ISB		Potentially relevant and appropriate for monitoring groundwater.
	The corrective action program is complete when compliance with the water quality standard is demonstrated based on the results of sampling and analysis for all constituents of concern for a period of 1 year.	Hazardous waste treatment, storage, and disposal facility	Cal. Code Regs. tit. 22, § 66264.100(g)(1)		MNA, ISCO, ISB		Potentially relevant and appropriate for monitoring groundwater.
	For closed facilities with hazardous waste left in place, groundwater monitoring must continue for a period of time sufficient to protect human health and the environment.	Hazardous waste treatment, storage, and disposal facility	Cal. Code Regs. tit. 22, § 66264.117[b][1][A] and [b][2][A] and 66264.310(b)(3)		MNA, ISCO, ISB		Potentially relevant and appropriate for monitoring groundwater.
	After final closure, maintain and monitor the groundwater system and comply with all other applicable requirements of [Cal. Code Regs. tit. 22] art. 6, ch. 14.	Hazardous waste treatment, storage, and disposal facility	Cal. Code Regs. tit. 22, § 66264.310(b)(3)		MNA, ISCO, ISB		Potentially relevant and appropriate for monitoring groundwater.

Table K4-1 (continued)

Alternatives: No Action, Institutional Controls (ICs), Monitored Natural Attenuation (MNA), *In Situ* Chemical Oxidation (ISCO), *In Situ* Biodegradation (ISB), Soil Excavation (EXC) (includes source removal, soil excavation, and dewatering), Asphalt Cap or Soil Cover (Cover)							
				ARAR Determination			
Action	**Requirement**	**Prerequisite**	**Citation**	**A**	**RA**	**TBC**	**Comments**
Final cover	The final cover shall be designed to prevent the downward entry of water into the closed landfill throughout a period of at least 100 years and to have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.		Cal. Code Regs. tit. 22, § 66264.310(a)(1) and (6)				Not an ARAR. See discussion in Section K4.6.
	The final cover shall be designed to function with minimum maintenance; promote drainage and minimize erosion or abrasion of the cover; accommodate settling and subsidence so that the cover's integrity is maintained.		Cal. Code Regs. tit. 22, § 66264.310(a)(2), (3), and (4)		Cover		Potentially relevant and appropriate for alternatives that include a cover.
	Landfill cover design requirements.		Cal. Code Regs. tit. 22, § 66264.228(e) through (r)		Cover		Potentially relevant and appropriate for the cover alternatives except for those provisions not necessary to protect public health, water quality, and other environmental quality as provided for at Cal. Code Regs. tit. 22, § 66264.310 (a)(7).
	Seismic design.	Hazardous waste treatment, storage, and disposal facility	Cal. Code Regs. tit. 22, § 66264.310(a)(5)				Not an ARAR. See discussion in Section K4.6.

Table K4-1 (continued)

Alternatives: No Action, Institutional Controls (ICs), Monitored Natural Attenuation (MNA), *In Situ* Chemical Oxidation (ISCO), *In Situ* Biodegradation (ISB), Soil Excavation (EXC) (includes source removal, soil excavation, and dewatering), Asphalt Cap or Soil Cover (Cover)							
				ARAR Determination			
Action	**Requirement**	**Prerequisite**	**Citation**	**A**	**RA**	**TBC**	**Comments**
Final cover (continued)	After closure, maintain the integrity and effectiveness of the final cover, which includes making repairs to the cap as necessary to correct the effects of settling, subsidence, erosion, or other events.	Hazardous waste treatment, storage, and disposal facility	Cal. Code Regs. tit. 22, § 66264.310(b)(1)		Cover		Potentially relevant and appropriate for the soil cover alternatives.
Security	Prevent the unknowing entry, and minimize the possibility for the unauthorized entry, of persons or livestock onto the active portion of the facility.	Hazardous waste treatment, storage, and disposal facility	Cal. Code Regs. tit. 22, § 66264.14(a)		Cover		Potentially relevant and appropriate for the soil cover alternatives.
Clean Water Act of 1977 (33 U.S.C. § 1344)*							
Storm water Discharge	General requirements for a storm water management plan and implementation of best management practices.	Construction involving 1 acre or more of soil disturbance	40 C.F.R. § 122.44(k)(2) and (4)	Cover, EXC			Potentially applicable for soil excavation and cover alternatives where 1 acre or more of soil disturbance is expected.
Clean Air Act (42 U.S.C. §§ 7401–7671)*							
Discharge to air	Provisions of SIP approved by the U.S. EPA under Section 110 of CAA.	Major sources of air pollutants	40 U.S.C. § 7410; portions of 40 C.F.R. § 52.220				Potentially applicable but implemented through SIP requirements listed below.
	NAAQS – primary and secondary standards for ambient air quality to protect public health and welfare (including standards for particulate matter and lead).	Contamination of air affecting public health and welfare	40 C.F.R. § 50.4–50.12				Not an ARAR. Federal NAAQS are nonenforceable standards.

Table K4-1 (continued)

Alternatives: No Action, Institutional Controls (ICs), Monitored Natural Attenuation (MNA), *In Situ* Chemical Oxidation (ISCO), *In Situ* Biodegradation (ISB), Soil Excavation (EXC) (includes source removal, soil excavation, and dewatering), Asphalt Cap or Soil Cover (Cover)

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
Discharge to air (continued)	A person shall not emit from any source for a period or periods aggregating more than 3 minutes in any hour a visible emission which is as dark as or darker than No. 1 on the Ringelmann chart or of such opacity as to obscure an observer's view to an equivalent or greater degree. A person shall not emit for a period or periods aggregating more than 3 minutes in any hour, an emission equal to or greater than 20 percent opacity. A person shall not emit particles from any operation in sufficient quantity to cause annoyance to another person.		BAAQMD Regulation 6, Section 6-301, 302, and 305	Cover, EXC			Potentially applicable for the earthwork and soil excavation activities.
Safe Drinking Water Act (42 U.S.C. § 300[f–j]-26)*							
Underground injection	The UIC program prohibits injection activities that allow movement of contaminants into underground sources of drinking water that may result in violations of primary drinking water standards or other health-based standards, or adversely affect health.	Any underground injections are prohibited unless permitted.	40 C.F.R. § 144.12 (a) and 144.82 (a)(1)	ISCO, ISB			Injection wells for ISCO and ISB alternatives would be Class V wells under the UIC program. Substantive provisions of 40 C.F.R. § 144.12 (a) and 144.82 (a)(1) are potentially applicable. The injection of treatment products would not cause the shallow groundwater at IR Site 35 to violate MCLs or to adversely affect human health.

Table K4-1 (*continued*)

Note:

* statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the Navy accepts the statutes or policies in their entirety as potential ARARs; specific potential ARARs are addressed in the table below each general heading; only substantive requirements of specific citations are considered potential ARARs

Acronyms/Abbreviations:

A – applicable
ARAR – applicable or relevant and appropriate requirement
art. – article
BAAQMD – Bay Area Air Quality Management District
CAA – Clean Air Act
Cal. Code Regs. – *California Code of Regulations*
C.F.R. – *Code of Federal Regulations*
ch. – chapter
LDR – land-disposal restriction
MCL – maximum contaminant level
NAAQS – National Ambient Air Quality Standards (primary and secondary)
RA – relevant and appropriate
RCRA – Resource Conservation and Recovery Act
§ – section
SIP – State Implementation Plan
subpt. – subpart
TBC – to be considered
tit. – title
UIC – underground injection control
U.S.C. – *United States Code*
U.S. EPA – United States Environmental Protection Agency

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Table K4-2
Potential State Action-Specific ARARs

Alternatives: No Action, Institutional Controls (ICs), Monitored Natural Attenuation (MNA), *In Situ* Chemical Oxidation (ISCO), *In Situ* Biodegradation (ISB), Soil Excavation (EXC) (includes source removal, soil excavation, and dewatering), Asphalt Cap or Soil Cover (Cover)

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
Cal/EPA Department of Toxic Substances Control*							
Landfill capping	Alternatives to construction or prescriptive standards.	Cal. Code Regs. tit. 27 requirements are only applicable for waste discharged after 18 July 1997 unless otherwise noted.	Cal. Code Regs. tit. 27, §§ 20080(b) and (c) and 21090		Cover		Substantive provisions are potentially relevant and appropriate for using alternative cap design that would meet the performance goal of prescriptive standards and must afford equivalent protection against water quality impairment.
Land-use covenants	A land-use Covenant imposing appropriate limitations on land use shall be executed and recorded when facility closure, corrective action, remedial or removal action, or other response actions are undertaken and hazardous materials, hazardous wastes or constituents, or hazardous substances will remain at the property at levels which are not suitable for unrestricted use of the land.	Property transfer by federal government to nonfederal entity.	Cal. Code Regs. tit. 22, § 67391.1		ICs		Cal. Code Regs. tit. 22, § 67391.1 provides for a land-use covenant to be executed and recorded when remedial actions are taken and hazardous substances will remain at the property at concentrations that are unsuitable for unrestricted use of the land. The substantive provisions of this regulation have been determined to be "relevant and appropriate" state ARARs by the Navy. U.S. EPA considers the following provisions of Cal. Code Regs. tit. 22, § 67391.1 to be relevant and appropriate for IR Site 35: (a)(1), (a)(2), (d), (e)(1), and (e)(2).

Table K4-2 (continued)

Alternatives: No Action, Institutional Controls (ICs), Monitored Natural Attenuation (MNA), *In Situ* Chemical Oxidation (ISCO), *In Situ* Biodegradation (ISB), Soil Excavation (EXC) (includes source removal, soil excavation, and dewatering), Asphalt Cap or Soil Cover (Cover)

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
Land-use controls	Provides conditions under which land-use restrictions will apply to successive owners of land.	Transfer property from the Navy to a nonfederal agency.	Cal. Civ. Code § 1471		ICs		Generally, Cal. Civ. Code § 1471 allows an owner of land to make a covenant to restrict the use of land for the benefit of a covenantee. The covenant runs with the land to bind successive owners, and the restrictions must be reasonably necessary to protect present or future human health or safety or the environment as a result of the presence on the land of hazardous materials, as defined in Cal. Health & Safety Code § 25260. Substantive provisions are the following general narrative standard: "to do or refrain from doing some act on his or her own land . . . where (c) Each such act relates to the use of land and each such act is reasonably necessary to protect present or future human health or safety or the environment as a result of the presence of hazardous materials, as defined in Section 25260 of the California Health and Safety Code." This narrative standard would be implemented through incorporation of restrictive

Table K4-2 (continued)

Alternatives: No Action, Institutional Controls (ICs), Monitored Natural Attenuation (MNA), *In Situ* Chemical Oxidation (ISCO), *In Situ* Biodegradation (ISB), Soil Excavation (EXC) (includes source removal, soil excavation, and dewatering), Asphalt Cap or Soil Cover (Cover)							
				ARAR Determination			
Action	**Requirement**	**Prerequisite**	**Citation**	**A**	**RA**	**TBC**	**Comments**
Land-use controls (continued)							covenants in the deed and Environmental Restriction and Covenant Agreement at the time of transfer.
	Allows DTSC to enter into an agreement with the owner of a hazardous waste facility to restrict present and future land uses.	Transfer property from the Navy to a nonfederal agency.	Cal. Health & Safety Code § 25202.5		ICs		The substantive provisions of Cal. Health & Safety Code § 25202.5 are the general narrative standards to restrict "present and future uses of all or part of the land on which the . . . facility . . . is located . . ."
	Provides a streamlined process to be used to enter into an agreement to restrict specific use of property in order to implement the substantive use restrictions of Cal. Health & Safety Code § 25232(b)(1)(A)–(E).	Transfer property from the Navy to a nonfederal agency.	Cal. Health & Safety Code §§ 25222.1 and 25355.5(a)(1)(C)	ICs			Generally, Cal. Health & Safety Code §§ 25222.1 and 25355.5(a)(1)(C) provide the authority for the DTSC to enter into voluntary agreements with land owners to restrict the use of property. The agreements run with the land restricting present and future uses of the land. The substantive requirements of the following Cal. Health & Safety Code § 25222.1 provisions are "relevant and appropriate": (1) the general narrative standard: "restricting specified uses of the property . . ." and (2) ". . . the agreement is irrevocable, and shall be recorded by the owner, . . . as a hazardous waste easement, covenant, restriction

Table K4-2 (continued)

Alternatives: No Action, Institutional Controls (ICs), Monitored Natural Attenuation (MNA), *In Situ* Chemical Oxidation (ISCO), *In Situ* Biodegradation (ISB), Soil Excavation (EXC) (includes source removal, soil excavation, and dewatering), Asphalt Cap or Soil Cover (Cover)							
				ARAR Determination			
Action	**Requirement**	**Prerequisite**	**Citation**	**A**	**RA**	**TBC**	**Comments**
Land-use controls (continued)							or servitude, or any combination thereof, as appropriate, upon the present and future uses of the land." The substantive requirements of the following Cal. Health & Safety Code § 25355.5(a)(1)(C) provisions are "relevant and appropriate": ". . . execution and recording of a written instrument that imposes an easement, covenant, restriction, or servitude, or combination thereof , as appropriate, upon the present and future uses of the land."
	Prohibits certain uses of land containing hazardous waste without a specific variance.	Hazardous waste property.	Cal. Health & Safety Code § 25232(b)(1)(A) –(E)		ICs		Land-use restrictions will be used to prohibit the following activities at portions of IR Site 35 that may pose unacceptable risk for specified land uses such as residential use, construction of hospitals for humans, schools for persons under 21 years of age, day care centers for children, or any permanently occupied human habitation.

Table K4-2 (continued)

Alternatives: No Action, Institutional Controls (ICs), Monitored Natural Attenuation (MNA), *In Situ* Chemical Oxidation (ISCO), *In Situ* Biodegradation (ISB), Soil Excavation (EXC) (includes source removal, soil excavation, and dewatering), Asphalt Cap or Soil Cover (Cover)

Action	Requirement	Prerequisite	Citation	ARAR Determination			Comments
				A	RA	TBC	
Land-use controls (continued)	Provides processes and criteria for obtaining written variances from a land-use restriction and for removal of the land-use restrictions.	Transfer property from the Navy to a nonfederal agency.	Cal. Health & Safety Code §§ 25233(c) and 25234		ICs		Cal. Health & Safety Code § 25233(c) sets forth "relevant and appropriate" substantive criteria for granting variances based upon specified environmental and health criteria. Cal. Health & Safety Code § 25234 sets forth the following "relevant and appropriate" substantive criteria for the removal of a land-use restriction on the grounds that ". . . the waste no longer creates a significant existing or potential hazard to present or future public health or safety."

Note:

* statutes and policies, and their citations, are provided as headings to identify general categories of potential ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the Navy accepts the statutes or policies in their entirety as potential ARARs; specific potential ARARs are addressed in the table below each general heading; only substantive requirements of specific citations are considered potential ARARs

Acronyms/Abbreviations:

A – applicable
ARAR – applicable or relevant and appropriate requirement
Cal. Civil Code – *California Civil Code*
Cal. Code Regs. – *California Code of Regulations*
Cal/EPA – California Environmental Protection Agency
Cal. Health & Safety Code – *California Health and Safety Code*
DTSC – (California Environmental Protection Agency) Department of Toxic Substances Control
IC – institutional control
IR – Installation Restoration (Program)
RA – relevant and appropriate
§ – section
TBC – to be considered
tit. – title
U.S. EPA – United States Environmental Protection Agency

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Table K4-3
Components of Soil and Groundwater Alternatives

Alternative Number	No Further Action	Cover	Excavation	ISB	MNA	ICs	ISCO
Alternatives for AOC 3, heptachlor in soil							
AOC 3-1	•						
AOC 3-2		•				•	
AOC 3-3			•				
Alternatives for AOCs 10 and 12, lead-based paint in soil							
AOC 10/12-1	•						
AOC 10/12-2		•				•	
AOC 10/12-3			•				
Alternatives for sitewide PAHs in soil							
PAH-1	•						
PAH-2						•	
PAH-3a			•			•	
PAH-3b			•			•	
PAH-4a			•			•	
PAH-4b			•				
Alternatives for AOC 1, naphthalene in groundwater							
AOC 1-1	•						
AOC 1-2					•	•	
AOC 1-3			•	•	•	•	
AOC 1-5							•
Alternatives for AOC 23, vinyl chloride in groundwater							
AOC 23-1	•						
AOC 23-2					•	•	
AOC 23-4							•

Acronyms/Abbreviations:
AOC – area of concern
IC – institutional control
ISB – *in situ* bioremediation
ISCO – *in situ* chemical oxidation
MNA – monitored natural attenuation
PAH – polynuclear aromatic hydrocarbon

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ATTACHMENT K1

LETTER OF NOVEMBER 13, 1996, FROM CAL/EPA DTSC TO NAVY

NAS ALAMEDA
SSIC No. 5090.3

Cal/EPA

November 13, 1996

Department of Toxic Substances Control

700 Heinz Avenue Suite 200 Berkeley, CA 94710-2737

Commander
Engineering Field Activity, West
Naval Facilities Engineering Command
Attn: Camille Garibaldi
900 Commodore Drive
San Bruno, California 94066-2402

Pete Wilson Governor

James M. Strock Secretary for Environmental Protection

Dear Ms. Garibaldi:

APPLICABLE RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE NAVAL AIR STATION, ALAMEDA

The California Department of Toxic Substances Control (DTSC), is in receipt of the Navy's September 12, 1996 letter requesting Applicable or Relevant and Appropriate Requirements (ARARs) from the State of California for the Remedial Investigation and Feasibility Study of the Naval Air Station, Alameda. Enclosed in this document are State laws and regulations that California State Agencies believe may apply to the environmental remediation of Naval Air Station (NAS) Alameda.

As lead regulatory agency and a partner with the Navy and the United States Environmental Protection Agency (EPA) in conducting the remediation of NAS Alameda, we propose that a workshop be scheduled with all responsible State and Federal agencies to establish the ARARs for the NAS Alameda remediation. We also encourage the participation of the Restoration Advisory Board in the workshop. The invitation to participate in the workshop shall include a new solicitation for ARARs from the invited agencies.

We hope you are in agreement with us on this proposal. We anticipate the process to establish ARARs to be a consensual process based on our mutual goals and our partnership as lead agencies responsible for the protection of human health and the environment at NAS Alameda.

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If you wish to discuss this letter, the enclosures, or the proposal, please call me at (510) 540-3809.

Sincerely,

Thomas P. Lanphar
Project Manager
Base Closure Branch

Enclosures

cc's: Ms. Gina Kathuria
Regional Water Quality Control Board
2101 Webster Street, Suite 500
Oakland, California 94612

Mr. Steve Edde
Base Environmental Coordinator
Alameda Naval Air Station
Building 1, Code 52
Alameda, California 94501

Mr. James Ricks
U.S. Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, California 94105

Mr. George Kikugawa
Engineering Field Activity, West
Naval Facilities Engineering Command
900 Commodore Drive
San Bruno, California 94066-2402

Ms. Ardella Dailey
Community Co-Chair
Restoration Advisory Board
2200 Central Avenue
Alameda, California 94501

California Laws, Regulations and Policies
for Potential Application at the
Naval Air Station, Alameda
November 12, 1996

I. Generation, Storage and Treatment of Hazardous Waste

A. California Code of Regulations (CCR), Title 22, Chapter 11, Identification and listing of hazardous wastes. Chapter identifies those waste that are subject to regulations hazardous waste and are subject to the notification requirements of Health and Safety Code section 25153.6.

1. Article 1: General; purpose and scope, definition of waste and hazardous waste, exclusions, requirements for recyclable materials and contaminated containers. (66261.1 - 66261.7)

2. Article 2: Criteria for identifying Characteristics of Hazardous Waste. (66261.10)

3. Article 3: Characteristics of Hazardous Waste. (66261.20 - 66261.35)

4. Article 4: List RCRA Hazardous Waste. (66261.30 - 66261.35)

5. Article 5: Categories of Hazardous Waste. (66261.100 - 66261.126)

B. CCR, Title 22, Chapter 12, Standards Applicable to generator of hazardous waste

1. Article 1: Applicability. A generator of a waste must determine if waste is hazardous, and if so obtain an identification number. (66262.10 - 66262.12)

2. Article 2: A generator who transports, or offers for transportation, hazardous waste for off-site transfer, treatment, storage or disposal shall prepare a Manifest. (66262.20 - 66262.23)

3. Article 3: Pre-transport Requirements include packaging, labeling, marking, and placarding. Article also identifies maximum accumulation time for hazardous waste prior to transport to permitted hazardous waste facility.

4. Article 4: Record keeping and Reporting. Establishes requirements for the generator to keep records of manifests and other hazardous waste generation activities.

5. Article 5: Export of Hazardous Waste. This article establishes requirements applicable to exports of hazardous waste to a foreign country from the State. Except to the extent 40 CFR section 262.58 provides otherwise, a primary exporter of hazardous waste shall comply with the requirements of this article.

C. CCR, Title 22, Chapter 14, Standards for Owners and operators of hazardous wastes transfer, treatment, storage and disposal facilities.

1. Article 2: Requirements apply to the owners and operators of hazardous waste facilities. These requirements are for inspection, Personal Training, General Requirements, Location Standards, Construction Quality Assurance Program, Seismic and precipitation design standards. (66264.13 - 66264.25)

2. Article 3: Preparedness and prevention apply to of hazardous waste facility. These are related to design and operation, required equipment, testing and maintenance of equipment, access to communication or alarm system, required aisle space and informing the local authorities. 66264.30 - 66264.37

3. Article 4: Contingency and emergency procedures apply to the owners and operators of hazardous waste facilities. The owners and operators shall have contingency plan for the facility. 66264.52 - 66264.56

4. Article 5: Manifest System, Recordkeeping, and Reporting. The regulations in this article apply to owners and operators of both on-site and off-site facilities. 66264.71 - 66264.77

5. Article 6: Water Quality Monitoring and Response Programs for Permitted Facilities.

6. Article 7: Closure and Post-Closure. Requirements apply to the owners and operators of hazardous waste management facilities. 66264.111 through 66264.120

7. Article 9: Use and management of containers.

8. Article 10: Requirements that apply to the owners and operators of facilities that use Tank Systems[66264.190 - 66264.199]

9. Article 11: Regulations in this article apply to owners and operators of facilities that use surface impoundment to treat, store or dispose of hazardous waste. 66264.221 through 66264.231

10. Article 12: Regulations in this article apply to owners and operators of facilities that store or treat hazardous waste in piles unless exempt. 66264.251 through 66264.259.

11. Article 13: Land Treatment. Applies to treatment or disposal of hazardous waste in land treatment units. Requires demonstration of treatment of waste prior to application. 66264.270 - 66264.283

12. Article 14: This article applies to disposal of hazardous waste in Landfills. 66264.300 - 66264.318

13. Article 15.5: The regulations in this article apply to the construction of Corrective Action Management Units for the management of remediation waste. The DTSC may designate one or more CAMUs. Placement of remediation waste does not constitute land disposal. Temporary units may also be designated for the storage or treatment of remediation waste. 66264.500 - 66264.553

14. Article 27: Regulations in this article apply to owners and operators of facilities that treat, store or dispose of RCRA hazardous waste by process vents associated with distillation, fraction, thin-film evaporation, solvent extraction, or air steam stripping. 66264.1030 through 1035

15. Article 28: Regulations in this article apply to owners and operators of facilities that treat, store or dispose of RCRA hazardous waste, unless exempt. 66264.1052 through 66264.1065

D. CCR, Title 22, Chapter 16, Recyclable Materials (Recyclable hazardous waste)

1. Article 1: Identifies recyclable hazardous waste types including: solvents, petroleum products, pickling liquor, unspent acids, unspent alkalis, unrinsed empty containers. 66266.1 - 66266.2

2. Article 2. This article applies to the generation,

transportation, and facility operation requirements. A generator of a recyclable hazardous material shall comply with all of the hazardous waste requirements except for the Extremely Hazardous Waste Disposal Permit requirements. 66266.3 - 66266.5

E. CCR, Title 22, Chapter 18, Land Disposal Restrictions

1. Article 1: Identifies hazardous waste that are restricted from land disposal. 66268.1 - 66268.9

2. Article 2: Contains schedule for land disposal prohibition and establishment of treatment standards. 66268.10 - 66268.29

3. Article 3: Contains prohibitions on Land Disposal. 66268.30 - 66268.38

4. Article 4: This article identifies treatment standards. 66268.40 - 66268.48

5. Article 5: Identifies prohibitions on storage of waste restricted from land disposal. 66268.50

6. Article 10: Identifies land disposal prohibitions of non-RCRA hazardous waste. 66268.100

7. Article 11: Contains treatment standards for non-RCRA waste categories. 66268.105 - 66268.114

II. Investigation and Remediation of Hazardous Substance Release Sites

A. California Health and Safety Code, Chapter 6.5. Hazardous Substance Account

1. Section 25187: Authorizes the Department to issue corrective action orders.

a. Remedial Action Order, Issued 1988 by the DTSC to the Naval Air Station, Alameda

B. California Health and Safety Code, Chapter 6.8. Hazardous Substance Account

1. Article 2: Definitions

a. 25319.5 "Preliminary Endangerment Assessment". Activity which is performed to determine whether current or past waste management practices have resulted in the release or threatened release of hazardous

substances which pose a threat to public health or the environment. 8-3-89

b. 25323.1 "Removal Action Workplan" A workplan approved by the DTSC or RWQCB to carry out a removal action. Includes: detailed engineering plan, description of onsite contamination, goals, and alternatives removal options that were considered and rejected and the basis for that rejection.

2. Article 5, Section 25355: Authorizes the Department to take over remedial actions at a hazardous substance release site if the Responsible Parties are not in compliance.

3. Article 5, Section 25355.5(a)(1)(B): Identifies requirements

4. Article 5, Section 25356.1, Remedial Action Plans and Removal Action Workplans

   a. Section 25356.1(d): All RAPs must be based upon Section 25350, Subpart F of the NCP and upon factors identified in this subsection.

   b. Section 25356.1(e): Identifies community involvement requirements as they relate to a RAP.

   c. Section 25356.1(f): Authorizes the DTSC to issue the final RAP.

   d. Section 25356.1(h): Exemptions to the RAP requirements.

      (1) Section 25356.1(h)(1): Authorizes the DTSC to prepare a Removal Action Workplan if the estimated cost of the removal action is less than $1,000,000. Identifies community involvement requirements for a RAW.

      (2) Section 25356.1(h)(2): A RAP is not required if the site listed on the National Priority List by the EPA.

      (3) Section 25356.1(h)(3): Authorizes DTSC to waive the RAP requirements in subdivision (d) if certain conditions apply, including estimated costs for remedial action below $2,000,000.

5. Article 5, Section 25358.1: Rights of the DTSC to

take actions at known or suspected hazardous substance release sites.

a. Section 25358.1(b)(1): The DTSC may require any potentially responsible party to furnish information on materials generated, stored, treated or disposed of at a hazardous substance release site

b. Section 25358.1(b)(2) The DTSC may require any potentially responsible party to furnish information on the nature or extent of a release or a threatened release of a hazardous substance at a hazardous substance release site.

6. Article 5, Section 25358.3(a): Authorizes the DTSC to take action in situations posing an imminent and substantial endangerment.

7. Article 5, Section 25358.3(b),(c): Authorizes the DTSC to undertake investigations whenever there has been a release or threat of a release of hazardous substances to the environment.

8. Article 5, Section 25358.4: Requires that all analysis of material to determine if it is hazardous must be done by a state certified and accredited laboratory.

9. Article 5, Section 25358.7: Identifies the right of any interested party who may be affected by remedial actions at a site to become involved in the DTSC decision making process.

10. Article 5, Section 25358.9: Authorizes the DTSC, to the extent consistent with RCRA, to exclude any portion of a response action conducted entirely onsite from the hazardous waste facility permit requirements of Section 25201 if both the following apply:

a. The removal or remedial action is carried out pursuant to a removal action workplan or a remedial action plan approved by the DTSC.

b. The RAW or RAP complies with all substantive requirements.

11. Article 5, Section 25359: Authorizes the DTSC to access punitive damages on Responsible Parties who fail to comply with clean-up and remediation orders.

12. Article 5, Section 25359.5: Authorizes the DTSC to issue 'Fence and Post' Orders and establishes their requirements.

13. Article 5, Section 25359.7: Requires a property owner to inform buyers of unmitigated hazardous substance releases on that property.

14. Article 6, Section 25367: Establishes penalties for the making of false claims and misrepresentations related to the release of hazardous substances to the environment.

C. California Health and Safety Code, Chapter 6.6: Safe Drinking Water and Toxic enforcement Act of 1986 (Prop. 65).

1. Section 25249.5: Prohibits the release, to drinking water, of hazardous substances which cause cancer or which have reproductive toxicity.

D. Preliminary Endangerment Assessment Guidelines, January 1995

III. Protection of Air Quality

A. Bay Area Air Quality Management District(BAQMD), Regulation 8, Rule 40, "Aeration of Contaminated Soil and Removal of Underground Storage Tanks:

B. BAAQMD, Regulation 8, Rule 47 "Air Stripping and Soil Vapor Extraction Operations"

IV. Soil Storage

A. Assembly Bill 1060, Richter (Chapter 627, Statutes of 1995): allow generators to hold contaminated soil from site cleanup projects in waste pile for up to one year or 18 months for purposes of offsite transportation, subject to certain conditions.

V. Sediment and Wetland Remediation

A. Endangered and Rare Species Protection

1. California Endangered Species Act of 1973

a. Fish and Game Code Section 2050; 2065

2. Requirements for endangered or rare species: Fish and Game Code Section 1900 et seq.; 2050 et seq. to 2068; 2070; 2080; 2090 et seq. to 2096;

3. Federal Endangered Species Act of 1973

B. Protection of fish and wildlife resources and their habitats

1. Designation of the Department of Fish and Game as trustee for State fish and wildlife resources: fish and Game Code Section 711.7;

2. Possession permit for scientific purposes, etc.: Fish and Game code Section 1002

3. Requirements for releasing substances deleterious to fish and wildlife: fish and Game Code Section 5650 (a)(b),(f): 5651; and 12016;

4. Illegal take of birds and mammals: Fish and Game Code Section 3003;

5. Relevant policies for the general protection and conservation of fish and wildlife resources: fish and Game Code Section 1600; 1700; 1750; 1801; and 2014; Water Code Section 1243

C. Federal Coastal Zone Management Act (16 USC 1456(c)(3)(A)): federal actions or federally funded or approved actions that affect the coastal zone must be consistent with the policies of the San Francisco Bay Conservation and Development Commission's federally approved coastal management program.

1. Elements of the BCDC's coastal management program:

a. McAteer-Petris Act

b. BCDC regulations

c. SF Bay Plan

d. SF Bay Area Seaport Plan: NAS Alameda designated as port priority

2. SFBCDC policies:

a. Fish and Wildlife: to the greatest extent feasible, remaining marshes and mudflats around the Bay, the remaining water volume and surface area of the Bay, and adequate freshwater inflow to the Bay should be maintained. Specific habitats that are needed to prevent the extinction of any species, or to maintain or increase any species that would provide substantial public benefits should be protected, whether in the

Bay or on the shoreline.

b. Water Quality: follow State Water Resources Control Board and the San Francisco Bay Regional Water Quality Control Board. Bay marshes, mudflats, and water surface area and volume should be maintained and, wherever possible, increased.

c. Marshes and Mudflats: Marshes and mudflats are integral part of the Bay tidal system and, therefore, should be protected in the same manner as open water area. Filling and diking should only be allowed for purposes providing substantial public benefits and only if there is no reasonable alternative.

d. Mitigation: Mitigation should consist of measures to compensate for the adverse impacts of Bay fill to the natural resources of the Bay, such as to water surface area, volume, or circulation, and to fish and wildlife habitat or marshes or mudflats. Mitigation is no a substitute for meeting the other requirements of the McAteer-Petris Act concerning fill.

VI. Protection and Remediation of Groundwater

A. CCR, Title 23, Division 3, Chapter 15

1. Governs the discharge of waste to land for treatment, storage, and disposal and establish siting, containment, monitoring, and closure requirements

B. State Water Resources Control Board Resolution Number 68-16 (Statement of Policy with Respect to Maintaining High Quality of Waters in California), October 28, 1968

1. Requires the continued maintenance of high quality waters of the state even where that quality is better than needed to protect beneficial uses, unless specific findings are made.

2. Chemical-specific and action-specific

3. Beneficial uses of groundwater must be defined for NAS Alameda

C. State Water Resources Control Board Resolution 88-63 (Adoption of Policy Entitled "Sources of Drinking

Water"), May 19, 1988

1. The Resolution states that, with few specific exceptions, all surface and groundwaters of the state are to be considered existing drinking water sources except where the TDS is greater than 3000 ppm, the well yield is less than 200 gpd from a single well, the water is a geothermal

D. State Water Resources Control Board Resolution 92-49 (As Amended on April 21, 1994), (Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304), July 8, 1994

E. Water Quality Control Plan, San Francisco Bay Basin Region, December 1986; and September 29, 1992 Basin Plan Amendments

F. California Code of Regulations, Title 22, Chapter 15, Domestic Water Quality Criteria and Monitoring

1. Article 4: Primary Standard - Inorganic Chemicals. Identifies Maximum Contaminant Levels in drinking water supplies. 64431.0 - - 64437.0

2. Article 4.5: Primary Standard - Organic Chemicals. Identifies Maximum Contaminant Levels in drinking water supplies. 64444.0 - - 64445.2

G. Title 3, Food and Agriculture; Division 6, Pesticides and Pest Control Operations; Chapter 4, Environmental Protection; Subchapter 1, Groundwater; Article 1, Pesticide Contamination Prevention.

1. Lists of pesticides labeled for agricultural, outdoor institutional or outdoor industrial use that contain chemicals designated as having the potential to pollute groundwater.

State ARARs for Solid Waste Disposal Site Closure and Postclosure Maintenance

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site
California Integrated Waste Management Act of 1989 PRC 40502 & 43020	14 CCR 17766 Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable or Relevant and Appropriate	Emergency Response Plan (ERP): potential emergency conditions that may exceed the design of the site and could endanger the public health or environment must be anticipated. Response procedures for these conditions must be addressed in the RD/RA plans.	Closure or Postclosure Maintenance Standard of Title 14, CCR, Chapter 3, Article 7.8, Scope and Applicability pursuant to 14 CCR 17760.	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 43020	14 CCR 17767 Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable or Relevant and Appropriate	Security at Closed Sites: all points of access to the site must be restricted, except permitted entry points. All monitoring, control, and recovery systems shall be protected from unauthorized access.	Closure or Postclosure Maintenance Standard of Title 14, CCR, Chapter 3, Article 7.8, Scope and Applicability pursuant to 14 CCR 17760.	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 43020	14 CCR 17773 Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable or Relevant and Appropriate	Final Cover: the design and construction of the final cover must meet specific prescriptive standards of 23 CCR 2581(a). These include minimum thickness and quality of the construction material. If the prescriptive standard is not feasible then an engineered alternative that meets the performance goals (i.e. limiting infiltration, controlling gas emissions, compatibility with reuse) can be proposed.	Closure or Postclosure Maintenance Standard of Title 14, CCR, Chapter 3, Article 7.8, Scope and Applicability pursuant to 14 CCR 17760	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 43020	14 CCR 17774 Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable or Relevant and Appropriate	Construction Quality Assurance (CQA): a CQA program must be designed and implemented. It must include specific parameters (and for some components specific testing methods) for each component of the final cover.	Closure or Postclosure Maintenance Standard of Title 14, CCR, Chapter 3, Article 7.8, Scope and Applicability pursuant to 14 CCR 17760.	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 43020	14 CCR 17776 Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable or Relevant and Appropriate	Final Grades: the final grades for the covered landfill must meet grading standards provided in 23 CCR 2581, they must be appropriate to control run-off and erosion.	Closure or Postclosure Maintenance Standard of Title 14, CCR, Chapter 3, Article 7.8, Scope and Applicability pursuant to 14 CCR 17760.	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 43020	14 CCR 17777 Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable or Relevant and Appropriate	Final Site Face: the design of the final site face must provide for the integrity of the final cover both under static and dynamic conditions	Closure or Postclosure Maintenance Standard of Title 14, CCR, Chapter 3, Article 7.8, Scope and Applicability pursuant to 14 CCR 17760.	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 43020	14 CCR 17778 Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable or Relevant and Appropriate	Final Drainage: the design of the final cover must control runon and runoff produced by a 100 year 24 hour storm event and must be prepared according to CQA requirements.	Closure or Postclosure Maintenance Standard of Title 14, CCR, Chapter 3, Article 7.8, Scope and Applicability pursuant to 14 CCR 17760.	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 43020	14 CCR 17779 Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable or Relevant and Appropriate	Slope Protection and Erosion Control: the design and construction of the slopes must protect the integrity of the final cover and minimize soil erosion.	Closure or Postclosure Maintenance Standard of Title 14, CCR, Chapter 3, Article 7.8, Scope and Applicability pursuant to 14 CCR 17760.	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 43020	14 CCR 17781 Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable or Relevant and Appropriate	Leachate Control During Closure and Post Closure: leachate must be monitored, collected, treated, and discarded appropriately.	Closure or Postclosure Maintenance Standard of Title 14, CCR, Chapter 3, Article 7.8, Scope and Applicability pursuant to 14 CCR 17760. The state does not intend that subsurface leachate monitoring and collecting systems need to be added to existing landfills unless leachate production and/or accumulation is evident.	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 43020	14 CCR 17783 Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable or Relevant and Appropriate	Gas Monitoring and Control During Closure and Post Closure: landfill gases must be collected and analyzed; the concentration of combustible gas at the landfill boundary must be 5% or less, trace gases must not be at levels that cause adverse health or environmental impacts.	Closure or Postclosure Maintenance Standard of Title 14, CCR, Chapter 3, Article 7.8, Scope and Applicability pursuant to 14 CCR 17760.	For closing sites

State ARARs for Solid Waste Disposal Site Closure and Postclosure Maintenance

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment	Associated Site
California Integrated Waste Management Act of 1989 PRC 40502 & 41020	14 CCR 17781 Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable or Relevant and Appropriate	Post Closure Maintenance: the landfill must be maintained and monitored for no less than 30 years following closure.	Closure or Postclosure Maintenance Standard of Title 14, CCR, Chapter 3, Article 7.8, Scope and Applicability pursuant to 14 CCR 17760.	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 41020	14 CCR 17796 Chapter 3, Article 7.8 Disposal Site Closure and Postclosure Maintenance	Applicable or Relevant and Appropriate	Post Closure Land Use: Site Closure Design shall show one or more proposed uses of the closed site or show development that is compatible with open space. Changes in postclosure land use must be approved by the appropriate State agency prior to implementation.	Closure or Postclosure Maintenance Standard of Title 14, CCR, Chapter 3, Article 7.8, Scope and Applicability pursuant to 14 CCR 17760.	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 41509	14 CCR 18261.3 Chapter 5, Article 3.4 Closure and Postclosure Maintenance Plans	Relevant and Appropriate	Provides the content requirements for closure plans for solid waste disposal sites.	Applies to solid waste disposal sites that received waste after January 1, 1988. Relevant and appropriate for closing sites that did not receive waste after January 1, 1988.	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 41509	14 CCR 18265.3 Chapter 5, Article 3.4 Closure and Postclosure Maintenance Plans	Relevant and Appropriate	Provides the content requirements for postclosure maintenance plans for solid waste disposal sites.	Applies to solid waste disposal sites that received waste after January 1, 1988. Relevant and appropriate for closing sites that did not receive waste after January 1, 1988.	For closing sites
California Integrated Waste Management Act of 1989 PRC 40502 & 41509	14 CCR 18275 Chapter 5, Article 3.4 Postclosure Maintenance Plans	Relevant and Appropriate	Provides the content requirements to obtain certification that the solid waste disposal sites has closed pursuant to state standards.	Applies to solid waste disposal sites that received waste after January 1, 1988 Relevant and appropriate for closing sites that did not receive waste after January 1, 1988.	For closing sites

14 CCR - California Code of Regulations, Title 14 ARAR - applicable or relevant and appropriate requirement ROD - Record of Decision RD/RA - remedial design/remedial action

DEPARTMENT OF THE NAVY
SOUTHWEST DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132-5190

5090
Ser 06CA.JS/0441
April 21, 2004

Ms. Marcia Liao
Project Manager
State of California Environmental Protection Agency
Department of Toxic Substances Control
700 Heinz Avenue, Suite 200
Berkeley, CA 94710

Dear Ms. Liao:

Subj: IDENTIFICATION OF STATE "APPLICABLE" OR "RELEVANT AND APPROPRIATE" REQUIREMENTS (ARARS) FOR INSTALLATION RESTORATION SITE 28 AT ALAMEDA POINT, ALAMEDA, CALIFORNIA

Pursuant to previous discussions and to accomplish the goals of Alameda Point, Installation Restoration (IR) Program, the Department of the Navy (DON) is hereby requesting that the Department of Toxic Substances Control (DTSC) identify potential State chemical-specific, action specific, and location specific ARARs for IR Site 28. Information on this site can be found in the draft *Remedial Investigation Report, IR Site 28, Todd Shipyards, of February 2004.*

In addition, the DON is requesting that the State of California (State) identify any other criteria, advisories, guidance, and proposed standards that the State requests be considered (TBCs) for the above identified site. Please coordinate responses from all California state agencies.

Timely identification of potential State ARARs is required under Section 121(d)(2)(A) of CERCLA and under the National Contingency Plan (NCP), 40 CFR 300.400(g) and 300.515(d) & (h). Experience to date around the country has shown that a failure to identify ARARs with sufficient precision, early in the process, can cause severe disruptions in timely implementation of remedial action.

To ensure timely and complete ARARs identification, please include the following information:

1. A specific citation to the statutory or regulatory provision(s) for the potential State ARAR and the date of enactment or promulgation.

2. A brief description of why the State ARAR is applicable or relevant and appropriate to the particular IR Site.

3. A description of how the potential State ARAR would apply to potential remedial action including: specific numeric discharge, effluent, or emission limitations; hazardous substance/constituent action or clean up levels; etc., if the State intends to take the position that the potential State ARAR includes such limitations, levels, etc.

4. If the State believes its proposed ARAR is more stringent than the corresponding Federal ARAR, please provide the rationale and technical justification for this position.

5. If the State determines that there is not enough information to fully respond to our request, please identify any additional information that would be required to support identification of State ARARs and their application.

Consistent with 40 CFR 300.515(h)(2), the Navy is requesting that your response be sent via first class mail addressed to Ms. Jennifer Stewart, the Navy Remedial Project Manager, and postmarked within 30 calendar days of receipt of this request.

If you have any technical questions concerning this request, please contact me at jennifer.stewart@navy.mil. For any legal questions, please call Mr. Rex Callaway, Environmental Counsel at (619) 532-0988.

Sincerely,

JENNIFER STEWART
Remedial Project Manager
By direction of the Commander

ATTACHMENT K2

LETTER OF MAY 22, 2006, FROM NAVY TO DTSC CONCERNING IDENTIFICATION OF STATE ARARs

DEPARTMENT OF THE NAVY
BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST
1455 FRAZEE RD, SUITE 900
SAN DIEGO, CA 92108-4310

5090
Ser BPMOW.gal\0457
22 May 2006

Ms. Dot Lofstrom
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, CA 95826-3200

SUBJECT: IDENTIFICATION OF STATE "APPLICABLE" OR "RELEVANT AND APPROPRIATE" REQUIREMENTS (ARARS) FOR INSTALLATION RESTORATION SITE 35 AT ALAMEDA POINT, ALAMEDA, CALIFORNIA

Dear Ms. Lofstrom:

Pursuant to previous discussions and to accomplish the goals of Alameda Point, Installation Restoration (IR) program, we are hereby requesting that the Department of Toxic Substances Control (DTSC) identify potential State chemical-specific, action specific, and location specific ARARs for Installation Restoration Site 35 (Areas of Concern in Transfer Parcel EDC-5). Information on this site can be found in the Final *Work Plan for Remedial Investigation for IR Site 35*, dated March 2006.

In addition, the Department of the Navy (DON) is requesting that the State of California identify any other criteria, advisories, guidance, and proposed standards that the State requests be considered (TBCs) for the Site 35. Please coordinate responses from all California state agencies.

Timely identification of potential State ARARs is required under Section 121(d)(2)(A) of CERCLA and under the National Contingency Plan (NCP), 40 CFR 300.400(g) and 300.515(d) & (h). Experience to date around the country has shown that a failure to identify ARARs with sufficient precision, early in the process, can cause severe disruptions in timely implementation of remedial action. To ensure timely and complete ARARs identification, please include the following information:

1. A specific citation to the statutory or regulatory provision(s) for the potential State ARAR and the date of enactment or promulgation.

2. A brief description of why the potential STATE ARAR is applicable or relevant and appropriate to the Site 35.

3. A description of how the potential State ARAR would apply to potential remedial action, including: specific numeric discharge, effluent, or emission limitations;

hazardous substance/constituent action or cleanup levels; etc., if the State intends to take the position that the potential State ARAR includes such limitations, levels, etc.

4. If the State believes its proposed ARAR is more stringent than the corresponding Federal ARAR, please provide the rationale and technical justification for this position.

5. If the State determines that there is not enough information to fully respond to our request, please identify any additional information that would be required to support identification of State ARARs and their application.

Consistent with 40 CFR 300.515(h)(2), we are requesting that you send a response within 30 calendar days of receipt of this request. If you have any technical questions concerning this request, please call Greg Lorton at (619) 532-0953. For any legal questions, please call Mr. Rex Callaway, Environmental Counsel at (619) 532-0988.

Sincerely,

THOMAS L. MACCHIARELLA
BRAC Environmental Coordinator
By direction of the Director

ATTACHMENT K3

LETTER OF JULY 21, 2003, FROM RWQCB TO NAVY

California Regional Water Quality Control Board

San Francisco Bay Region

Winston H. Hickox
Secretary for Environmental Protection

Internet Address: http://www.swrcb.ca.gov
1515 Clay Street, Suite 1400, Oakland, California 94612
Phone (510) 622-2300 ∃ FAX (510) 622-2460

Gray Davis
Governor

Date: JUL 21 2003
File No. 2199.9285 (JCH)

Ms. Glenna M. Clark
Remedial Project Manager
Department of the Navy
Southwest Division
Naval Facilities Engineering Command
1230 Columbia Street, Suite 1100
San Diego, California 92101-8517

SUBJECT: CONCURRENCE THAT GROUNDWATER MEETS THE EXEMPTION CRITERIA IN THE STATE WATER RESOURCES CONTROL BOARD SOURCE OF DRINKING WATER POLICY RESOLUTION 88-63, AND SAN FRANCISCO BAY REGIONAL WATER QUALITY CONTROL BOARD RESOLUTION 89-39 FOR GROUNDWATER WEST OF SARATOGA STREET AT ALAMEDA POINT, CITY OF ALAMEDA, ALAMEDA COUNTY

Dear Ms. Clark:

This is in response to the U.S. Navy's July 10, 2003, request for an exemption from the municipal and domestic water supply designation in accordance to San Francisco Bay Regional Water Quality Control Board (Regional Board) Resolution 89-39 and State Water Resources Control Board (State Board) Source of Drinking Water Policy, Resolution 88-63.

Staff has reviewed the accompany report titled "Determination of The Beneficial Uses of Groundwater, Alameda Point, Alameda, California" (Report) dated July 2000, and finds that the quality and nature of the groundwater in the first and second water bearing zones beneath Alameda Point west of Saratoga Street are such that these waters are not potential sources of drinking water pursuant to State Board Resolution No. 88-63 and Regional Board Resolution 89-39. Furthermore, as the U.S. Navy demonstrated in the Report, the artificial land surface west of Saratoga Avenue lies entirely within what was the San Francisco Bay prior to the early 1900's.

Staff concurs with the U.S. Navy that the groundwater in the first and second water bearing zones west of Saratoga Avenue are not potential sources of drinking water, based on the high total dissolved solids (TDS) data. However, the U.S. Navy must consider all other potential beneficial uses of the groundwater west of Saratoga Avenue as outlined in the 1995 Water Quality Control Plan, San Francisco Bay Regional Board.

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at http://www.swrcb.ca.gov.

Hydrogeology of the Subsurface at Alameda Point west of Saratoga Avenue

There are two water-bearing zones at Alameda Point west of Saratoga Avenue. The first is an unconfined aquifer composed of artificial fill material from just below ground surface to the top of the Bay Sediment Unit. The natural groundwater gradient for the shallow fill slopes toward the Bay. The Bay Sediment Unit west of Saratoga Avenue is about 10 to 110 feet thick. The second water-bearing zone is a semi-confined aquifer composed of the lower portion of the Bay Sediment Unit, the Merrit Sand Formation (where present), and the upper unit of the San Antonio Formation. Beneath the second water bearing zone is the Alameda Formation.

Total Dissolved Solids Levels in the Shallow Fill Aquifer at Alameda Point west of Saratoga Avenue

The TDS exemption criteria in the State Board's Sources of Drinking Water Policy, Resolution No. 88-63, states that all groundwater in California are considered a potential drinking water source unless the TDS levels exceed 3,000 mg/L, and it is not reasonably expected by the Board that the groundwater could supply a public water system. The first and second water bearing zones at Alameda Point west of Saratoga Avenue contain water with high TDS contents due to naturally occurring saltwater intrusion. Information submitted by the U.S. Navy indicates that the maximum TDS concentrations in the first water bearing zone range from 80 – 52,000 mg/L and the maximum TDS concentrations in the second water bearing zone range from 1,600 – 78,600 mg/L.

Additional Issues

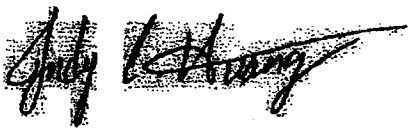
While the U.S. Navy has adequately demonstrated that the groundwater in the first and second water bearing zones are brackish and their TDS concentrations exceed the State Board's Sources of Drinking Water Policy exemption criteria, there are several other issues that must still be addressed. Other potential groundwater beneficial uses as outlined in the 1995 Basin Plan (Table 2-9), still apply to Alameda Point west of Saratoga Avenue (i.e. agricultural supply, industrial process supply, and industrial service supply).

Pursuant to State Board Resolution 92-49, the U.S. Navy must still demonstrate that 1) adequate source removal has occurred, 2) the plume or plumes have been adequately defined both laterally and vertically, and 3) a long-term monitoring program is established to verify that the plume or plumes are stable and will not impact ecological receptors or human health (e.g. from volatilization into trenches and buildings).

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at http://www.swrcb.ca.gov.

Please contact me at (510) 622-2363 or email jch@rb2.swrcb.ca.gov if you have any questions.

Very Truly Yours,



Judy C. Huang, P.E.
Associate Water Resource Control Engineer
Groundwater Protection and Waste Containment Division

cc:

Mr. Mark Ripperda
Project Manager
U.S. EPA Region IX (SFD-8-2)
75 Hawthorne Street
San Francisco, CA 94105-3901

Ms. Marcia Liao
Department of Toxic Substances Control
700 Heinz Avenue, Suite 200
Berkeley, CA 94710

Mr. Charlie Huang
Cal EPA
Department of Fish and Game
1700 K Street, Room 250
P.O. Box 9444204
Sacramento, CA 94244-2090

Ms. Elizabeth Johnson
Alameda Reuse and Redevelopment Authority
950 West Mall Square, Building 1
Alameda, CA 94501

Dr. Jim Polisini
Cal EPA/DTSC
1011 Grandview Dr.
Glendale, CA 91201

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at http://www.swrcb.ca.gov.

Mr. Bert Morgan
RAB Community Co-Chair
301 Grand Street
Alameda, CA 94501

Ms. Lea Loizos
ARC Ecology
833 Market Street, #1107
San Francisco, CA 94103

Mr. Steve Eddie
BRAC
Environmental Liaison
Navy SWDIV Detachment
410 Palm Avenue, Building 1, Suite 161
Treasure Island
San Francisco, CA 94130-1802

Mr. Mike McClelland, SWDIV
1230 Columbia Street, Suite 1100
San Diego, California 92101-8517

Mr. Dan Baden
IT Corporation
4005 Port Chicago Hwy.
Concord, CA 94520

Ms. Beth Kelly
Tetra Tech EMI
10670 White Rock Road, Suite 100
Rancho Cordova, CA 95670

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at http://www.swrcb.ca.gov.

ATTACHMENT K4

LETTER OF JUNE 23, 2006, FROM DTSC TO NAVY

Department of Toxic Substances Control

Maureen F. Gorsen, Director
8800 Cal Center Drive
Sacramento, California 95826-3200

Linda S. Adams
Secretary for
Environmental
Protection

Arnold Schwarzenegger
Governor

June 23, 2006

Mr. Thomas L. Macchiarella, Code BPMOW.TLM
Department of the Navy
Base Realignment and Closure Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

RESPONSE TO REQUEST FOR IDENTIFICATION OF STATE "APPLICABLE" OR "RELEVANT AND APPROPRIATE" REQUIREMENTS (ARARS) FOR INSTALLATION RESTORATION SITE 34 AT ALAMEDA POINT, ALAMEDA CALIFORNIA

Dear Mr. Macchiarella:

In a letter dated May 22, 2006, the U.S. Navy requested that the Department of Toxic Substances Control (DTSC) identify potential State chemical-specific, action specific, and location specific ARARs for Installation Restoration Site 35 (Areas of Concern in Transfer Parcel EDC-5). Previously, in a letter dated September 12, 1996, the Navy formally requested state ARARs for the Remedial Investigation (RI) and Feasibility Study (FS) of the Naval Air Station Alameda. DTSC responded in a letter dated November 13, 1996 with a list of California laws, regulations and policies for potential application at the Naval Air Station Alameda (now Alameda Point).

The list of California laws, regulations, and policies previously provided to the Navy on November 13, 1996 is appropriate for use by the Navy in consideration of ARAR selection. During the course of the RI/FS process, as additional site-specific information is collected, DTSC is available for further consultation in this matter. I look forward to working closely with the Navy during the RI/FS process to ensure timely and complete ARAR identification.

If you have any questions or comments, please call me at (916) 255-6449.

Sincerely,

Dot Lofstrom, P.G.
Project Manager
Northern California Operations
Office of Military Facilities

cc:

Mr. Greg Lorton, Code BPMOW.GL
Department of the Navy
Base Realignment and Closure Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Ms. Judy Huang
Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, California 94612

Ms. Anna-Marie Cook
US Environmental Protection Agency Region IX
75 Hawthorne Street
San Francisco, California 94105

Dr. Charlie Huang
California Department of Fish and Game
1700 K Street, Room 250
Sacramento, California 94244-2090

ATTACHMENT K5

1999 MEMORANDUM OF AGREEMENT BETWEEN THE NAVY, CALIFORNIA STATE HISTORIC PRESERVATION OFFICER, AND ADVISORY COUNCIL ON ALAMEDA HISTORIC DISTRICT

Memorandum of Agreement
Among
The United States Navy, The Advisory Council on Historic Preservation and The California State Historic Preservation Officer Regarding the Layaway, Caretaker Maintenance, Leasing, and Disposal of Historic Properties on the Former
Naval Air Station, Alameda, California

WHEREAS, the Department of the Navy (Navy) has been directed to close, layaway, place in caretaker maintenance, and subsequently lease, sell, transfer, or otherwise dispose of properties at the former Naval Air Station (NAS), Alameda by the Base Realignment and Closure Act, as amended in 1993, and this undertaking will affect buildings and structures within the NAS Alameda Historic District, a property eligible for inclusion in the National Register of Historic Places (Register); and

WHEREAS, the south jetty of the Oakland Inner Harbor Jetties and Federal Channel Historic District, a property determined to qualify for listing on the National Register by the Army Corps of Engineers in consultation with the California State Historic Preservation Officer (SHPO), is on land under the jurisdiction and control of the former NAS Alameda; and

WHEREAS, the NAS Alameda Historic District and the south jetty of the Oakland Inner Harbor Jetties and Federal Channel Historic District are historic properties located within the limits of the City of Alameda (City), a Certified Local Government under Section 101(c) of the National Historic Preservation Act (Act), as amended; and

WHEREAS, the Navy has consulted with the Advisory Council on Historic Preservation (Council) and the California SHPO pursuant to 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470f); and

WHEREAS, upon disposal of the historic properties from the Navy to a non-federal entity, any Federal jurisdiction ceases and the jurisdiction of the historic property reverts exclusively to the City, and therefore, the City was invited to participate in the development of this agreement and has been invited to concur;

NOW, THEREFORE, the Navy, the Council and the California SHPO agree the layaway, caretaker maintenance, lease, sale, transfer, and disposal of the property included in the NAS Alameda Historic District and that portion of the Oakland Inner Harbor Jetties and Federal Channel Historic District shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

Stipulations

The Navy will ensure that the following measures are carried out:

1. National Register Nomination.

The Navy shall prepare the National Register Nomination Form for the NAS Alameda Historic District and submit it to the Keeper of the National Register within one year from the date of execution of this agreement.

2. Historic Artifacts and Records.

a. The Navy has collected the items in the Naval Historical Center's (NHC) inventory of historic artifacts and other historically significant materials from the former NAS and Naval Air Depot, Alameda and secured them in temporary storage in Building 29 at NAS Alameda.

b. The items collected in 2.a. above that are listed on the NHC's inventory (APPENDIX A) will remain Navy property under the jurisdiction and control of the Director of the Naval Historical Center, Washington Naval Yard, District of Columbia, and will be placed either on permanent loan with a museum(s) on Alameda or in the greater San Francisco Bay area, or will be transported to other appropriate institutions where they will be permanently curated.

c. The Navy has coordinated the disposal of NAS Alameda's records, drawings, plans, and photographs with and transferred them to the National Archives Pacific-Sierra Region, San Bruno, CA.

3. Layaway and Caretaker Maintenance.

a. Prior to layaway and placement of historic properties into a caretaker maintenance status, the Navy shall follow the "Maintenance and Repair Guidelines for the NAS Alameda Historic District" (APPENDIX B) regarding routine repair and maintenance of historic properties within the NAS Alameda Historic District, and all actions taken in accordance with APPENDIX B may proceed without further consultation with SHPO or Council, except as specified in that document.

b. Until disposal or transfer, as the contributing historic properties are vacated, the Navy shall layaway and provide caretaker maintenance of the historic properties at the minimum levels described in APPENDIX C.

c. Prior to initiating any action which would irreversibly alter, damage or demolish a contributing historic building or structure which has been classified for Layaway Level 6 (No Reuse Likely) the Navy shall contact the Pacific-Great Basin Service Center, NPS, San Francisco, California to determine what level and kind of recordation is required for the property. Unless otherwise agreed to by NPS, the Navy shall ensure that all documentation is complete and accepted by the Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) prior to any irreversible alteration or demolition, and that copies of the documentation are provided to the California SHPO, the City and the Alameda library and historical museum(s).

4. Leasing of Historic Properties.

a. Prior to the transfer, sale or conveyance by some other means from the control and jurisdiction of the Navy, the Navy may enter into interim leases which will permit tenants to adaptively reuse contributing properties within the NAS Alameda Historic District, provided that the lease agreements require tenants to follow APPENDIX B in maintaining or adapting these historic properties for use.

b. The Navy shall inspect the leased contributing historic properties semi-annually to ensure that the conditions of APPENDIX B are followed in maintaining or adapting the historic property for other uses and shall take appropriate remedial action to assure compliance with APPENDIX B where deviations are observed. Appropriate remedial action shall include notification of SHPO and Council.

c. Where the City of Alameda requires modification to those buildings listed as contributing to the NAS Alameda Historic District to meet Fire-Safety or Americans with Disabilities Act requirements as a condition of occupancy, the Navy shall encourage the tenant or prospective subtenant to have the required modifications designed by an architect trained and experienced in the rehabilitation of historic buildings using the State Historical Building Code, Part 8, Title 24 of the California Code of Regulations.

d. To avoid intrusiveness and inappropriate signing within the Historic District tenants shall be required to follow the policy included in APPENDIX D governing the size, location, color, and lettering style of new signs to be installed within the Historic District.

5. Long Term Preservation Planning.

a. The Navy shall make an application to the City Council to place that portion of the Oakland Inner Harbor Jetties and Federal Channel Historic District on its "Historic Buildings Study List" and afford it the protection provided to listed properties.

b. The Navy has prepared a ***Guide to Preserving the Character of the Naval Air Station Alameda Historic District*** to assist the City and its Historical Advisory Board in administering the Historic District in accordance with the City's Building and Housing Ordinance Article VII, Historical Preservation, 13-21, "Preservation of Historical Monuments."

c. Within a calendar year from the execution of this agreement the City shall adopt an amendment to its Building and Housing Ordinance Article VII, Historical Preservation, 13-21, "Preservation of Historical Monuments" to include review of exterior modifications to historic structures consistent with the Secretary of the Interior's *Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings*, and shall designate the NAS Alameda Historic District a Historical Monument and afford it all the protection and privileges provided such designated properties pursuant to the City's historic preservation ordinance.

d. The City will ensure that the Alameda Historical Advisory Board shall continue in its present role as described in the Alameda Ordinance 13-21, Preservation of Historical Monuments, increasing its area of responsibility to include the NAS Alameda Historic District.

e. When title to property located within the NAS Alameda Historic District, and that on which the South Jetty of the Oakland Inner Harbor Jetties and Federal Channel Historic District is located, is transferred from the Navy to a non-federal entity all undertakings affecting these properties will be administered exclusively in accordance with City codes and ordinances.

f. The City shall apprise prospective Historic District tenants and property owners of the financial tools and economic incentives that are available, including but not limited to the State Historical Building Code and Federal and State tax incentives, for the preservation and adaptive rehabilitation of historic properties.

g. Within 30 calendar days of execution of this agreement City shall seek the assistance of the National Trust for Historic Preservation for guidance on marketing the historic properties in the NAS Alameda Historic District.

6. Document Review and Comment.

The California SHPO shall be afforded thirty (30) days after receipt to comment on any documentation submitted by the Navy as a result of consultation efforts or otherwise the result of implementation of this agreement. Should the California SHPO decline to participate or fail to respond within thirty (30) days to a written request for comments, the Navy shall continue to consult with the Council to complete its responsibilities for the specific action.

7. Annual Report and Review.

On or before December 15 of each year, until the terms of this agreement have been fulfilled, or title to the historic properties have been transferred to non-federal entities, the Navy shall provide an annual report to the Council, California SHPO, and City addressing following topics:

a. status of the curation of artifacts,

b. identification of historic properties leased, transferred or conveyed to others,

c. status of the City's efforts to market and preserve the historic properties, and

d. list and explain any problems or unexpected issues encountered during the previous year.

8. Resolving Objections.

a. Should any party to this agreement object to any action carried out or proposed by the Navy with respect to the implementation of this agreement, the Navy shall consult with the objecting party to resolve the objection. If, after entering into such consultation, the Navy determines that the objection cannot be resolved through consultation directly with the objecting party, the Navy shall forward all relevant documentation to the Council, including the Navy's proposed response to the objection. The Council shall exercise one of the following options within 30 calendar days of receipt of all pertinent documentation:

(1) advise the Navy in writing that the Council concurs with the Navy's proposed response and final decision, if so indicated, whereupon the Navy shall respond to the objecting party in writing; or

(2) provide the Navy with written recommendations and/or comments, which the Navy shall take into account in reaching its final decision regarding its response to the objection in accordance with 36 CFR 800.6; or

(3) notify the Navy in writing that the Council shall provide written comments within a specified time frame pursuant to 36 CFR 800.6. The resulting comments shall be taken into account by the Navy in accordance with 36 CFR 800.6(c).

Should the Council fail to exercise one of the above options within 30 calendar days after receipt of all pertinent documentation, the Navy may assume the Council concurrence in the Navy's proposed response. In considering any party's comments, the Navy shall take into account any recommendation or comment with reference only to the subject of the objection. The Navy's responsibility to carry out all actions under this agreement that are not the subject of the objection shall remain unchanged and shall be executed accordingly.

b. At any time during implementation of the stipulations of this agreement, should an objection(s) pertaining to this agreement be raised by a member of the public, the Navy shall notify in writing the signatory parties to this agreement and take the objection into account. The Navy shall consult with the objector and, if requested by the objector, consult with any or all of the signatory parties to this agreement with respect to the objection.

9. Amendments.

Any party to this agreement may propose, in writing, to the Navy that the terms and/or stipulations of this agreement be amended. The Navy shall consult with the other parties to this agreement to consider such an amendment. 36 CFR 800.5 shall govern the execution of any such amendment once agreed upon by all parties.

10. Anti-Deficiency Act.

a. All requirements set forth in this agreement requiring the expenditure of Navy funds are expressly subject to the availability of appropriations and the requirements of the Anti-Deficiency Act (31 U.S.C. Section 1341). No obligation undertaken by the Navy under the terms of this Agreement shall require or be interpreted to require a commitment to expend funds not appropriated for a particular purpose.

b. If the Navy cannot perform any obligation set forth in this agreement because of the unavailability of funds, the Navy, California SHPO, City, and Council intend that the remainder of the agreement be executed. Any obligation under the agreement which cannot be performed because of the unavailability of funds must be renegotiated between the Navy, California SHPO, City and Council.

Execution of this agreement by the Navy, Council, and California SHPO, and subsequent implementation of its terms, shall be evidence that the Navy has afforded the Council an opportunity to comment on the Navy's undertakings and its effects on historic properties in accordance with Section 106 of the National Historic Preservation Act and its implementing regulations contained in 36 CFR Part 800.

UNITED STATES NAVY, NAVAL FACILITIES ENGINEERING COMMAND, ENGINEERING FIELD ACTIVITY WEST, SAN BRUNO, CA.

BY: G. J. Buchanan Date: SEP 01 1999
Print Name of Title of Signer: G. J. Buchanan, CAPT USN CEC, Commanding Officer

CALIFORNIA STATE HISTORIC PRESERVATION OFFICER

BY: Daniel Abeyta Date: 9/30/99
Print Name & Title of Signer: J Daniel Abeyta Acting SHPO

ADVISORY COUNCIL ON HISTORIC PRESERVATION

BY: John M. Fowler Date: 10/5/99
Print Name & Title of Signer: JOHN FOWLER, EXECUTIVE DIRECTOR

CONCUR:
CITY OF ALAMEDA

BY: [signature] Date: 9-14-99
Print Name & Title of Signer: JAMES M. FLINT, CITY MANAGER

Approved as to Form
CITY ATTORNEY
By: Teresa A. Highsmith
Assistant City Attorney

Recommended for Approval:
G. J. Buchanan

APPENDICES

APPENDIX A - Naval Historical Center Curator Accession/Catalog July 2, 1997

APPENDIX B - Maintenance and Repair Guidelines for Naval Air Station Alameda Historic District

APPENDIX C - Layaway and Caretaker Maintenance Standards

APPENDIX D - Sign Procedures

NAVAL HISTORICAL CENTER CURATOR BRANCH INVENTORY REPORT	NAVY DEPARTMENT CURATOR ACCESSION NUMBER 97-61-
	DATE
COMMAND/ACTIVITY NAME	NAVAL AIR STATION
	ALAMEDA, CA
	LOCATION: NAS ALAMEDA BUILDING 29

NAVY DEPARTMENT CURATOR CATALOG NUMBER	DIMENSIONS			ITEM NAME/DESCRIPTION	REMARKS
N	36	26		SIGN, INFORMATION, "PROTECTIVE CLOTHING"	
O	15.5	8.75	7.5	SHIELD, PROTECTIVE, FACE,	MFR WILLSON
P	22.5	17.5		SIGN, INFORMATION, SECURITY, KGB	MADE OF PAPER
Q	22.5	17.5		SIGN, INFORMATION, SECURITY, KGB	MADE OF PAPER
R	14	7.5	1	SIGN, DOOR, NAVOCEANCOMDET, OIC	BLACK WITH GOLD LETTERING
S	20	9.5	6.5	SET, WIND MEASURING, AN/PMQ-1C	SN 201
T	13.25	7.5	7.25	INTERCOM UNIT, DESK, WESTERN ELECTRIC TELETALK	
U	13.25	7.5	7.25	INTERCOM UNIT, DESK, WESTERN ELETRIC TELETALK	NUMBER 6 ON OBVERSE SIDE
V	13.5	6.5	5	INTERCOM UNIT, DESK, VOYCALL	NUMBER 2 ON BOTTOM SIDE
W	23.5	11.25	12	MACHINE, MIMEOGRAPH, HAND POWERED	FROM NADEP BUILDING 167
X	8.75	4.5	7	ANALYZER, TRANSISTOR, MODEL 900	
Y	12	5	1.5	GAUGE, PRESSURE, 160LBS	NAS ALAMEDA CALIBRATION LAB
Z	24	15	7.2	KIT, CHAPLAIN, COMBINATION, PROTESANT/CATHOLIC	NAS ALAMEDA CHAPEL

ENCLOSURE (1)

NAVAL HISTORICAL CENTER CURATOR BRANCH INVENTORY REPORT	NAVY DEPARTMENT CURATOR ACCESSION NUMBER 97-61- DATE
COMMAND/ACTIVITY NAME	NAVAL AIR STATION ALAMEDA, CA LOCATION: NAS ALAMEDA BUILDING 29

NAVY DEPARTMENT CURATOR CATALOG NUMBER	DIMENSIONS			ITEM NAME/DESCRIPTION	REMARKS
AA	18.25	17	8	KIT, CHAPLAIN, USN, JEWISH FAITH	METAL CONTAINER
AB	48	36		FLAG, CHAPLAIN, USN, JEWISH FAITH	NYLON WITH FRINGE
AC	62.5	45.5		FLAG, ORGANIZATIONAL, USN, WAVES	NAVAL STATION TREASURE ISLAND
AD	48	24		SIGN, INFORMATION, AIR TERMINAL, "GATE 1"	FROM AIR TERMINAL
AE	12.25	11.25	5	HELMET, PROTECTIVE, COMBAT, M1917	SN ZA178
AF	18.5	16	2	PLAQUE, COMEMORATIVE, NADEP BILLIONTH NIF DOLLAR, C 1972	
AG	7	4	1.75	SET, DRILL BIT, 1/16TH TO 1/2 IN	BLANK BITS / NARTU
AH	97.25	31	1	DISPLAY BOARD, RUBBER PRODUCTS	NAVAL AVIATION DEPOT
AI	59	36	4.5	DISPLAY BOARD, COMMAND	SIMA SAN FRANCISCO
AJ	8.75	5	1.25	WING FITTING ASSEMBLY	FOR A-3 SERIES AIRCRAFT
AK	23.5	4	6.5	FLAP SUPPORT ASSEMBLY	FOR A-3 SERIES AIRCRAFT
AL	14.25	6	7.75	FAN DISK ASSEMBLY, TF34 ENGINE	FOR S-3 SERIES AIRCRAFT
AM	13	6.25	5.5	CLOSING ARM, LANDING GEAR DOOR	FOR S-3 SERIES AIRCRAFT
AN	11.5	8	.75	HINGE, CANOPY BREAK AWAY	FOR S-3 SERIES AIRCRAFT

ENCLOSURE (1)

NAVAL HISTORICAL CENTER CURATOR BRANCH INVENTORY REPORT	NAVY DEPARTMENT CURATOR ACCESSION NUMBER 97-61- DATE
COMMAND/ACTIVITY NAME	NAVAL AIR STATION ALAMEDA, CA LOCATION: NAS ALAMEDA BUILDING 29

NAVY DEPARTMENT CURATOR CATALOG NUMBER	DIMENSIONS			ITEM NAME/DESCRIPTION	REMARKS
AO	13.5	6.25	7.5	GYRO ASSEMBLY, WEAPON CONTROL, AIRCRAFT	FOR A-3 AND A-4 SERIES AIRCRAFT
AP	7.75	7	.5	FLOOR SECTION, AIRCRAFT	FOR P-3 SERIES AIRCRAFT
AQ	15	7	2.5	DIE, STAMP, MACHINE MOUNTED	
AR	20	11	2	PLAQUE, AWARD, BENEFICIAL SUGGESTION	NAS OVERHAUL AND REPAIR DEPT
AS	25.5	9		DISPLAY, TOOL CHIT	
AT	9.5	6		METER, FREQUENCY, CALIBRATION, SN 2684	FOR SHRIKE MISSILE
AU	12	8.75	11	TEST SET, TORPEDO, HEAT AND CONTROL SYSTEM	FOR MK 44, MK 48, AND MK 48
AV	8.75	4		SIGN, LICENSE, "JAPANESE HUNTING"	MADE BY O&R DEPT C WWII
AW	5	3.75		SIGN, PERMIT, PARKING, SN 18501	NADEP
AX	5	3.75		SIGN, PERMIT, PARKING, SN 18502	NADEP
AY	5	3.75		SIGN, PERMIT, PARKING, SN 18503	NADEP
AZ	5	3.75		SIGN, PERMIT, PARKING, SN 19000	NADEP

NAVAL HISTORICAL CENTER CURATOR BRANCH INVENTORY REPORT	NAVY DEPARTMENT CURATOR ACCESSION NUMBER 97-61-
	DATE
COMMAND/ACTIVITY NAME	NAVAL AIR STATION ALAMEDA, CA LOCATION: NAS ALAMEDA BUILDING 29

NAVY DEPARTMENT CURATOR CATALOG NUMBER	DIMENSIONS			ITEM NAME/DESCRIPTION	REMARKS
BA	5.75	6.5	1	PATTERN, MOLD, INSIGNIA	NADEP ALAMEDA
BB	10	10	1.75	PATTERN, MOLD, INSIGNIA	NADEP ALAMEDA
BC	7.5	7	2	PATTERN, MOLD, INSIGNIA	USN MASTER MACHINIST ASSOC.
BD	10	3.5	7.25	KIT, HOLE BORING / CUTTER	
BE	12.75	11	1.5	PANEL, PATCH, ELECTRONIC	FOR PROGRAMMING MACHINERY
BF	28.5	22	13	CONSOLE, COMPUTER, C-3 DATA SYSTEMS	FOR WORK MANAGEMENT
BG	18	17.75	.5	PLAQUE, COMMEMORATIVE	IN MEMORY OF BMC RAYMOND BAKER
BH	19	12	.75	PLAQUE, AWARD, SAFETY. C 1989	NAVAIRSYSCOM / NADEP ALAMEDA
BI	3.75	4	.25	PLAQUE, COMMEMORATIVE	A&R / NADEP 1941 -1997
BJ	27	3.5	3.5	BILLET, ALUMINUM	FOR FORGE OPERATIONS
BK	27	3.5	3.5	BILLET, ALUMINUM	FOR FORGE OPERATIONS
BL	44	14	8	LADLE, FORGE	
BM	46.25	7	.5	SIGN, PATTERN SHOP	
BN	83.5	22.75	3	CRADLE, FORGE METAL POT	

ENCLOSURE (1)

NAVAL HISTORICAL CENTER CURATOR BRANCH INVENTORY REPORT	NAVY DEPARTMENT CURATOR ACCESSION NUMBER 97-61-
	DATE
COMMAND/ACTIVITY NAME	NAVAL AIR STATION
	ALAMEDA, CA
	LOCATION: NAS ALAMEDA BUILDING 29

NAVY DEPARTMENT CURATOR CATALOG NUMBER	DIMENSIONS			ITEM NAME/DESCRIPTION	REMARKS
BO	37	3	1.5	TONGS, FORGE	
BP	50.25	57	2	PLAQUE INSIGNIA, UNIT	NAVAL AIR REWORK FACILITY
BQ	11.25	14.75		POT, METAL FORGE	FOR MOLTEN METAL
BR	11.5	8	2	SET, MICROMETER	FOR MEASURING WEAR
BS	45.5	19	15	MASK ASSEMBLY, PROTECTIVE	FOR AIRCRAFT CHEMICAL WASHDOWN
BT	60	6.5		PLAQUE, INSIGNIA, UNIT	NAS ALAMEDA
BU	66.5	54		FLAG, ORGANIZATIONAL, UNIT	NAVAIRSYSCOM
BV	36	24	.75	PLAQUE, COMMAND, UNIT	NARDAC SAN FRANCISCO
BW	28.25	22.5	38.5	CART, TOOL, MECHANIC, SN BSM-625	NADEP ALAMEDA
BX	70	6.5	12.25	DISPLAY, PRODUCT, INSTRUMENT BEARINGS	REWORKED AT NADEP ALAMEDA
BY	96.75	62.75	40	DIORAMA, INSTALLATION	NAVAL AVIATION DEPOT
BZ	24.5	20.25	1.75	PLAQUE, AWARD, SAFETY, C 1974	NARF ALAMEDA
CA	16.75	13.75	1	PLAQUE, AWARD, SAFETY, C1972	NAVAL AVIATION DEPOT

ENCLOSURE (1)

NAVAL HISTORICAL CENTER CURATOR BRANCH INVENTORY REPORT	NAVY DEPARTMENT CURATOR ACCESSION NUMBER 97-61-
	DATE
COMMAND/ACTIVITY NAME	NAVAL AIR STATION
	ALAMEDA, CA
	LOCATION: NAS ALAMEDA BUILDING 29

NAVY DEPARTMENT CURATOR CATALOG NUMBER	DIMENSIONS			ITEM NAME/DESCRIPTION	REMARKS
CB	3.75	4	1.25	PLAQUE, COMMEMORATIVE	A&R / NADEP ALAMEDA 1941-1997
CC	3.75	4	1.25	PLAQUE, COMMEMORATIVE	A&R / NADEP ALAMEDA 1941-1997
CD	2	15.25		FLASHLIGHT, HAND, US, MX-993/U	USED BY TAXI GROUND CREW / WITH CONE SHIELD
CE	2	15.25		FLASHLIGHT, HAND, US, MX-993/U	USED BY TAXI GROUND CREW / WITH CONE SHIELD
CF	2	8		FLASHLIGHT, HAND, US, MX-993/U	USED BY GROUND CREW
CG	61.5	58	.5	MAT, DECK, QUARTERDECK, UNIT	CBU 416
CH	56	12.5	.25	SIGN, ORGANIZATIONAL, "S-3 FLIGHT SYSTEMS"	NADEP CODE 94424 (S-3 FLIGHT SYSTEMS)
CI	8	6	3.25	TEST SET, BOMB RACK	NADEP
CJ	10.25	3		CLOCK, WALL, US, 24-HOUR	NAS ALAMEDA AIR TERMINAL
CK	28	9	11.5	BOMB RACK, EJECTOR, US, AERO 20B SN 486	CUTAWAY TRAINING AID
CL	34	12	7.5	BOMB RACK, EJECTOR, US, AERO 7A-5 SN 158	
CM	4	4		SIGN, ORGANIZATIONAL, "P-3C. UPDATE III"	NADEP ALAMEDA/PLACED IN COMPLETED AIRCRAFT
CN	11.5	13.5		BUCKET, SAND, FIRE PROTECTION	FROM BLDG 5 / USED TO FIGHT MAGNESIUM FIRES

ENCLOSURE (1)

NAVAL HISTORICAL CENTER CURATOR BRANCH INVENTORY REPORT	NAVY DEPARTMENT CURATOR ACCESSION NUMBER 97-61-
	DATE
COMMAND/ACTIVITY NAME	NAVAL AIR STATION
	ALAMEDA, CA
	LOCATION: NAS ALAMEDA BUILDING 29

NAVY DEPARTMENT CURATOR CATALOG NUMBER	DIMENSIONS			ITEM NAME/DESCRIPTION	REMARKS
CO	22.75	10.25	17.75	INFLATOR/MONITOR, AIRCRAFT TIRE SN LOB0018	
CP	10.25	10	7	CARBURETOR, AIRCRAFT ENGINE	
CQ	20	14.5	16	TEST SET, FLAP ACTUATOR, AIRCRAFT	
CR	1.25	.25		COIN, COMMEMORATIVE, NAS ALAMEDA	25TH ANNIVERSARY
CS	5	2		TICKET, CLAIM CHECK, BAGGAGE, SN 28263	GENERAL PURPOSE
CT	5	2		TICKET, CLAIM CHECK, BAGGAGE, SN 28262	GENERAL PURPOSE
CU	5	2		TICKET, CLAIM CHECK, BAGGAGE, SN 15799	NAS MIRAMAR
CV	5	2		TICKET, CLAIM CHECK, BAGGAGE, SN 15800	NAS MIRAMAR
CW	55.25	43	2	PAINTING, OIL, USS SAMUEL GOMPERS (AD 37)	ARTIST: GIORGINA CANDELARIA C 1989. INCLUDES USS SPRUANCE DD963 AND DD975
CX	60.5	41	4	PAINTING, OIL, BATTLE OF MANILA BAY SN1090	ARTIST: F. BAUER C 1910

ENCLOSURE (1)

NAVAL HISTORICAL CENTER CURATOR BRANCH INVENTORY REPORT	NAVY DEPARTMENT CURATOR ACCESSION NUMBER 97-61- DATE
COMMAND/ACTIVITY NAME	NAVAL AIR STATION ALAMEDA, CA LOCATION: NAS ALAMEDA BUILDING 29

NAVY DEPARTMENT CURATOR CATALOG NUMBER	DIMENSIONS			ITEM NAME/DESCRIPTION	REMARKS
CY	13.75	13.25	2	BOARD, SWITCH/INDICATOR, ELETRONIC	FORGE SHOP SAMPLE
CZ	13.5	13	2	BOARD, SWITCH/INDICATOR, ELECTRIC	FORGE SHOP SAMPLE
DA	19.5	10	14	CASE, BISCUIT, SURVIVAL RATION, US, CIVIL DEFENSE	CIVIL DEFENSE ITEM
DB	19.5	16.75	10.75	TEST SET, US. AIRCRAFT FIRE CONTROL SYSTEM SN AV020	USED WITH THE A-6 SERIES AIRCRAFT
DC	24	13.25	17	TEST SET, TRANSISTOR, TYPE 575 SN 011057	USED IN SHOP TESTS FOR TRANSISTORS
DD	23	17		VEST, AVIATION, GROUND CREWMANS, LARGE	FROM AIR TERMINAL
DE	23	17		VEST, AVIATION GROUND CREWMAN'S, LARGE	FROM AIR TERMINAL
DF	9.5	10	5.5	HELMET, FLIGHT DECK CREWMAN'S	FROM AIR TERMINAL / MARKED "D./HUGO BARNEY"
DG	9.5	10	5.5	HELMET, FLIGHT DECK CREWMAN'S	FROM AIR TERMINAL / MARKED "BUSH"
DH	7.5	4.5	5.5	PROTECTOR, FOOT / TOE (1 PAIR)	FROM AIR TERMINAL

ENCLOSURE (1)

NAVAL HISTORICAL CENTER CURATOR BRANCH INVENTORY REPORT	NAVY DEPARTMENT CURATOR ACCESSION NUMBER 97-61-
	DATE
COMMAND/ACTIVITY NAME	NAVAL AIR STATION
	ALAMEDA, CA
	LOCATION: NAS ALAMEDA BUILDING 29

NAVY DEPARTMENT CURATOR CATALOG NUMBER	DIMENSIONS			ITEM NAME/DESCRIPTION	REMARKS
DI	10.5	5.5		PATCH, ORGANIZATIONAL	MARKED "N.A.S. ALAMEDA / AIR TERMINAL"
DJ	10.5	5.5		PATCH, ORGANIZATIONAL	MARKED "N.A.S. ALAMEDA / AIR TERMINAL"
DK	38	14	37.5	SIDEBOARD, QUARTERDECK, SHIP'S	FROM USS SAMUEL GOMPERS (AD 37)
DL	38	14	37.5	SIDEBOARD, QUARTERDECK, SHIP'S	FROM USS SAMUEL GOMPERS (AD 37)
DM	36	29.5	39	MACHINE, PUNCH CARD, COMPUTER, IBM MODEL 29	WITH INSTRUCTION BOOK
DN	43.5	29.5	48	MACHINE, SORTING, PUNCH CARD, SN 23997	FROM NAVAL AVIATION DEPOT
DO	22	16.5	10.5	TEST UNIT, SEARCH RADAR, GRUMMAN (CASE 1 OF 3)	FOR USE WITH AN/APQ-92 OR AN/APQ-105 RADAR (A-6 SERIES AIRCRAFT)
DP	21	18	10	TEST UNIT, SEARCH RADAR, GRUMMAN (CASE 2 OF 3)	FOR USE WITH AN/APQ-92 OR AN/APQ-105 RADAR (A-6 SERIES AIRCRAFT)
DQ	22	19	11	TEST UNIT, SEARCH RADAR, GRUMMAN (CASE 3 OF 3)	FOR USE WITH AN/APQ-92 OR AN/APQ-105 RADAR (A-6 SERIES AIRCRAFT)
DR	14.5	24.75		CAPSULE, TIME, COMMEMORATIVE	FROM NARF MATERIALS ENGINEERING LABORATORY DTD FEB 1986 (DO NOT OPEN UNITL 2061) (COMMEMORATES 75TH ANNIVERSARY OF NAVAL AVIATION)
DS	36	15	41	SCALE, WEIGHT, SN 65885-190402	FROM NARF ALAMEDA

NAVAL HISTORICAL CENTER CURATOR BRANCH INVENTORY REPORT	NAVY DEPARTMENT CURATOR ACCESSION NUMBER 97-61-
	DATE
COMMAND/ACTIVITY NAME	NAVAL AIR STATION
	ALAMEDA, CA
	LOCATION: NAS ALAMEDA BUILDING 29

NAVY DEPARTMENT CURATOR CATALOG NUMBER	DIMENSIONS			ITEM NAME/DESCRIPTION	REMARKS
DT	58	30	85.5	LANDING GEAR ASSEMBLY, NOSE, AIRCRAFT, P-3 SERIES AIRCRAFT	SN 93431
DU	66	48	75.25	LANDING GEAR ASSEMBLY, MAIN, AIRCRAFT, P-3 SERIES AIRCRAFT	SN 93115
DV	26.5	38	2	PLAQUE, BUILDER'S, FACILITY	AIRCRAFT ENGINE OVERHAUL FACILITY C1953
DW	39.25	19	8	PROPELLER, AIRCRAFT, FOR P-3 SERIES AIRCRAFT	CUTAWAY SECTION FOR TRAINING

ENCLOSURE (1)

APPENDIX B

Maintenance and Repair Guidelines for Naval Air Station Alameda Historic District

Definition of Terms:

In addition to the terms defined here, and unless otherwise indicated, all definitions given in 36 CFR § 800.2 will be accepted for the purpose of this agreement.

1. **Routine maintenance:** Routine maintenance will include only exterior maintenance and repair.

2. **Maintenance:** Maintenance is the recurring day-to-day or periodic work required to continue current use of the facility. It includes work undertaken to prevent damage or deterioration.

3. **Repair:** Repair includes overhauling, refinishing or reprocessing constituent parts or material of a facility in order to continue effective current use. It includes replacement in kind when new materials and design match existing material and design.

Actions Not Requiring Further Consultation Pursuant to the Regulations (36 CFR Part 800)

A. Structural Elements

1. Repair or replacement of siding, trim, or hardware when done in kind to match existing material and design.

2. Replacement of glass when done in kind to match existing material and design. Window panes may be double or triple glazed as long as the glazing is clear and replacement does not alter existing window material and form. This excludes the use of tinted glass, which will consultation.

3. Maintenance of features such as frames, hoodmolds, paneled or decorated jambs and moldings through appropriate surfaces treatments such as cleaning, rust removal, limited paint removal, and re-application of protective coating systems.

4. Repair or replacement of doors, when done in kind to match existing material and design.

5. Repair or replacement of roofs or part of a roof that are deteriorated, when done in kind to match existing material and design. Adequate anchorage for roofing material to guard against wind damage an moisture penetration shall be provided.

6. Repair or replacement of porches and stairs when done in kind to match existing material and design.

7. Repair of window frames by patching, splicing, consolidating, or otherwise reinforcing or replacing in kind those parts that are either extensively deteriorated or are missing. The same configuration of pane will be retained.

B. Surfaces

1. Painting exterior surfaces when the new paint matches the existing or original color. If the existing paint color is desirable and the original color is now known, the color should be in keeping with approved historic color schemes. Damaged or deteriorated paint may be removed to next sound layer by hand scraping or hand sanding. Abrasive methods, such as sandblasting or waterblasing, are not allowed.

APPENDIX C

LAYAWAY AND CARETAKER MAINTENANCE STANDARDS

Layaway Level 1 (property remains in continuous use): Operational facilities, systems and equipment shall be maintained at normal operational levels. All services, including, but not limited to, installed utilities, mechanical systems, grounds maintenance, interior and exterior structural finishes and systems shall continue in operation. Maintenance of historic properties will be carried out in accordance with the terms of **APPENDIX B**, Maintenance and Repair Guidelines for NAS Alameda Historic District.

Layaway Level 2 (property expected to be reused within 6 months of operational closure): Maintenance shall be performed to maintain the structural integrity, weather tightness and utility systems of the facility to limit deterioration. Water shall be periodically turned on to faucets, toilets, urinals, etc., to keep drain traps "wet." Appliances shall be winterized and unnecessary electrical shall be de-energized. Heating/air conditioning will be turned off except where heating/air conditioning is required to maintain the mechanical systems in working order, for humidity control and to prevent freezing. Historic properties previously heated/air conditioned will be inspected on a regular basis for mildew, mold and other evidence of deterioration. Where deterioration is observed appropriate measures will be taken to arrest the deterioration and prevent reoccurrence. Maintenance of historic properties will be carried out in accordance with the terms of **APPENDIX B**, Maintenance and Repair Guidelines for NAS Alameda Historic District.

Layaway Level 3 (property expected to be reused within 6-24 months of operational closure): Same as Level 2 except that the heating/air-conditioning will be turned off. Historic properties previously heated/air conditioned will be inspected on a regular basis for mildew, mold and other evidence of deterioration. Where deterioration is observed appropriate measures will be taken to arrest the deterioration and prevent reoccurrence. Maintenance of historic properties will be carried out in accordance with the terms of **APPENDIX B**, Maintenance and Repair Guidelines for NAS Alameda Historic District.

Layaway Level 4 (potential reuse of property is beyond 24 months of operational closure): Same as Level 2 except that no heat or air conditioning will be provided and all utilities will be turned off. Water lines and fire suppression systems will be drained. Sewer traps shall be routinely filled with a non-toxic antifreeze or other methane gas suppression system. Passive ventilation shall be used to control humidity. Scheduled inspections shall be made to detect any damage from mold or mildew. Where damage is observed appropriate measures will be taken to arrest deterioration and prevent its reoccurrence. Maintenance of historic properties will be carried out in accordance with the terms of **APPENDIX B**, Maintenance and Repair Guidelines for NAS Alameda Historic District.

Layaway Level 5 (leased facility): Utilities shall be provided to the lessee on a fee basis. Lessee will provide for and fund maintenance, repair or services to the property(s). Maintenance of historic properties will be carried out in accordance with the terms of **APPENDIX B**, Maintenance and Repair Guidelines for NAS Alameda Historic District.

Layaway Level 6 (no reuse envisioned; abandoned in place): The property, related systems and equipment shall be closed and secured. Windows and entrances shall be locked (or boarded up as necessary). Maintenance work shall be restricted to the prevention of unauthorized entry to the facility or grounds immediately adjacent. Basic entomology services shall be continued to the grounds surrounding the facility. Only conditions adversely affecting public health, the environment and public safety shall be corrected. All utilities shall be shut off or disconnected.

APPENDIX D

Sign Procedures

RECEIVED
MAR 2 6 1998
CITY OF ALAMEDA

CITY OF ALAMEDA PLANNING BOARD
RESOLUTION NO. PB-98-8

A RESOLUTION OF THE PLANNING BOARD OF THE CITY OF ALAMEDA APPROVING A SIGN PROGRAM FOR ALAMEDA POINT(THE FORMER ALAMEDA NAVAL AIR STATION)

WHEREAS, Alameda Naval Air Station closed in May of 1997; and

WHEREAS, Alameda Naval Air Station is under an interim leasing program between the Navy, the Alameda Reuse and Redevelopment Authority and the City of Alameda; and

WHEREAS, a portion of the base has been determined to be eligible for the National Register of Historic Places as an Historic District and thus, given federal protections; and

WHEREAS, the interim leasing area needs sign control to protect the historic character of the base; and

WHEREAS, the subject property is designated Federal Facilities on the General Plan Diagram; and

WHEREAS, the subject property is located in an M-2-G, General Industrial (Manufacturing) Zoning District with a Special Government Combining District; and

WHEREAS, the Board held a public hearing on this application on August 11, 1997, and examined pertinent maps, drawings, and documents; and

WHEREAS, the Board made the following findings:

1. The proposed Sign Program is consistent with the General Plan, since it implements policy 3.3.d which states: New construction, redevelopment and alterations should be compatible with historic resources in the immediate area.

2. The proposed Alameda Point Sign Program will not adversely affect other property in the vicinity since it does not propose any construction, but only proposes standards for any signs to be placed within the former Alameda Naval Air Station (Alameda Point.)

3. Signs allowed under the Sign Program are of a suitable design for the historic district and the safety restrictions of the unique street configuration of the base.

4. The standards in the proposed Alameda Point Sign Program are more appropriate for signage in Alameda Point than the City's Sign Regulations because they

recognize the consistency of the building sizes, design, and unique streetscape. Alameda Municipal Code Sign Regulations Section 30-6.3b2 provide the authority to adopt an individual sign program for specific areas.

THEREFORE BE IT RESOLVED that the proposal is Categorically Exempt under CEQA Guidelines, Section 15305 - Minor alterations to land use limitations; and

THEREFORE BE IT FURTHER RESOLVED that the Planning Board of the City of Alameda hereby approves the Alameda Point Sign Program, pursuant to Alameda Municipal Code Sign Regulations Section 30-6.3b2, and subject to the following conditions:

1. Signs within Alameda Point shall follow standards found in Exhibit A, "Standards and Procedures for Signs within Alameda Point", dated February 1998. The area subject to the Sign Program is delineated in Exhibit B.

2. If substantial redevelopment of Alameda Point occurs, the Planning Board can adopt a new sign program that would supersede this Sign Program.

NOTICE. No judicial proceedings subject to review pursuant to California Code of Civil Procedure Section 1094.5 may be prosecuted more than ninety (90) days following the date of this decision or decision on any appeal plus extensions authorized by California Code of Civil Procedure Section 1094.6.

PASSED AND ADOPTED by the Planning Board of the City of Alameda on the 26th day of January, 1998 by the following vote:

AYES: (6) Thomas, Bard, Gottstein, Harris, Johnson, Piziali

NOES: (0)

ABSENT: (1) Rossi

ATTEST: Colette Meunier
Colette Meunier, Secretary
City Planning Board

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EXHIBIT A

CITY OF ALAMEDA
INTERIM STANDARDS AND PROCEDURES FOR SIGNS WITHIN ALAMEDA POINT

February 1998

I. Purpose of the Standards and Procedures

The purpose of these standards and procedures is threefold. First, they establish the City's interim signage requirements for Alameda Point (the former Alameda Naval Air Station.) Second, they are consistent with the preservation of Alameda Point's unique historic resources and character and existing physical development characteristics. Third, they provide tenants and interim lessees with clear requirements for signage and permit processing. Unless specified herein all signage shall comply with the City of Alameda's Sign Regulations.

II. Existing Signs

Existing signs shall not be removed from any building or area or altered unless such removal or alteration is approved through a sign permit issued by the Planning Director. For a sign to be removed or altered, it must meet the following criteria:

A. The sign does not contribute to the historic character of the building or the area.

B. The sign is irrelevant to the present or proposed use of the building or area. Examples of this criteria include signs that identify a former tenant or use or that refer to the prior caretaker status of the building.

C. The sign is not the building number or area identification sign, unless it will be replaced with an in-kind sign.

D. The sign's removal or alteration will not irreversibly damage the building or area. Any damage to a building or area resulting from the removal or alteration of a sign shall be repaired immediately by the tenant to meet the approval of the City Planning Director. Any alteration required to remove a sign must meet the Planning Director's approval.

E. The altered sign meets the standards in Section III, "New Signs".

The existing free-standing changeable copy sign located at the terminus of Atlantic Avenue at Ferry Point Drive may be used only by the City of Alameda for informational purposes.

III. New Signs

A. General Standards

1. The purposes of signage in Alameda Point are to direct traffic to buildings and areas and to identify buildings and areas, and the businesses located within. Signs shall not advertise products or services unless the product or service is part of a business's name.

2. The sign copy on an individual sign face shall be limited to the name of the business, the street address and/or building number, and two design features, such as logos, figures, or symbols.

3. All signs shall respect the architectural character of Alameda Point, being Streamline Moderne or Art Deco style generally, characterized by sans serif lettering and stylized forms where possible. The guide produced by the Navy for design review, "Layman's Guide to Buildings Preserving the Character of the Naval Air Station Alameda Historic District", shall be used in reviewing each proposal. It is available for review at the City Planning Department.

4. Signs shall be compatible with the building to which they are attached. Size, height, location and material shall strongly relate to building design and style. Colors shall be compatible with the building's colors.

5. Signs shall comply with all applicable requirements of the City of Alameda Sign Ordinance, including the requirement of a building permit.

6. Signs shall not remove, alter or irreversibly damage distinctive materials, features, finishes and construction techniques or examples of craftsmanship.

B. Materials

1. Sign materials shall be consistent with the materials and characteristics of the historic architectural styles. Appropriate materials may include painted or engraved wood and dimensional letters of cast or fabricated metal or painted plastic. For buildings within the Hangar Area, the preferred signage is the large painted-on wall sign on the side or front corner of the building in order to be consistent with the historic district, within the standards contained in Section D., below. Areas outside the historic district are not restricted to this type of sign. Wall mounted signs should not project more than 6' from the wall.

2. Cabinet type signs with plastic faces are not allowed.

C. Prohibited Signs

In addition to those signs prohibited by Section 30-6.5 of the City of Alameda's Sign Ordinance, the following signs are not permitted at Alameda Point:

1. Any signs attached to trees, rocks, utility poles, street signs, except for public utility, traffic, or safety identification or information;

2. Any signs that constitute a traffic safety hazard, and

3. Freestanding signs, including monument style signs, except lawn signs as defined in section D.4, and only within the Historic District.

4. Signs that are affixed to or painted on a fence, except for unenclosed uses that are not associated with a building or where a building is located more than 100 feet from a street.

D. Building Signs

Building tenants may be only identified with wall signs, window signs, awning signs, or a combination of these three types. The exception to this standard is for historic residential units, for the Officers's Club, the Chapel, and for certain other historic structures fronting on the mall (Buildings 1,16, 18, 60, and 94). These buildings shall be identified only with small, freestanding lawn signs. Descriptions of these types of signs, specific standards for each, and the amounts of allowable sign area are as follows:

1. Wall Signs

A wall sign is permanently affixed parallel to a wall or printed on the wall of a building. Painted, engraved, or sandblasted signs and signs with individual letters are preferred. Exposed neon signage and internally illuminated pan channel letters are allowed except along the frontages of the historic buildings listed above.

2. Window Signs

Any sign, picture, symbol, or combination thereof placed in a window is considered to be a window sign, as defined in the City of Alameda Sign Ordinance. Individual letters are preferred. Exposed neon signage is allowed except along the frontages of the historic structures listed above. Temporary paper signs are not allowed. Window signs shall not cover more than 25 percent of the total window area of the first floor of a building. Window signs are not allowed above the first floor.

3. Awning Signs

An awning sign is a sign that is printed or painted on or attached to an awning, canopy, or other structural protective cover over a door, entrance, window, or outdoor service area. Backlit and illuminated awnings may be allowed. Awning signs are not allowed on single- or duplex-unit residential buildings.

4. Lawn Signs

A lawn sign is a freestanding sign board supported by posts at either end, without a base. Such a sign shall not exceed four feet in height. It shall be located in the lawn or landscaping in front of a building, unless and exception is granted by the Planning Director because of unique circumstances at the building site. The City will determine where a lawn sign may be located on the site based on visibility from the street and the relationship with the building. The size, spacing provisions and landscaping shall conform with Section 30-6.4.f Freestanding Signs, of City's Sign Regulations, and shall not exceed 30 square feet. No more that one free-standing sign will be allowed per lease hold. Lawn signs shall be allowed only in the historic district on existing landscaped areas.

5. Sign Area and Number of Signs

The amount of total allowed sign area will be based on two criteria: the original use of the building and the length of the principal building frontage adjacent to a street, as determined by the Planning Director. These criteria will be applied as follows:

a. Residential Buildings

For existing single-family residential buildings, which have been converted to a non-residential use, in the area between Pan Am Way and Main Street, the total allowed sign area shall not exceed one-half square foot per linear foot of principal building frontage not to exceed 15 square feet. Only one sign, either a wall sign or a lawn sign, may be permitted per building.

The former barracks buildings, numbers 2, 4, and 17, are exempt from the residential standard and should be considered under whichever of the following categories meets their proposed use. If the use continues to be residential, then theses structures shall be limited to the standard for cultural buildings, below.

b. Cultural, Educational and Recreational Buildings

The total allowed sign area shall not exceed one-half square foot per linear foot of principal building frontage not to exceed 50 square feet per building, whichever is less. Only one sign may be permitted per building frontage.

c. Office, Commercial and Industrial Buildings

The total allowed sign area shall not exceed one square foot per linear foot of principal building frontage with the total sign area not to exceed the following standards, whichever is less:

1) For buildings under 25,000 square feet in total floor area: two signs, the total of which may not exceed 100 square feet;

2) For buildings between 25,000 and 100,000 square feet in total floor area: two signs, the total of which may not exceed 200 square feet; and

3) For buildings over 100,000 square feet in total floor area: 250 square feet on each of the following: Street frontage, and the two side faces of the building visible from the street, with the total not exceed 750 square feet.

E. Directional Signs

The City Engineer, in consultation with the City Planning Director, shall decide where and how many directional signs can be located to direct traffic to a building, set of buildings or area. This signage shall be limited to traffic terms such as "Enter" or "Exit" and shall not include any business names. The exception to this standard is the special circumstance of providing direction to a particular building or business whose location is not readily apparent from the street. A directional sign shall not exceed 4 square feet in total area. This sign area is in addition to the allowed sign area described in Section III.D, "Sign Area", when used in conjunction with a particular business.

F. Address signs

Address signs as provided on each building by the Navy or City of Alameda shall not be counted against allowable sign area. Other address signs will be counted if the tenant's name appears as part of the sign.

G. Building Markers

Building markers, which include memorial signs or tablets, names of buildings, historic significance, and date of construction, are allowed when constructed of bronze, stone, or other similar material. The maximum size is 4 square feet. This sign area is in addition to the total allowed sign area described in Section III.D, "Sign Area."

G. Banners and Art Signs

Non-commercial banners, flags, and art signs may be used temporarily for no more than 30 days to decorate the streetscape and to advertise public events and other similar special events subject to the approval of the City.

H. Temporary Signs

1. Business Identification Signs

Temporary business identification signs are allowed pending completion of the permitted permanent business identification signs. The sign may be plastic, fabric, or similar material, but not paper. It shall not exceed the sign area standards described in Section III.D, "Sign Area." The maximum time period a temporary sign may remain up is 30 calendar days.

2. Real Estate Signs

Temporary real estate signs are allowed per the City Sign ordinance.

3. Construction Signs

Building, site, and/or infrastructure construction signs are allowed up to ten days before actual work begins. Sign area shall not exceed 32 square feet per sign per building, site or project. Signs shall be removed within 10 working days after the completion of construction.

IV. Procedures

Sign permits from the City are required for the removal or alteration of existing signs and the installation of new signs except those listed as exempt in the City of Alameda Sign Ordinance.

V. Applicability

These standards and procedures shall be applicable for the term of the Interim Leasing period.

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CITY OF ALAMEDA RESOLUTION NO. 13139

ADDING THE NAVAL AIR STATION ALAMEDA HISTORIC DISTRICT TO THE CITY HISTORICAL AND CULTURAL MONUMENT LIST

WHEREAS, Section 106 of the 1966 National Historic Preservation Act requires that Federal Agencies recognize their historic properties that may be eligible for the National Register; and

WHEREAS, the Alameda Reuse and Redevelopment Authority, Alameda Point, initiated a request that the Naval Air Station Alameda Historic District (which is a National Register Eligible District) at Alameda Point (former Naval Air Station, Alameda) be designated as a City Monument; and

WHEREAS, the site is designated as Federal Facilities on the General Plan diagram; and

WHEREAS, the site is classified as M-2-G General Industrial (Manufacturing) Special Government Combining District; and

Approved as to Form
CITY ATTORNEY

WHEREAS, this is not a project as defined by CEQA, Guidelines, Sections 15357; and

WHEREAS, based upon the evaluation contained in the *Historic Architectural Resources Inventory for Alameda NAS,* the Naval Air Station Alameda Historic District would be eligible to be designated a City Monument under two criteria: a group of structures which are associated with broad cultural, political and social history of the United States and a site which embodies the distinguishing characteristics of an architectural type which is inherently valuable for study; and

WHEREAS, the Naval Air Station Alameda Historic District would be eligible as an example of the development of U.S. Naval Bases in the San Francisco Bay Area for World War II, with 1938-1945 as the period of significance, and because the buildings have a continuity of style and a high degree of architectural integrity enhanced by the retention of landscaping and park-like open spaces; and

WHEREAS, at the February 5, 1998 meeting of the Historical Advisory Board, the Board recommended that the Naval Air Station Alameda Historic District at Alameda Point be designated a Alameda Historical Monument.

NOW, THEREFORE, BE IT RESOLVED by the Council of the City of Alameda that the Naval Air Station Alameda Historic District be recognized and be added to the City Historical and Cultural Monument List.

* * * * * *

I, the undersigned, hereby certify that the foregoing Resolution was duly and regularly adopted and passed by the Council of the City of Alameda in regular meeting assembled on the 7th day of September, 1999, by the following vote to wit:

AYES:	Councilmembers Daysog, DeWitt, Johnson, Kerr and Mayor Appezzato - 5.
NOES:	None.
ABSENT:	None.
ABSTENTIONS:	None.

IN WITNESS, WHEREOF, I have hereunto set my hand and affixed the official seal of said City this 8th day of September, 1999.

Diane Felsch, City Clerk
City of Alameda

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APPENDIX L

COST DEVELOPMENT SUMMARIES

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ACRONYMS/ABBREVIATIONS

AOC	area of concern
B(a)P	benzo(a)pyrene
bcy	bank (in place) cubic yards
bgs	below ground surface
CAM	California Assessment Manual
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DO	dissolved oxygen
DTSC	(California Environmental Protection Agency) Department of Toxic Substances Control
EBS	environmental baseline survey
FFA	Federal Facilities Agreement
FS	feasibility study
FWBZ	first water-bearing zone
IC	institutional control
IR	Installation Restoration (Program)
ISB	*in situ* bioremediation
ISCO	*in situ* chemical oxidation
LBP	lead-based paint
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
MNA	monitored natural attenuation
MOA	memorandum of agreement
O&M	operation and maintenance
ORC	oxygen release compound
ORP	oxidation-reduction potential
OWS	oil/water separator
PAH	polynuclear aromatic hydrocarbon
ppm	parts per million
preliminary RG	(site-specific) preliminary remediation goal
RACER	Remedial Action Cost Engineering and Requirements (System)
RCRA	Resource Conservation and Recovery Act

RI	remedial investigation
ROD	record of decision
SIM	selected ion monitoring
STLC	soluble threshold limit concentration
TPH	total petroleum hydrocarbons
U.S. EPA	United States Environmental Protection Agency
VOC	volatile organic compound
XRF	X-ray fluorescence

Appendix L
COST DEVELOPMENT SUMMARIES

This appendix documents the development of order-of-magnitude cost estimates for Installation Restoration (IR) Program Site 35 remedial alternatives evaluated in the main Remedial Investigation (RI)/Feasibility Study (FS) Report. The no action alternatives have no associated costs and are therefore not discussed in this appendix. These cost estimates are solely for comparing alternatives in the main RI/FS Report and should not be used for budgeting or planning purposes.

L1 METHODOLOGY

Cost estimates for the main RI/FS Report were prepared following United States Environmental Protection Agency (U.S. EPA) technical guidance (U.S. EPA 1988, 2000) and the National Oil and Hazardous Substances Pollution Contingency Plan. The Remedial Action Cost Engineering and Requirements System (RACER) was the primary source of cost data (Earth Tech 2005). Costs for site-specific or unique line items were based on vendor quotes. Microsoft Excel spreadsheets were used to tabulate costs on an annual basis and calculate present values in 2006 dollars.

L1.1 Description of RACER

RACER cost models are based on generic engineering solutions for environmental projects, technologies, and processes. The generic engineering solutions were derived from historical project information, government laboratories, construction management agencies, vendors, contractors, and engineering analyses. The software used for estimating cost, RACER 2006, incorporates the most up-to-date engineering practices and procedures to accurately reflect current removal/remediation processes and pricing. When an estimate is developed in RACER, generic engineering solutions are customized by adding site-specific parameters to reflect project-specific conditions and requirements. The tailored plan is then translated into specific work items, priced using the current cost data. RACER incorporates and summarizes cost by the code of accounts that was developed by the interagency Cost Estimating Group for Hazardous, Toxic, and Radiological Waste Remediation.

Included in the capital costs developed by RACER are estimates for professional labor support of the remedial action. The cost of this support is calculated on the basis of the technology employed and includes construction oversight and preparation of work plans (e.g., plans for safety and health, sampling, and quality control). Indirect cost estimates for the remedial action include items such as sales tax on purchased items, contractors' overhead, contractors' profits, bonds, and insurance costs. Engineering, another indirect cost item, varies for each alternative depending on the complexity of the remedial action.

The accuracy of the cost estimates presented in the main RI/FS Report ranges from minus 30 percent to plus 50 percent, consistent with U.S. EPA RI/FS technical guidance (U.S. EPA 1988). Costs prepared at this stage of a remediation project can increase during final design and/or implementation. Such escalation is usually a result of scope changes that cannot be explicitly defined because complete, accurate, and detailed

information is lacking when the RI/FS Report is prepared. Contingency allowances have therefore been added to the total capital costs and operation and maintenance (O&M) costs at a rate of 20 percent to cover increases that might occur as a result of scope-related uncertainties.

L1.2 User-Defined Costs

It was not possible to develop RACER cost estimates for some elements of the alternatives because of certain site-specific or unique characteristics. The costs for these elements were estimated with quotes and other cost data from vendors, contractors, and previous cost estimates. These costs were evaluated and adjusted as necessary to account for inflation.

L1.3 Cost Estimate Components

Cost estimates for IR Site 35 remedial alternatives include capital costs, O&M costs, and contingency allowances. Descriptions of these cost categories are provided below.

L1.3.1 CAPITAL COSTS

Capital costs consist of direct and indirect costs. Direct costs include expenditures incurred for equipment, labor, and materials to develop, construct, and implement a remedial action. Indirect costs include all other expenses necessary to support the construction that cannot be directly associated with a specific equipment item or remedial activity. Indirect costs include the following:

- health and safety items
- permitting and legal fees
- site supervision
- engineering
- contractor overhead and profit
- start-up costs

These indirect expenditures are included in the detailed cost analysis either as separate line items or as a percentage of the direct capital cost.

L1.3.2 OPERATION AND MAINTENANCE COSTS

O&M costs refer to those postconstruction items necessary to assure the continued effectiveness of a remedial action. Typical O&M expenses include power, operating labor, consumable materials, purchased services (such as laboratory services), equipment replacement, maintenance, sampling of monitoring wells, permit fees, annual reports, and periodic site reviews.

L1.3.3 CONTINGENCY ALLOWANCES

Contingency allowances are assumed to be 20 percent of the cost of each alternative. As noted in Section L1.1, contingency allowances have been added to the cost estimates to account for uncertainties in project scope. After a remedial alternative has been selected and is proceeding toward implementation, the size of the contingency allowance would be expected to decrease as cost estimates are prepared during subsequent phases of design.

L1.4 Present Value

Present value is calculated using present worth analysis, a method of evaluating alternative remedial action solutions when expenditures occur over time. The costs for the various remedial action alternatives can be compared on the basis of a single figure for each alternative by discounting all future costs to a common year. This single figure—the present value—represents the amount of money which, if invested in the initial year of a remedial action and disbursed as needed, would be sufficient to cover all costs associated with that alternative.

The present worth of expenditures occurring over the life of a remedial action is determined using the following formula:

$$PW = \sum_{t=1}^{n} \frac{x_t}{(1+i)^t}$$

where

PW = present worth
x_t = escalated expenditures for the remedial action in year t (escalation rate assumed to be 0 percent per year for costing purposes)
i = annual interest or discount rate (using real discount rates [adjusted for inflation] from Office of Management and Budget Circular A-94 January 2006 [OMB 2006])
t = number of years in which each expenditure occurs following start of construction
n = number of years following start of construction

The present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances). Because the alternatives may be completed at different times, the present value was calculated for each alternative on the basis of the real discount rate. For this report, discount rates ranging from 2.5 to 3.0 percent (OMB 2006) were used.

L1.5 General Assumptions

Assumptions that influence the cost of implementing remedial alternatives at IR Site 35 were based on general engineering practices and the requirements of RACER, when

appropriate. The following general assumptions were used to develop cost estimates for each alternative in the main RI/FS Report.

- Total costs were calculated using a cost base of 2006 dollars.
- O&M costs would be incurred beginning in 2007 and continue thereafter as required by each alternative.
- IR Site 35 is accessible for the activities described for each alternative. Specialized equipment or services, with the exception of those described in the main RI/FS Report, would not be required.
- All operations would be conducted using U.S. EPA Level D protective clothing.
- Work plan and safety and health plan preparation, technical oversight during planning, and implementation of work are included in the cost for professional labor.
- Contingency allowances are 20 percent of capital costs, O&M costs, and periodic costs.

L2 COST ESTIMATES

Cost estimates were developed for two soil alternatives for Area of Concern (AOC) 3, two soil alternatives for AOCs 10 and 12, five soil alternatives for the Polynuclear Aromatic Hydrocarbon (PAH) Areas, three groundwater alternatives for AOC 1, and two groundwater alternatives for AOC 23 (Table L-1). This section discusses the site-specific assumptions and parameters used to estimate costs for these alternatives. Tables L-2 through L-21 present the major assumptions that influence costs for the alternatives and summarize the yearly costs and the present value for each alternative. The no further action alternatives have no associated costs and are not discussed in this section.

L2.1 Alternative AOC 3-2: Soil Cover and ICs

This subsection provides a description of Alternative AOC 3-2 for impacted soil at AOC 3. This alternative involves the installation of a soil cover to act as a surface barrier between the impacted soil and the environment. Institutional controls (ICs) are included to maintain the protectiveness of the soil cover.

L2.1.1 REFINEMENT OF EXTENT OF HEPTACHLOR IN SOIL

Before installation of the soil cover, a predesign sampling program would be implemented based on the RI soil sampling results to refine the extent of heptachlor in soil exceeding the site-specific preliminary remediation goal (preliminary RG) from this area (i.e., the western boundary). It is assumed that up to 10 soil borings would be manually advanced to collect soil samples at intervals of 0 to 1 and 1 to 2 feet below ground surface (bgs) for pesticide analysis using U.S. EPA Method 8081A. Based on the results of these soil analyses, the assumed dimensions and depth of the soil cover area may be refined.

L2.1.2 SOIL COVER

For costing purposes, the area of heptachlor in soil at concentrations above the preliminary RG is assumed to be 3,500 square feet with a depth of 2 feet bgs (Figure 11-1 of the main RI/FS Report). The assumed dimensions and depth of the area are based on the RI soil sampling results and may be revised depending on the analytical results reported for soil samples collected during the predesign investigation.

Heptachlor was not a chemical of concern for groundwater at AOC 3 and generally has a low mobility. The objective of the soil cover would be to provide a physical barrier to prevent exposure to underlying impacted soil rather than provide a low-permeability cap to protect groundwater. The soil cover is assumed to be constructed of clean, imported soil from a local source.

Prior to installation of the soil cover, the existing grass sod on top of the proposed cover area would be removed and disposed of off-site. A topographic survey of the existing soil surface would then be performed. A 2-foot-thick soil cover would be constructed over the existing soil and compacted to at least 90 percent. Upon completion of the cover, a topographic survey of the final grade would be performed to verify that the minimum thickness is in place. The covered area would then be revegetated with grass sod to prevent erosion of the protective soil layer.

L2.1.3 INSTITUTIONAL CONTROLS

ICs would be implemented as part of this alternative to prohibit actions that might damage or otherwise reduce the effectiveness of the soil cover. Penetration of the soil cover would not be allowed without concurrence from the regulatory agencies and the Navy. In instances where excavation near the soil cover is necessary, the ICs would require development and implementation of guidelines to assure that the exposed impacted soil is managed appropriately, protective measures to prevent exposure to workers and the public are taken, and the soil cover is restored.

The Navy would employ a dual approach to include land-use restrictions in Navy deeds of conveyance and in the Covenant to Restrict Use of Property agreements with California Environmental Protection Agency Department of Toxic Substances Control (DTSC), entered into pursuant to the March 2000 Navy/DTSC Memorandum of Agreement (MOA) (Appendix N to the main RI/FS Report). More specifically, land-use restrictions would be incorporated into and implemented through two separate legal instruments, as provided in the Navy/DTSC MOA:

- restrictive covenants included in one or more quitclaim deeds from the Navy to the property recipient
- restrictive covenants included in one or more Covenant to Restrict Use of Property agreements entered into by the Navy and DTSC as provided in the Navy/DTSC MOA and consistent with the substantive provisions of Title 22 *California Code of Regulations* Section 67391.1

A Covenant to Restrict Use of Property would incorporate the land-use restrictions into environmental restrictive covenants that run with the land and that are enforceable by

DTSC against future transferees. The quitclaim deed(s) would include identical land-use restrictions in environmental restrictive covenants that run with the land and that would be enforceable by the Navy against future transferees.

The Navy would also address IC implementation and maintenance actions, including periodic inspections, in the preliminary and final remedial design reports developed and submitted to the Federal Facilities Agreement (FFA) signatories for review pursuant to the FFA. These actions are described in Navy Principles and Procedures for Specifying, Monitoring and Enforcement of Land-Use Controls and Other Post-Record of Decision (ROD) Actions (Appendix O to the main RI/FS Report) attached to a January 16, 2004, Department of Defense Memorandum entitled Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) ROD and Post-ROD Policy. The preliminary and final remedial design reports are primary documents as provided in Section 7.3 of the FFA.

The Navy would also use its policy entitled Principles and Procedures for Specifying, Monitoring and Enforcement of Land-Use Controls and Other Post-ROD Actions (Appendix O to the main RI/FS Report) for specifying, implementing, and monitoring ICs for this alternative.

L2.1.4 REVIEWS AND REPORTING

During the remedial design phase, an annual maintenance program would be established to assess the condition of the cover and the need for repairs due to erosion or other forces. Annual maintenance reports documenting results of the postconstruction inspection program and any follow-on maintenance activities would be prepared over the life of the project, which for costing purposes is defined as 30 years. Comprehensive reviews of the selected remedy would be performed every 5 years under CERCLA.

L2.2 Alternative AOC 3-3: Excavation and Off-Site Disposal

This subsection provides a description of Alternative AOC 3-3. This alternative involves the excavation and off-site disposal of soil impacted with concentrations of heptachlor above the preliminary RG at AOC 3.

L2.2.1 REFINEMENT OF EXTENT OF HEPTACHLOR IN SOIL

The extent of heptachlor in soil would be assessed as part of this alternative. The predesign investigation for Alternative AOC 3-3 would be identical to the investigation described for Alternative AOC 3-2 (Section L2.1.1).

L2.2.2 EXCAVATION AND OFF-SITE DISPOSAL

For costing purposes, the excavation area is assumed to be 3,500 square feet with a depth of 2 feet bgs (Figure 11-1 of the main RI/FS Report). The total volume of excavated soil is estimated to be 260 bank (in place) cubic yards (bcy). The dimensions, depth, and volume of the proposed excavation area may be revised depending on analytical results reported for the soil samples collected during the predesign investigation.

Prior to excavation activities, the existing grass sod on top of the proposed excavation area would be removed and disposed of off-site. Excavated soil would be segregated, stockpiled into 13 approximately 20-cubic-yard batches, and characterized before off-site disposal. There is a potential for a portion of the excavated soil to be classified as Resource Conservation and Recovery Act (RCRA) hazardous waste. Furthermore, RCRA land-disposal restrictions would need to be met prior to land disposal of the soil. Any hazardous waste would be appropriately manifested, transported, and disposed of by licensed and permitted transporters and disposal facilities.

For costing purposes, it is assumed that seven of the 20-cubic-yard stockpiles of excavated soil (140 bcy) would be managed as Class II nonhazardous waste. It is also assumed that the other six stockpiles of excavated soil (120 bcy) would be classified as RCRA hazardous waste, half of which (three stockpiles) would require incineration to meet RCRA land-disposal restrictions.

After excavation is complete, confirmation samples would be collected as described in Section L2.2.3 below. Following completion of confirmation sampling, the excavation would be backfilled with clean, imported soil and compacted to at least 90 percent. The backfilled area would then be revegetated with grass sod to prevent erosion.

L2.2.3 CONFIRMATION SAMPLING

After excavation is complete, approximately ten confirmation samples would be collected from the excavation area and analyzed to confirm that the preliminary RG for heptachlor has been met. It is assumed for costing purposes that one confirmation sample per approximately 450 to 500 square feet and an additional 20 percent quality assurance samples (total of approximately 10 samples) would be collected. The final confirmation sampling program would be developed during the remedial design.

L2.2.4 CLOSEOUT REPORT

Following completion of excavation, confirmation sampling, and backfilling activities, the remedial action would be completed and no further sampling, IC implementation, or other actions would be performed. A remedial action closeout report would be prepared upon the completion of remedial activities.

L2.3 Alternative AOC 10/12-2: Limited Excavation, Cover, and ICs

This subsection provides a description of remedial Alternative AOC 10/12-2 for soil containing lead (from lead-based paint [LBP]) at AOCs 10 and 12. This alternative involves the limited excavation of impacted soil beneath areas that are currently unpaved, and ICs prohibiting removal of existing pavement over soil with lead concentrations above the preliminary RG. Impacted soil beneath paved areas at AOCs 10 and 12 would not be excavated because the existing asphalt and concrete pavement act as a surface barrier to the underlying soil. Lead-contaminated sediment at concentrations above the preliminary RG in one storm drain would also be removed. ICs are included to maintain the protectiveness of the existing asphalt or concrete pavement.

L2.3.1 REFINEMENT OF EXTENT OF LEAD IN SOIL

Before excavation activities, a predesign sampling program would be implemented based on the RI soil sampling results to further delineate the extent of the lead-impacted soil in unpaved areas of AOC 10. It is assumed that up to 20 soil borings would be manually advanced to collect soil samples at depth intervals of 0 to 1 foot bgs. Soil samples would be analyzed for lead using a field portable X-ray fluorescence (XRF) instrument. In addition, 20 percent of the total number of samples would be submitted to an off-site analytical laboratory for confirmation lead analysis using U.S. EPA Method 6010B. Based on results of these soil analyses, the assumed dimensions and depths of the impacted areas would be refined.

Based on results of the RI, all remaining soil in AOC 12 with lead concentrations above the preliminary RG is located beneath paved surfaces. Therefore, no soil excavations would be performed in AOC 12 for this alternative (excavation would occur only in AOC 10).

L2.3.2 LIMITED EXCAVATION IN UNPAVED AREAS

Based on the RI soil sampling results, there are two areas in AOC 10 with soil containing lead at concentrations above the preliminary RG (Figure 11-2 of the main RI/FS Report). For costing purposes, one area is assumed to be 325 square feet and is covered with grass. The second area is assumed to be 1,900 square feet, with 40 percent (760 square feet) covered with grass and 60 percent (1,140 square feet) located beneath an asphalt road and concrete sidewalk. The total size of the unpaved areas in AOC 10 is estimated to be 1,085 square feet. Because of the source of lead (LBP), the depth of excavation is assumed to be 1 foot bgs. The total volume of excavated soil for this alternative is estimated to be 40 bcy. The dimensions, depths, and volumes of the proposed excavation areas may be revised based on analytical results reported for the soil samples collected during the predesign investigation and results from confirmation sampling.

Prior to excavation activities, the existing grass sod on top of the proposed excavation areas would be removed and disposed of off-site. Storm-drain sediment containing lead would be removed concurrently as described in Section L2.3.5. Excavated soil and storm-drain sediment would be segregated, stockpiled into five 8-cubic-yard batches, and characterized before off-site disposal. There is a potential for a portion of the excavated soil and sediment to be classified as RCRA or California hazardous waste. Furthermore, RCRA land-disposal restrictions would need to be met prior to land disposal of the hazardous waste. Any hazardous waste would be appropriately profiled, manifested, transported, and disposed of by licensed and permitted transporters and disposal facilities.

For costing purposes, it is assumed that three stockpiles of excavated soil (24 bcy) would be managed as Class II nonhazardous waste; one stockpile (8 bcy) would be classified as RCRA hazardous waste and would require stabilization to meet RCRA land-disposal restrictions; and one stockpile would be classified as California hazardous waste. After excavation is complete, confirmation samples would be collected from within the excavation (Section L2.3.3).

L2.3.3 CONFIRMATION SAMPLING

After excavation is complete, approximately three confirmation samples would be collected from the excavation areas at AOC 10 and analyzed using a portable XRF instrument to confirm that the preliminary RG for lead has been met. It is assumed that one confirmation sample per approximately 500 square feet and an additional 20 percent quality assurance samples (total of approximately three samples) would be collected. In addition, 20 percent of the total number of samples (one sample) would be submitted to an off-site analytical laboratory for confirmation lead analysis using U.S. EPA Method 6010B. Following completion of confirmation sampling, the excavation areas would be backfilled with clean, imported soil and compacted to at least 90 percent. The backfilled area would then be revegetated with grass sod. The final confirmation sampling program would be developed during the remedial design.

L2.3.4 INSPECTIONS

An annual inspection program would be established to assess the condition of the existing asphalt or concrete pavement and any need for repairs due to erosion or other forces. For cost estimating purposes, the assumed duration of this alternative is 30 years. The inspection program would be continued over the life of the project.

L2.3.5 STORM-DRAIN SEDIMENT REMOVAL

Alternative AOC 10/12-2 would also include the removal and off-site disposal of lead-impacted sediment found during the RI in one storm drain near AOC 12 with lead concentrations above the preliminary RG. The total volume of sediment is estimated to be 10 bcy. Impacted sediment could be removed from the storm drains using hand tools, a vactor truck, or similar equipment.

For costing purposes, it is assumed that 50 percent (5 bcy) of the sediment volume would be managed as Class II nonhazardous waste; 20 percent of the sediment volume (2 bcy) would be classified as RCRA hazardous waste and require stabilization to meet RCRA land-disposal restrictions; and the remaining 30 percent (3 bcy) would be classified as California hazardous waste.

L2.3.6 INSTITUTIONAL CONTROLS

ICs would be implemented as part of this alternative to prohibit actions that might damage or otherwise reduce the effectiveness of the existing asphalt or concrete pavement. Penetration of the covers or pavement would not be allowed without concurrence from the regulatory agencies and the Navy. In instances where excavation near the covers or pavement is necessary, the ICs would require development and implementation of guidelines to assure that any exposed impacted soil is managed appropriately, that protective measures to prevent public exposure are taken, and that the covers and pavement are restored. The mechanisms for IC implementation would be similar to those described for Alternative AOC 3-2 in Section L2.1.3.

L2.3.7 REVIEWS AND REPORTING

During the remedial design phase, an annual inspection program would be established to assess the condition of the asphalt and concrete pavements over lead-impacted soil and the need for repairs due to erosion or other forces. Annual reports documenting results of the postconstruction inspection program and any follow-on maintenance activities would be prepared over the life of the project, which for costing purposes is defined as 30 years. Comprehensive reviews of the selected remedy would be performed every 5 years under CERCLA.

L2.4 Alternative AOC 10/12-3: Excavation and Off-Site Disposal

This subsection provides a description and detailed analysis of remedial Alternative AOC 10/12-3. This alternative involves the excavation and off-site disposal of all soil with lead concentrations above the preliminary RG at AOCs 10 and 12.

L2.4.1 REFINEMENT OF EXTENT OF LEAD IN SOIL

A predesign sampling program, based on the RI soil sampling results, would be implemented prior to excavation activities to further delineate the extent of excavation needed to remove all impacted soil exceeding the preliminary RG at AOCs 10 and 12. For AOC 10, it is assumed that up to 20 soil borings would be manually advanced to collect soil samples at depth intervals of approximately 0 to 1 foot bgs for the unpaved areas or within 1 foot below the pavement's subbase layer for the paved areas. For AOC 12, it is assumed that up to 40 soil borings would be manually advanced to collect soil samples at depths from 0.5 foot to 2 feet below the pavement's subbase layer.

Soil samples would be analyzed for lead using a field portable XRF instrument. In addition, 20 percent of the total number of samples from each AOC would be submitted to an off-site analytical laboratory for confirmation lead analysis using U.S. EPA Method 6010B. Based on results of these soil analyses, the assumed dimensions and depth of the excavation areas would be refined.

L2.4.2 EXCAVATION AND OFF-SITE DISPOSAL

As described in Section L2.3.2, there are two areas with lead in soil at concentrations above the preliminary RG at AOC 10 (Figure 11-2 of the main RI/FS Report). One area is assumed to be 325 square feet and is covered with grass. The second area is assumed to be 1,900 square feet, of which 40 percent is covered with grass and 60 percent is located beneath an asphalt road and concrete sidewalk. Because of the source of lead (LBP), the assumed depth of excavation for costing purposes is 1 foot bgs for the unpaved areas and 1 foot below the pavement's subbase layer for the paved areas. The total volume of excavated soil is estimated to be 85 bcy.

Based on the RI soil sampling results, there are six areas with lead in soil at concentrations above the preliminary RG at AOC 12 (Figure 11-3 of the main RI/FS Report). These areas range in size from approximately 405 to 1,700 square feet, with a total combined area of 5,525 square feet. All the areas are covered with asphalt or

concrete pavement. The depth of excavation for the areas would vary from 0.5 foot to 2 feet below the pavement's subbase layer. The total volume of excavated soil is estimated to be 252 bcy.

Prior to excavation activities, existing grass sod on top of the unpaved areas would be removed and disposed of off-site. Paved surfaces would be demolished and removed for off-site disposal to allow for excavation of underlying soil. For costing purposes, the costs of removing and disposing of any existing paved surfaces are assumed to be paid by the property developer. Replacement of paved surfaces is not included. For each AOC, excavated soil and sediment would be segregated, stockpiled, and characterized before off-site disposal. There is a potential for a portion of the excavated soil and sediment to be classified as RCRA or California hazardous waste. Furthermore, RCRA land-disposal restrictions would need to be met prior to land disposal of the hazardous waste. Any hazardous waste would be appropriately manifested, transported, and disposed of by licensed and permitted transporters and disposal facilities.

The 85 bcy of excavated soil at AOC 10 would be stockpiled into ten 8.5-bulk-cubic-yard batches. It is assumed that five stockpiles (42.5 bcy) would be managed as Class II nonhazardous waste; two stockpiles (17 bcy) would be classified as RCRA hazardous waste and require stabilization to meet RCRA land-disposal restrictions; and three stockpiles (25.5 bcy) would be classified as California hazardous waste.

The 252 bcy of excavated soil at AOC 12 would be stockpiled into approximately ten 25-bulk-cubic-yard batches. It is assumed that five stockpiles (127 bcy) would be managed as Class II nonhazardous waste; two stockpiles (50 bcy) would be classified as RCRA hazardous waste and require stabilization to meet RCRA land-disposal restrictions; and three stockpiles (75 bcy) would be classified as California hazardous waste.

After excavation is complete, confirmation samples would be collected as described in Section L2.4.3. Following completion of confirmation sampling, the excavation would be backfilled with clean, imported soil and compacted to at least 90 percent. The backfilled areas would then be revegetated with grass sod or paved with asphalt or concrete (approximately 3 inches in thickness on top of a 9-inch-thick subbase layer) to restore previous surface cover, and would be sloped to promote drainage.

L2.4.3 CONFIRMATION SAMPLING

After excavation is complete, approximately 6 confirmation samples would be collected from excavation areas at AOC 10, and 14 confirmation samples would be collected from AOC 12. Confirmation samples would be analyzed using a portable XRF instrument to confirm that the preliminary RG for lead has been met. It is assumed that one confirmation sample would be collected per approximately 500 square feet of excavation area and an additional 20 percent quality assurance samples would be collected. In addition, 20 percent of the total number of samples from each AOC would be submitted to an off-site analytical laboratory for confirmation lead analysis using U.S. EPA Method 6010B. The final confirmation sampling program would be developed during the remedial design.

L2.4.4 STORM-DRAIN SEDIMENT REMOVAL

Removal of impacted storm-drain sediment for Alternative AOC 10/12-3 is the same as the removal process presented for Alternative AOC 10/12-2 (Section L2.3.5).

L2.4.5 CLOSEOUT REPORT

Because this alternative would achieve the preliminary RG upon completion of excavation activities, no 5-year reports would be included. A remedial action closeout report would be prepared upon the completion of remedial activities.

L2.5 Alternative PAH-2: ICs

This subsection provides a description and detailed analysis of remedial Alternative PAH-2 for soils containing PAHs at concentrations above the preliminary RG at IR Site 35. This alternative involves ICs in the area shown as crosshatched on Figure 11-4 of the main RI/FS report. The ICs would require implementation of a sampling plan for soil beneath buildings and hardscape in the event that buildings and/or hardscape is removed during redevelopment.

L2.5.1 INSTITUTIONAL CONTROLS

IC implementation mechanisms for this alternative would be the same as those described for Alternative AOC 3-2 in Section L2.1.3. Documents describing these IC mechanisms are included in Appendices N and O.

Existing ICs were established across Alameda Point as part of the City of Alameda's Marsh Crust Ordinance and currently restrict excavations beyond specified depths. This alternative does not impact these existing ICs, which would remain in place. The ICs would include the following elements: 1) a requirement that the transferee prepare a sampling plan for soil beneath buildings and hardscape prior to demolition of buildings, removal of hardscape (parking lots, sidewalks, roadways), and other major site work that affects soil under hardscape; the soil sampling plan would require approval from regulatory agencies and the Navy in advance of site work; and 2) a requirement that the Navy and regulatory agencies have access to the site for the purpose of implementing the remedy and conducting inspections.

Previous PAH-related removal actions at IR Site 35 have focused on soil in unpaved areas. For costing purposes, ICs for this alternative are assumed to apply to the identified area until results of future soil sampling under existing buildings and hardscape indicate that PAH-related health risks are similar to or less than those associated with soil in unpaved areas.

L2.5.2 REVIEWS AND REPORTING

Periodic inspections would be conducted over the project life. Comprehensive reviews of the selected remedy would be performed every 5 years under CERCLA. A 30-year duration has been assumed for costing purposes.

L2.6 Alternative PAH-3a: Excavation in Unpaved Areas to 2 Feet bgs and ICs

This subsection provides a description of remedial Alternative PAH-3a. This alternative addresses soil with benzo(a)pyrene [B(a)P] equivalent concentrations above the preliminary RG in unpaved areas. Under this alternative, soil with B(a)P equivalent concentrations above the preliminary RG in unpaved areas would be excavated to 2 feet bgs and disposed of off-site. ICs would be designed and implemented in the area shown on Figure 11-4 of the main RI/FS report. The ICs would require implementation of a sampling plan for soil beneath buildings and hardscape in the event that redevelopment involves removal of buildings and/or hardscape.

L2.6.1 EXCAVATION AND OFF-SITE DISPOSAL

Based on the RI soil sampling results, B(a)P equivalent concentrations above the preliminary RG in the 0- to 2-foot-bgs depth interval exist at six locations (two in unpaved areas and four in paved areas), as shown on Figure 11-4 of the main RI/FS Report. The two unpaved locations would be excavated and backfilled with clean, imported fill material from a local source. For costing purposes, each PAH-impacted area is assumed to be 50 feet by 50 feet in area, centered on each RI sampling location. An estimated 300 bcy of soil would be excavated under this alternative. Since cancer risk associated with PAHs is within the risk management range and noncancer HIs are below 1, the objective of excavation would be to remove additional mass of PAH-impacted soil.

Prior to excavation activities, the existing grass sod over the areas to be excavated would be removed and disposed of off-site. Excavated soil would be stockpiled and characterized before off-site disposal. For costing purposes, it is assumed that the excavated soil with B(a)P equivalent concentrations above the preliminary RG would be classified as Class II nonhazardous waste and transported for disposal to a corresponding landfill (e.g., Altamont, Livermore). Approximately two samples would be collected from the excavated soil to determine the waste profile and the management classification. It is also assumed that one waste-profiling sample plus one quality assurance sample would be collected. The collected waste-profiling samples would be submitted to an off-site analytical laboratory for analyses of PAHs using U.S. EPA Method 8270C Selected Ion Monitoring (SIM); gasoline-range total petroleum hydrocarbons (TPH), diesel-range TPH, and motor oil–range TPH using U.S. EPA Method 8015 (modified); volatile organic compounds (VOCs) using U.S. EPA Method 8260B; and California Assessment Manual (CAM) 17 metals using U.S. EPA Method 200.7. For cost estimating purposes, it was assumed that one stockpile sample would be analyzed for up to four soluble threshold limit concentration (STLC) metals (arsenic, lead, cadmium, and chromium).

After excavation is completed, the excavated areas would be backfilled with clean, imported soil from a local source. The backfilled areas would then be revegetated with grass sod and sloped to promote drainage.

L2.6.2 INSTITUTIONAL CONTROLS

ICs for this alternative would be the same as those described for Alternative PAH-2 (Section L2.5.1).

L2.6.3 REVIEWS AND REPORTING

Reviews and reporting activities for this alternative would be the same as those described for Alternative PAH-2 in Section L2.5.2.

L2.7 Alternative PAH-3b: Excavation to 2 Feet bgs and ICs

This subsection provides a description of remedial Alternative PAH-3b. This alternative involves the excavation and off-site disposal of all identified soil with B(a)P equivalent concentrations above the preliminary RG in the 0- to 2-foot-bgs depth interval at IR Site 35. ICs would be designed and implemented in the area shown on Figure 11-4 of the main RI/FS Report. ICs would require implementation of a sampling plan for soil beneath buildings and hardscape in the event that redevelopment involves removal of buildings and/or hardscape.

L2.7.1 EXCAVATION AND OFF-SITE DISPOSAL

For this alternative, all six of the identified PAH areas with B(a)P equivalent concentrations above the preliminary RG in the upper 2 feet of soil would be excavated to 2 feet bgs and backfilled with clean, imported fill from a local source. The total estimated size of PAH-impacted areas (including paved and unpaved surface) is approximately 14,915 square feet. An estimated 1,105 bcy of PAH-impacted soil would be excavated under this alternative. As with Alternative PAH-3a, the objective of excavation would be to remove additional mass of PAH-impacted soil.

Prior to excavation activities, paved surfaces would be demolished and removed for off-site disposal to allow for excavation of underlying soil. Excavated soil would be segregated, stockpiled into 500-bulk-cubic-yard batches, and characterized before off-site disposal. For costing purposes, it is assumed that the excavated PAH-impacted soil with B(a)P equivalent concentrations above the preliminary RG would be classified as Class II nonhazardous waste and transported for disposal to a corresponding landfill (e.g., Altamont, Livermore). Approximately four samples would be collected from the excavated soils to determine the waste profile and management classification. It is also assumed that one waste-profiling sample per 500 bcy (or three samples) plus one quality assurance sample would be collected. The collected samples would be submitted to an off-site analytical laboratory for analyses of PAHs using U.S. EPA Method 8270C SIM; gasoline- diesel-, and motor oil–range TPH using U.S. EPA Method 8015 (modified); VOCs using U.S. EPA Method 8260B; and CAM 17 metals using U.S. EPA Method 200.7. For costing purposes, it was assumed that one of the stockpile samples would be analyzed for up to four STLC metals (arsenic, lead, cadmium, and chromium).

After the excavation is completed, the excavated areas would be backfilled with clean, imported soil from a local source. The backfilled areas would then be revegetated with grass sod and sloped to promote drainage.

L2.7.2 INSTITUTIONAL CONTROLS

ICs for this alternative would be the same as those described for Alternative PAH-2 (Section L2.5.1).

L2.7.3 REVIEWS AND REPORTING

Reviews and reporting activities for this alternative would be the same as those described for Alternative PAH-2 in Section L2.5.2.

L2.8 Alternative PAH-4a: Excavation in Unpaved Areas to 4 Feet bgs and ICs

This subsection provides a description of remedial Alternative PAH-4a. This alternative addresses soil with B(a)P equivalent concentrations above the preliminary RG in unpaved areas. Under this alternative, soil with B(a)P equivalent concentrations above the preliminary RG would be excavated to 4 feet bgs and disposed of off-site. ICs would be designed and implemented in the area shown on Figure 11-4 of the main RI/FS Report. The ICs would require implementation of a sampling plan for soil beneath buildings and hardscape in the event that redevelopment involves removal of buildings and/or hardscape. The assumed excavation locations are presented on Figure 11-5 of the main RI/FS Report.

L2.8.1 EXCAVATION AND OFF-SITE DISPOSAL

Unpaved areas identified on Figure 11-5 of the main RI/FS Report would be excavated to remove soil with B(a)P equivalent concentrations above the preliminary RG to a depth of approximately 4 feet bgs and backfilled with clean, imported fill from a local source. At locations where exceedances were only in the 0- to 2-foot-bgs depth interval, excavation of the 2- to 4-foot-bgs depth interval would not be required. For the 44 locations where PAH-impacted soil was identified at 2 to 4 feet bgs, the upper 2 feet of excavated soil would be reused on-site after characterizing to confirm the soil is at or below the preliminary RG. The total excavation area is assumed to be 91,000 square feet. An estimated 13,100 bcy of soil would be excavated under this alternative. For costing purposes, of the 13,100 bcy of excavated soil, 6,700 bcy is estimated to be soil with B(a)P equivalent concentrations above the preliminary RG, and the remaining 6,400 bcy is assumed to be suitable for use as backfill. As with Alternative PAH-3a, the objective of excavation would be to remove additional mass of PAH-impacted soil.

Excavated soil would be segregated, stockpiled into 500-bcy batches, and characterized before reuse or off-site disposal. Approximately 34 samples including 7 quality assurance samples would be collected from stockpiles for PAH analysis by an off-site analytical laboratory. For costing purposes, the soil with B(a)P equivalent concentrations above the preliminary RG is assumed to be classified as Class II nonhazardous waste and

transported to a corresponding landfill (e.g., Altamont, Livermore) for disposal. Excavated soil with PAH concentrations below the preliminary RG would be reused for backfilling on-site. Excavated soil with PAH concentrations below the preliminary RG would be reused for backfilling on-site. An estimated 18 samples would be collected from soil with B(a)P equivalent concentrations above the preliminary RG to determine the waste profile and the management classification. It is assumed that one waste-profiling sample per 500 bcy (or 14 samples) plus four quality assurance samples would be collected. The collected samples would be submitted to an off-site analytical laboratory for the same analyses specified for Alternative PAH-3a (Section L2.7.1). For costing purposes, it was assumed that four of the stockpile samples would be analyzed for up to four STLC metals (arsenic, lead, cadmium, and chromium).

After excavation is completed, the excavated areas would be backfilled with clean, imported soil from a local source or with excavated soil from on-site that is at or below the preliminary RG. For costing purposes, approximately 6,400 bcy of excavated soil from on-site would be reused and approximately 6,700 bcy of clean imported backfill material would be purchased. The backfilled areas would then be revegetated with grass sod and sloped to promote drainage.

L2.8.2 INSTITUTIONAL CONTROLS

ICs for this alternative would be the same as those described for Alternative PAH-2 (Section L2.5.1).

L2.8.3 REVIEWS AND REPORTING

Reviews and reporting activities for this alternative would be the same as those described for Alternative PAH-2 in Section L2.5.2.

L2.9 Alternative PAH-4b: Excavation to 4 Feet bgs

This subsection provides a description of Alternative PAH-4b. This alternative involves the excavation and off-site disposal of all identified soil with B(a)P equivalent concentrations above the preliminary RG to a depth of 4 feet bgs at IR Site 35 (Figure 11-5 of the main RI/FS Report). This alternative would not include ICs.

L2.9.1 EXCAVATION AND OFF-SITE DISPOSAL

For this alternative, the total size of areas with B(a)P equivalent concentrations above the preliminary RG (including paved and unpaved surface) is approximately 122,000 square feet. At locations where exceedances were only in the 0- to 2-foot-bgs depth interval, excavation of the 2- to 4-foot-bgs depth interval would not be required. For the 44 locations where soil with B(a)P equivalent concentrations above the preliminary RG was identified at the depth of 2 to 4 feet-bgs, the soil would be excavated to 4 feet bgs. The upper 2 feet of excavated soil would be reused on-site after characterizing to confirm that B(a)P equivalent concentrations in shallow soil are at or below the preliminary RG. An estimated 17,000 bcy of soil would be excavated under this alternative. For costing purposes, 8,000 bcy is estimated to be soil with B(a)P equivalent concentrations below

the preliminary RG, and therefore suitable for use as backfill. The objective of excavation would be to remove additional mass of PAH-impacted soil.

Prior to excavation activities, paved surfaces would be demolished and removed for off-site disposal to allow for excavation of underlying soil. Excavated soil would be segregated, stockpiled into 500-cubic-yard batches, and characterized before reuse or off-site disposal. Approximately 44 samples, including 9 quality assurance samples (or 20 percent), would be collected from stockpiles for PAH analysis by an off-site analytical laboratory. For costing purposes, it is assumed the excavated soil would be classified as Class II nonhazardous waste and transported for disposal to a corresponding landfill (e.g., Altamont, Livermore). Excavated soil with PAH concentrations below the preliminary RG would be reused for backfilling on-site. An estimated 24 samples would be collected from the excavated soil with B(a)P equivalent concentrations above the preliminary RG to determine the waste profile and the management classification. It is also assumed that one waste-profiling sample per 500 bcy (or 19 samples) plus five quality assurance samples would be collected. The collected samples would be submitted to an off-site analytical laboratory for the same analyses specified for Alternative PAH-3a (Section L2.7.1). For estimating purposes, it is assumed that five of the stockpile samples would be analyzed for up to four STLC metals (arsenic, lead, cadmium, and chromium).

After excavation is completed, the excavated areas would be backfilled with clean, imported soil from a local source or with excavated soil from on-site that is at or below the preliminary RG. For costing purposes, approximately 8,000 bcy of excavated soil from on-site would be reused, and approximately 9,000 bcy of clean imported backfill material would be purchased. The backfilled areas would then be revegetated with grass sod and sloped to promote drainage.

L2.9.2 CLOSEOUT REPORT

This alternative would be completed with no long-term maintenance upon the completion of excavation and backfilling activities. Therefore, no 5-year reviews would be included. A remedial action closeout report would be prepared upon the completion of remedial activities.

L2.10 Alternative AOC 1-2: MNA and ICs

This subsection provides a description of groundwater remedial Alternative AOC 1-2: monitored natural attenuation (MNA) and ICs for groundwater at AOC 1.

L2.10.1 REFINEMENT OF EXTENT OF NAPHTHALENE IN GROUNDWATER

An initial groundwater investigation would be conducted for Alternative AOC 1-2 to verify the extent of naphthalene at concentrations above the preliminary RG. The current interpreted naphthalene extent is shown on Figure 11-6 of the main RI/FS Report and is based on December 2005 results from discrete groundwater sampling during the RI.

For costing purposes, the initial groundwater investigation is assumed to consist of the following activities.

- Collect soil and grab groundwater samples from approximately 15 borings in the first water-bearing zone (FWBZ). It is assumed that two soil samples and one groundwater sample per boring would be collected for VOC analysis. The goal of the grab groundwater sampling would be to confirm the current configuration of the naphthalene-affected area in the FWBZ. The data from analyses of these samples would be used to determine the location of new groundwater monitoring wells for use in the MNA program for this AOC.
- Install, develop, sample, and survey three new monitoring wells in the FWBZ at AOC 1 in the vicinity of RI groundwater sampling location A01SB03. These new wells would provide information about the extent of naphthalene in groundwater at concentrations above the preliminary RG (100 micrograms per liter [µg/L]) and could be used to monitor the effectiveness of the remedial action.

The assumed locations of the 15 grab groundwater samples and 3 new monitoring wells are shown on Figure 11-6 of the main RI/FS Report. The actual groundwater sampling locations would be determined during the remedial design stage based on a review of available information. The final locations of the new monitoring wells would be determined based on results of the grab groundwater sampling conducted during the remedial design phase of the project.

L2.10.2 MONITORED NATURAL ATTENUATION FOR NAPHTHALENE

For Alternative AOC 1-2, an MNA sampling program would be developed and implemented that would include sampling of the three new FWBZ wells for VOCs and field parameters. Sufficient groundwater data are not available to predict the time required for MNA to reach the preliminary RG; therefore, for costing purposes, it is assumed that the duration of MNA is 10 years. This duration is based on the assumption of a stable plume and typical natural attenuation rates at similar sites (USGS 2003), where an order-of-magnitude reduction in contaminant concentrations in 10 years is common. Sampling would occur quarterly for the first year and annually thereafter for the remainder of the 10-year MNA period. It is also assumed that naphthalene concentrations would have declined below the preliminary RG at that time.

L2.10.3 INSTITUTIONAL CONTROLS

Under Alternative AOC 1-2, ICs would be put in place at AOC 1 to mitigate vapor intrusion risk if additional groundwater sampling results indicate unacceptable risk. ICs would remain in place until the Navy, U.S. EPA, DTSC, and the San Francisco Bay Water Board concur that they are no longer warranted. Alternative AOC 1-2 does not include active remediation. Natural attenuation processes would be expected to continue reducing contaminant concentrations at the site.

The selected remedy would be reviewed periodically as part of the CERCLA 5-year review process. The assumed duration of ICs for this alternative is 10 years.

L2.10.4 REVIEWS AND REPORTING

For Alternative AOC 1-2, it is assumed that annual data summary reports for remedial actions would be prepared and submitted to the regulatory agencies. For costing purposes, one 5-year review is assumed to be performed at the end of year 5 and a closeout report is assumed to be prepared at the end of year 10. Reviews would be documented in a summary report issued to appropriate regulatory agencies that might suggest modifications to the monitoring programs as appropriate.

L2.11 Alternative AOC 1-3: Source Removal, Enhanced Aerobic ISB, and ICs

This subsection provides a description of groundwater Alternative AOC 1-3: source removal, enhanced aerobic *in situ* bioremediation (ISB), and ICs for groundwater at AOC 1.

L2.11.1 REFINEMENT OF EXTENT OF NAPHTHALENE IN GROUNDWATER

An initial groundwater investigation would be conducted for Alternative AOC 1-3 in order to verify the extent of naphthalene in groundwater at concentrations above the preliminary RG. The scope of the investigation would be identical to that described for Alternative AOC 1-2 (Section L2.10.1).

L2.11.2 SOURCE REMOVAL AND ENHANCED AEROBIC ISB

This alternative includes excavation, off-site disposal, and ISB treatment of residual naphthalene in groundwater. Figure 11-7 of the main RI/FS Report presents the assumed treatment approach for Alternative AOC 1-3. This groundwater alternative assumes that an area approximately 40 feet by 40 feet by 14 feet thick located near oil/water separator (OWS) number OWS 063A would be identified as the source of naphthalene in AOC 1 groundwater. The intent of this alternative would be to remove OWS 063A and elevated naphthalene concentrations in soil. Utilities in the excavation area would be disconnected or removed temporarily. It is assumed that the groundwater extracted during the dewatering process would remove most of the groundwater containing naphthalene and be treated for VOCs using activated carbon. It is also assumed that two 1,000-pound activated carbon vessels in series would be mobilized to the site to treat up to 50 gallons per minute of extracted groundwater prior to discharge via the storm drains to San Francisco Bay.

Before excavation, the extent of naphthalene in groundwater at the site would be determined as described in Section L2.10.1. This investigation data would be used for planning purposes in the remedial design effort and for planning purposes for waste profiling and soil disposal.

For costing purposes, it is assumed that 18 confirmation samples (16 plus 2 quality assurance/quality control samples) would be collected from the excavation bottom and sidewalls and that the samples would be analyzed for VOCs using U.S. EPA Method 8260B. Other constituents would not be included in the analysis, as the goal of

the excavation is to remove the naphthalene source to groundwater. The final confirmation sampling program would be developed during the remedial design phase.

The excavated soil would be stockpiled and characterized for off-site disposal. For costing purposes, it is assumed that approximately 830 bcy of soil would be disposed of off-site, and that all the material would be classified as Class II nonhazardous waste.

Following completion of excavation and confirmation sampling, the excavation would be backfilled with clean, imported soil, and utilities would be restored. The first foot of backfill would be treated using aerobic ISB amendment (i.e., oxygen release compound [ORC]). The ORC-soil mixture would be placed in the bottom foot of the excavation. The timed release of oxygen from the ORC-soil mixture would stimulate ISB and thereby reduce residual naphthalene concentrations in the groundwater. Groundwater performance monitoring included under Alternative AOC 1-3 would provide for assessment of changes in groundwater naphthalene concentrations over time.

L2.11.3 ISB PERFORMANCE MONITORING

This alternative assumes that residual concentrations of contaminants could remain in the naphthalene-affected area following source area excavation and dewatering. The excavation and off-site disposal of contaminated soil and its associated dewatering would remove a substantial amount of naphthalene from soil and groundwater. ISB treatment described above would degrade residual naphthalene following source removal. Because it is likely that naphthalene concentrations above the preliminary RG would remain in groundwater following source removal, performance monitoring of the ISB treatment is included as part of this alternative. The actual source removal, ISB, and monitoring program would be designed during the remedial design phase of the project. The scope of these activities may be revised as necessary once results of the initial groundwater investigation and groundwater monitoring events are available for review. For costing purposes, it is assumed that the three proposed monitoring wells would be used for performance monitoring. Figure 11-6 of the main RI/FS Report shows the proposed monitoring well locations.

For the naphthalene-affected area, the ISB performance monitoring program would include sampling of three new monitoring wells for VOCs and field parameters (i.e., conductivity, temperature, turbidity, pH, oxidation-reduction potential [ORP], and dissolved oxygen [DO]). Groundwater sampling and analysis would be performed prior to and following the ORC-soil mixing to evaluate remediation progress for a total of 1 year. For costing purposes, it is assumed that the duration of ISB performance monitoring is 10 years. The sampling would occur quarterly for the first year and annually thereafter until RGs are met. It is also assumed for costing purposes that contaminant concentrations would have declined to below the preliminary RG within 10 years.

L2.11.4 INSTITUTIONAL CONTROLS

The ICs for this alternative would be identical to those described for Alternative AOC 1-2 (Section L2.10.3).

L2.11.5 REVIEWS AND REPORTING

For Alternative AOC 1-3, it is assumed that annual data summary reports for the ISB performance monitoring program would be submitted to the regulatory agencies. For costing purposes, one 5-year review is assumed to be performed at the end of year 5 and a closeout report is assumed to be prepared at the end of year 10. Reviews would be documented in a summary report issued to appropriate regulatory agencies that might suggest modifications to the monitoring programs as appropriate.

L2.12 Alternative AOC 1-5: ISCO

This subsection provides a description of groundwater Alternative AOC 1-5: *in situ* chemical oxidation (ISCO) for groundwater at AOC 1.

L2.12.1 REFINEMENT OF EXTENT OF NAPHTHALENE IN GROUNDWATER

An initial groundwater investigation would be conducted for Alternative AOC 1-5 to verify the extent of naphthalene concentrations in groundwater above the preliminary RG. The scope of the investigation would be identical to that described for Alternative AOC 1-2 (Section L2.10.1).

L2.12.2 *IN SITU* CHEMICAL OXIDATION

This alternative includes ISCO treatment of groundwater impacted with naphthalene. For costing purposes, the modified Fenton's process described in Section 9 of the main RI/FS Report is assumed to be used for naphthalene treatment. Figure 11-8 of the main RI/FS Report presents the assumed treatment approach for Alternative AOC 1-5. For costing purposes, it is assumed that treatment would occur over an approximate area of 7,500 square feet (Figure 11-8 of the main RI/FS Report). Alternative AOC 1-5 would employ an estimated 32 injection points with spacing of 20 feet on center (Haskins, pers. com. 2006). The assumed dose rate for ISCO is 400 gallons per injection point. Measures to minimize possible contaminant migration during injection would be developed in the remedial design stage. The injections would be implemented using direct-push drilling technology and applied via gravity through temporary injection screens. For costing purposes, it is assumed that the injections would focus on an approximately 10-foot-thick treatment zone for ISCO. The treatment interval may be refined based on results of the initial groundwater investigation. Performance of the process would be evaluated through groundwater sampling and analysis.

Although the ISCO process should provide active treatment, no pilot-scale testing is assumed to be necessary. The modified Fenton's process was recently performed successfully at IR Site 9. Pilot-scale testing is not considered necessary at IR Site 35 because of this local experience.

L2.12.3 EFFECTIVENESS SAMPLING FOR NAPHTHALENE

After completion of ISCO treatment, it is assumed for costing purposes that naphthalene concentrations would rapidly decrease to levels below the preliminary RG within 6 months.

Performance monitoring of the ISCO treatment is included as a part of this alternative to verify the treatment's effectiveness. The actual monitoring program would be designed during the remedial design phase of the project and evaluated once results of the first few rounds of sampling (after the initial groundwater investigation and monitoring well installation) are available for review. For costing purposes, it is assumed that the three newly proposed monitoring wells would be used for monitoring. Figure 11-6 of the main RI/FS Report shows the proposed monitoring locations.

For Alternative AOC 1-5, the ISCO performance monitoring program would include sampling of three new monitoring wells for VOCs, dissolved metals, and field parameters (i.e., ferrous iron, conductivity, temperature, turbidity, pH, ORP, and DO). Groundwater sampling and analysis would be performed prior to and following the ISCO reagent injection to evaluate remediation progress for a total of 6 months. For costing purposes, it is assumed that the duration of ISCO performance monitoring is 2 years. The sampling would occur bimonthly for the first 6 months, quarterly for the remainder of the first year, and annually for the second year. It is also assumed that naphthalene concentrations would have declined to below the preliminary RG at that time.

L2.12.4 CLOSEOUT REPORT

Because ISCO treatment is assumed to reduce naphthalene concentrations to levels below the preliminary RG within 6 months, and Alternative AOC 1-5 has a duration of only 2 years, periodic reviews would not need to be performed every 5 years. At the end of year 2, a project closeout report would be prepared.

L2.13 Alternative AOC 23-2: MNA and ICs

This subsection provides a description of groundwater Alternative AOC 23-2: MNA and ICs for groundwater at AOC 23.

L2.13.1 REFINEMENT OF EXTENT OF VINYL CHLORIDE IN GROUNDWATER

An initial groundwater investigation would be conducted for Alternative AOC 23-2 to verify the extent of vinyl chloride concentrations above the preliminary RG in groundwater. The current interpreted extent of vinyl chloride in groundwater is shown on Figure 11-9 of the main RI/FS Report and is based on grab groundwater sampling results from previous investigations in September 2001 and the RI in December 2005.

For costing purposes, the initial groundwater investigation is assumed to consist of the following activities.

- Collect soil and grab groundwater samples from approximately 20 borings in the FWBZ. It is assumed that two soil samples and one groundwater sample per boring would be collected for VOC analysis. The goal of the grab groundwater sampling would be to confirm the current configuration of the contaminated area in the FWBZ. The data from groundwater analysis of these samples would be used to locate new groundwater monitoring wells for use in the MNA program for this AOC.

- Install, develop, sample, and survey five new monitoring wells in the FWBZ at AOC 23. These new wells would provide information about the assumed extent of vinyl chloride in groundwater at concentrations above the preliminary RG (0.5 µg/L) and could be used to monitor the effectiveness of the remedial action.

The assumed locations of the 20 grab groundwater samples and 5 new monitoring wells are shown on Figure 11-9 of the main RI/FS Report. The actual groundwater sampling locations would be determined during the remedial design stage based on a review of available information. The final locations of the new monitoring wells would be determined based on results of the grab groundwater sampling conducted during the remedial design phase of the project.

L2.13.2 MONITORED NATURAL ATTENUATION FOR VINYL CHLORIDE

For Alternative AOC 23-2, an MNA sampling program would be developed and implemented that would include sampling of the five new FWBZ wells for VOCs and field parameters. Sufficient groundwater data are not available to predict the time required for MNA to reach the preliminary RG; therefore, for costing purposes, it is assumed that the duration of MNA is 10 years. This duration is based on the assumption of a stable plume and typical natural attenuation rates at similar sites (USGS 2003), where an order-of-magnitude reduction in contaminant concentrations in 10 years is common. Sampling would occur quarterly for the first year and annually thereafter until preliminary RGs are met. It is also assumed that contaminant concentrations would have declined below the preliminary RG within 10 years.

L2.13.3 INSTITUTIONAL CONTROLS

Under Alternative AOC 23-2, ICs would be put in place at AOC 23 to prohibit extraction of groundwater for domestic purposes. Alternative AOC 23-2 does not include active remediation. Natural attenuation processes would be expected to continue reducing contaminant concentrations at the site.

The Navy would employ the same dual approach for IC implementation described for Alternative AOC 3-2 in Section L2.1.3. The selected remedy would be reviewed periodically as part of the CERCLA 5-year review process. The assumed duration of ICs for this alternative is 10 years.

L2.13.4 REVIEWS AND REPORTING

For Alternative AOC 23-2, it is assumed that annual data summary reports for remedial actions would be prepared and submitted to the regulatory agencies. For costing purposes, one 5-year review is assumed to be performed at the end of year 5 and a closeout report is assumed to be prepared at the end of year 10. Reviews would be documented in a summary report issued to appropriate regulatory agencies that might suggest modifications to the monitoring programs as appropriate.

L2.14 Alternative AOC 23-4: ISCO

This subsection provides a description of groundwater Alternative AOC 23-4: ISCO for groundwater at AOC 23.

L2.14.1 REFINEMENT OF EXTENT OF VINYL CHLORIDE IN GROUNDWATER

An initial groundwater investigation would be conducted for Alternative AOC 23-4 to verify the extent of vinyl chloride concentrations above the preliminary RG in groundwater. The scope of the groundwater investigation would be identical to that described for Alternative AOC 23-2 (Section L2.13.1).

L2.14.2 *IN SITU* CHEMICAL OXIDATION

This alternative includes ISCO treatment of soil near RI boring A23SB22, where vinyl chloride was reported at a concentration of 210 micrograms per kilogram in one soil sample collected between 5 and 6 feet bgs. This alternative also includes ISCO treatment of groundwater impacted with vinyl chloride using the modified Fenton's process described in Section 9 of the main RI/FS Report.

For costing purposes, it is assumed that treatment would occur over two areas with a combined total of approximately 80,000 square feet (Figure 11-10 of the main RI/FS Report). Alternative AOC 23-4 would employ an estimated 115 injection points with spacing of 30 feet on center (99 injection points at Environmental Baseline Survey [EBS] Parcels 123 and 124 and 16 injection points south of EBS Parcel 125). The assumed dose rate for ISCO is 400 gallons per injection point (Haskins, pers. com. 2006). Measures to minimize possible contaminant migration during injection would be developed in the remedial design stage. The injections would be performed using direct-push drilling technology and applied via gravity through temporary injection screens. For costing purposes, it is assumed that the injections would focus on an approximately 10-foot-thick treatment zone for ISCO. The treatment interval may be refined based on results of the initial groundwater investigation. Performance of the process would be evaluated through groundwater sampling and analysis.

Although the ISCO process should provide active treatment, no pilot-scale testing is assumed to be necessary. The modified Fenton's process was recently performed successfully at IR Site 9. Pilot-scale testing is not considered necessary at IR Site 35 because of this local experience.

L2.14.3 EFFECTIVENESS SAMPLING FOR VINYL CHLORIDE

After ISCO treatment, it is assumed for costing purposes that vinyl chloride concentrations would decrease rapidly to levels below the preliminary RG within 6 months. Performance monitoring of the ISCO treatment is included as a part of this alternative to verify the ISCO treatment effectiveness. The actual monitoring program would be designed during the remedial design phase of the project and evaluated once results of the first few rounds of sampling were available for review. For costing purposes, it is assumed that the five newly proposed monitoring wells would be used for

monitoring. Figure 11-9 of the main RI/FS Report shows the proposed monitoring locations.

For Alternative AOC 23-4, the ISCO performance monitoring program would include sampling of five new monitoring wells for VOCs, dissolved metals, and field parameters (i.e., ferrous iron, conductivity, temperature, turbidity, pH, ORP, and DO). Groundwater sampling and analysis would be performed prior to and following the ISCO reagent injection to evaluate remediation progress for a total of 6 months. For costing purposes, it is assumed that the duration of ISCO performance monitoring is 2 years. The sampling would occur bimonthly for the first 6 months, quarterly for the remainder of the first year, and annually for the second year. It is also assumed that contaminant concentrations would have declined to below the preliminary RG at that time.

L2.14.4 CLOSEOUT REPORT

Because ISCO treatment is assumed to reduce vinyl chloride concentrations to levels below the preliminary RG within 6 months, and Alternative AOC 23-4 has a duration of only 2 years, periodic reviews would not need to be performed every 5 years. At the end of year 2, a project closeout report would be prepared.

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U.S. EPA. *See* United States Environmental Protection Agency.

USGS. *See* United States Geological Survey.

TABLES

Table L-1
Remedial Alternatives for Which Cost Estimates Were Developed

AOC 3 – Heptachlor in Soil

Alternative	Description
AOC 3-2	soil cover and ICs
AOC 3-3	excavation and off-site disposal

AOCs 10 and 12 – Lead in Soil

Alternative	Description
AOC 10/12-2	limited excavation, cover, and ICs
AOC 10/12-3	excavation and off-site disposal

PAHs in Soil at IR Site 35

Alternative	Description
PAH-2	ICs
PAH-3a	excavation in unpaved areas to 2 feet bgs and ICs
PAH-3b	excavation to 2 feet bgs and ICs
PAH-4a	excavation in unpaved areas to 4 feet bgs and ICs
PAH-4b	excavation to 4 feet bgs

AOC 1 – Naphthalene in Groundwater

Alternative	Description
AOC 1-2	MNA and ICs
AOC 1-3	source removal, enhanced aerobic ISB, and ICs
AOC 1-5	ISCO

AOC 23 – Vinyl Chloride in Groundwater

Alternative	Description
AOC 23-2	MNA and ICs
AOC 23-4	ISCO

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
IC – institutional control
ISB – *in situ* bioremediation
ISCO – *in situ* chemical oxidation
MNA – monitored natural attenuation
PAH – polynuclear aromatic hydrocarbon

Table L-2
AOC 3
Cost Estimate Assumptions for Soil Alternatives

Components	Assumptions
Alternative AOC 3-2: soil cover and ICs	
Predesign soil sampling	Soil sampling for delineation of excavation boundaries • Preparation of work plan (one person for 1 week) • Advance up to 10 soil borings • Collect up to 24 samples (soil samples at depth intervals of 0 to 1 and 1 to 2 feet bgs from each boring plus 20 percent QA/QC samples) • Analyze samples for pesticides using U.S. EPA Method 8081A • Assume 2-week laboratory turnaround time
Remedial design and implementation	Remedial design effort, including design of soil cover (assumed to require 1,000 hours) Preconstruction survey (two people for 1 week; includes report) Soil cover • Remove existing grass sod on top of the proposed soil cover area (total area is assumed to be 3,500 square feet) and dispose of off-site • Assume 2-foot-thick cover, purchase 260 bcy of clean soil from local source • Install soil cover and compact to at least 90 percent • Grade to promote drainage • Resurface with grass sod over 3,500-square-foot area for erosion protection
ICs and reviews	IC implementation • Assume IC design effort included in the remedial design effort above • No fencing or signage • Assume $3,000 per year for IC implementation (annual inspection and maintenance costs and reports) • Implemented for an assumed duration of 30 years • Comprehensive reviews would be performed every 5 years under CERCLA
Alternative AOC 3-3: excavation and off-site disposal	
Predesign soil sampling	Same as above for Alternative AOC 3-2
Remedial design and implementation	Remedial design effort (assumed to require 1,000 hours) Preconstruction survey (two people for 1 week; includes report) Excavation to an estimated depth of 2 feet bgs • USA notification and sitewide utility-locating survey (two people for 1 day) • No existing pavement; no removal and transport for off-site recycling are needed • Remove existing grass sod on top of the proposed excavation area (total area is assumed to be 3,500 square feet) and dispose of off-site • Total volume of excavated soil is assumed to be 260 bcy (total area is assumed to be 3,500 square feet and depth is assumed to be 2 feet bgs) • Excavated soil would be segregated, stockpiled into 20-cubic-yard batches, and characterized before off-site disposal; assuming 260 bcy of excavated soil, there would be 13 stockpiles • Approximately seven stockpiles (140 bcy) are assumed to be nonhazardous waste going to the Class II landfill at Altamont, Livermore, California, or similar facility

Table L-2 (continued)

Components	Assumptions
Alternative AOC 3-3: excavation and off-site disposal (continued)	
Remedial design and implementation (continued)	• Approximately six stockpiles (120 bcy) are assumed to be RCRA-characteristic hazardous waste due to heptachlor concentrations, with half the waste (three stockpiles or 60 cubic yards) to be treated by incineration. Hazardous waste not requiring incineration would be transported to the Chemical Waste Management's hazardous waste landfill in Kettleman City, California (200 miles away) or similar facility. Hazardous waste requiring incineration would be transported to the Clean Harbors' hazardous waste landfill in Aragonite, Utah (750 miles away) or similar facility. • Waste transportation and disposal costs from local waste company – Assume 1.4 tons per bcy – $45 per ton for nonhazardous waste, including transportation to the Class II landfill at Altamont, Livermore, California, or similar facility; disposal; and landfill taxes – $170 per ton for RCRA-characteristic hazardous waste, including transportation to the Chemical Waste Management's hazardous waste landfill in Kettleman City, California (200 miles away) or similar facility; disposal; and landfill taxes – $915 per ton for RCRA-characteristic hazardous waste, including transportation to the Clean Harbors' hazardous waste landfill in Aragonite, Utah (750 miles away) or similar facility; incineration; disposal; and landfill taxes • Backfill with purchased clean, imported fill from a local source (same amount) Landscape • Resurface with grass sod over a 3,500-square-foot area for erosion protection Remedial action closeout report (two people for 2 weeks)
Confirmation soil sampling	Confirmation soil sampling • Collect ten samples (one confirmation sample per 450 to 500 square feet and an additional 20 percent QA/QC samples) • Analyze samples for pesticides using U.S. EPA Method 8081A • Assume 2-day laboratory turnaround time
Waste profile soil sampling	Soil sampling for disposal • Collect 16 samples (one sample per every stockpile plus 20 percent QA/QC samples) • Analyze samples for pesticides using U.S. EPA Method 8081A • Assume 2-week laboratory turnaround time

Acronyms/Abbreviations:
AOC – area of concern
bcy – bank (in place) cubic yards
bgs – below ground surface
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
IC – institutional control
QA – quality assurance
QC – quality control
RCRA – Resource Conservation and Recovery Act
USA – Underground Service Alert
U.S. EPA – United States Environmental Protection Agency

Table L-3
Cost Estimate Summary for
Alternative AOC 3-2: Soil Cover and ICs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$100,000			$100,000
Initial investigation/predesign sampling	$14,000			$14,000
Preconstruction survey	$8,000			$8,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs with Markups[a]				**$124,000**
Capital Costs				
Removal of existing sod (3,500 square feet)	$6,000			$6,000
Soil cover (260 cubic yards)	$17,000			$17,000
Landscape sod (3,500 square feet)	$15,000			$15,000
Subtotal Capital Costs With Markups[a]				**$38,000**
O&M Costs				
ICs and reporting (30 years)		$3,000		$90,000
5-year reviews			$24,000	$144,000
Subtotal O&M Costs With Markups[a]				**$234,000**
Subtotal With Markups[a]				**$396,000**
Contingency (20%)				$79,000
TOTAL COST				**$475,000**
Present Value of Alternative AOC 3-2 (based on 2006 dollars)[b]				**$365,000**

Notes:
[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit
[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:
AOC – area of concern
IC – institutional control
O&M – operation and maintenance
USA – Underground Service Alert

Table L-4
Cost Estimate Summary for
Alternative AOC 3-3: Excavation and Off-Site Disposal

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$100,000			$100,000
Initial investigation/predesign sampling	$14,000			$14,000
Preconstruction survey	$8,000			$8,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs with Markups[a]				**$124,000**
Capital Costs				
Removal of existing sod (3,500 square feet)	$6,000			$6,000
Excavation and backfill (260 cubic yards)	$16,000			$16,000
Off-site disposal	$139,000			$139,000
Waste profile sampling	$10,000			$10,000
Confirmation sampling	$6,000			$6,000
Landscape sod (3,500 square feet)	$15,000			$15,000
Subtotal Capital Costs With Markups[a]				**$192,000**
O&M Costs				
Closeout report				$28,000
Subtotal O&M Costs With Markups[a]				**$28,000**
Subtotal With Markups[a]				**$344,000**
Contingency (20%)				$69,000
TOTAL COST				**$413,000**
Present Value of Alternative AOC 3-3 (based on 2006 dollars)[b]				**$401,000**

Notes:
[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit
[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:
AOC – area of concern
O&M – operation and maintenance
USA – Underground Service Alert

Table L-5
AOC 10
Cost Estimate Assumptions for Soil Alternatives

Components	Assumptions
Alternative AOC 10/12-2: limited excavation, cover, and ICs	
Predesign soil sampling	Soil sampling for delineation of excavation boundaries • Preparation of work plan (one person for 1 week) • Advance up to 20 soil borings • Collect up to 24 samples (collect soil samples at a depth interval of 0 to 1 foot bgs from each boring plus 20 percent QA/QC samples) • Analyze samples for lead using a portable XRF instrument • Submit 20 percent of the total number of samples (five samples) to off-site analytical laboratory for confirmation lead analysis using U.S. EPA Method 6010B • Assume 2-week laboratory turnaround time
Remedial design and implementation	Remedial design effort (assumed to require 1,000 hours) Preconstruction survey (two people for 1 week; includes report) Excavation to an estimated depth of 1 foot bgs in unpaved areas • USA notification and sitewide utility-locating survey (two people for 1 day) • Remove existing grass sod on top of the proposed excavation areas (total grass area is assumed to be 1,085 square feet) and dispose of off-site • Total volume of excavated soil is assumed to be 40 bcy (total area is assumed to be 1,085 square feet and depth is assumed to be 1 foot) • Excavated soil would be segregated, stockpiled into 8-bcy batches, and characterized before off-site disposal. Assuming 40 bcy of excavated soil, there would be five stockpiles. • Approximately three stockpiles (24 bcy) are assumed to be nonhazardous waste going to the Class II landfill at Altamont, Livermore, California, or similar facility • Approximately one stockpile (8 bcy) is assumed to be RCRA-characteristic hazardous waste and to be treated by stabilization at the Chemical Waste Management's hazardous waste landfill in Kettleman City, California (200 miles away) or similar facility • Approximately one stockpile (8 bcy) is assumed to be California-characteristic hazardous waste going to the Chemical Waste Management's hazardous waste landfill in Kettleman City, California (200 miles away) or similar facility • Waste transportation and disposal costs from local waste company – Assume 1.4 tons per bcy – $45 per ton for nonhazardous waste, including transportation to the Class II landfill at Altamont, Livermore, California, or similar facility; disposal; and landfill taxes – $235 per ton for RCRA-characteristic hazardous waste, including transportation to the Chemical Waste Management's hazardous waste landfill in Kettleman City, California (200 miles away) or similar facility; stabilization; disposal; and landfill taxes – $105 per ton for California-characteristic hazardous waste, including transportation to the Chemical Waste Management's hazardous waste landfill in Kettleman City, California (200 miles away) or similar facility; disposal; and landfill taxes

Table L-5 *(continued)*

Components	Assumptions
Alternative AOC 10/12-2: limited excavation, cover, and ICs (continued)	
Remedial design and implementation (continued)	• Backfill with purchased clean, imported fill from a local source (same amount) Landscape • Resurface with grass sod over a 1,085-square-foot area for erosion protection Pavement maintenance in paved areas • Total paved area is estimated to be 1,140 square feet • Assume $1,200 per year for inspection and maintenance implementation (annual maintenance costs and reports) • Implemented for an assumed duration of 30 years
Confirmation soil sampling	Confirmation soil sampling • Collect three samples (one confirmation sample per 500 square feet and an additional 20 percent QA/QC samples) • Analyze samples for lead using a portable XRF instrument • Submit 20 percent of the total number of samples (one sample) to off-site analytical laboratory for confirmation lead analysis using U.S. EPA Method 6010B • Assume 2-day laboratory turnaround time
Waste profile soil sampling	Soil sampling for disposal • Collect six samples (one sample per every stockpile plus 20 percent QA/QC samples) • Analyze samples for CAM 17 metals using U.S. EPA Method 200.7 • Additional laboratory analysis – 50 percent of the stockpile samples (three samples) would be analyzed for STLC-soluble lead and chromium – 25 percent of the stockpile samples (two samples) would be analyzed for TCLP-soluble lead and chromium • Assume 2-week laboratory turnaround time
ICs and reviews	IC implementation • Assume IC design effort included in the remedial design effort above • No fencing or signage • Assume $3,000 per year for IC implementation (annual maintenance costs and reports) • Implemented for an assumed duration of 30 years • Comprehensive reviews would be performed every 5 years under CERCLA
Alternative AOC 10/12-3: excavation and off-site disposal	
Predesign soil sampling	Same as above for Alternative AOC 10/12-2
Remedial design and implementation	Remedial design effort (assumed to require 1,000 hours) Preconstruction survey (two people for 1 week; includes report) Excavation to an estimated depth of 1 foot bgs or 1 foot below the pavement's subbase layer • USA notification and sitewide utility-locating survey (two people for 1 day) • Remove existing grass sod on top of the proposed excavation areas (total grass area is assumed to be 1,085 square feet) and dispose of off-site

Table L-5 (continued)

Components	Assumptions
Alternative AOC 10/12-3: excavation and off-site disposal (continued)	
Remedial design and implementation (continued)	• Remove paved surfaces on top of the proposed excavation areas (total paved area is assumed to be 1,140 square feet) and dispose of off-site (the costs of removing and disposing any existing paved surfaces would be paid by the property developer, not the Navy) • Total volume of excavated soil is assumed to be 85 bcy (total area is assumed to be 2,225 square feet and depth is assumed to be 1 foot) • Excavated soil would be segregated, stockpiled into 8.5-cubic-yard batches, and characterized before off-site disposal. Assuming 85 bcy of excavated soil, there would be 10 stockpiles • Approximately five stockpiles (42.5 bcy) are assumed to be nonhazardous waste going to the Class II landfill at Altamont, Livermore, California, or similar facility • Approximately two stockpiles (17 bcy) are assumed to be RCRA-characteristic hazardous waste and to be treated by stabilization at the Chemical Waste Management's hazardous waste landfill in Kettleman City, California (200 miles away) or similar facility • Approximately three stockpiles (25.5 bcy) are assumed to be California-characteristic hazardous waste going to the Chemical Waste Management's hazardous waste landfill in Kettleman City, California (200 miles away) or similar facility • Waste transportation and disposal costs from local waste company (see above rates) • Backfill with purchased clean, imported fill from local source (same amount) Landscape/hardscape • Resurface with grass sod for erosion protection (total grass area is assumed to be 1,085 square feet) • Reapply asphalt or concrete (3-inch-thick pavement over 9-inch-thick layer of subbase) in area currently covered with hardscape (total paved area is assumed to be 1,140 square feet) Remedial action closeout report (two people for 2 weeks)
Confirmation soil sampling	Confirmation soil sampling • Collect six samples (one confirmation sample per 500 square feet and an additional 20 percent QA/QC samples) • Analyze samples for lead using a portable XRF instrument • Submit 20 percent of the total number of samples (one sample) to off-site analytical laboratory for confirmation lead analysis using U.S. EPA Method 6010B • Assume 2-day laboratory turnaround time
Waste profile soil sampling	Soil sampling for disposal • Collect 12 samples (one sample per every stockpile plus 20 percent QA/QC samples) • Analyze samples for CAM 17 metals using U.S. EPA Method 200.7 • Additional laboratory analysis – 50 percent of the stockpile samples (six samples) would be analyzed for STLC-soluble lead and chromium – 25 percent of the stockpile samples (three samples) would be analyzed for TCLP-soluble lead and chromium • Assume 2-week laboratory turnaround time

Table L-5 (continued)

Acronyms/Abbreviations:
AOC – area of concern
bcy – bank (in place) cubic yards
bgs – below ground surface
CAM – California Assessment Manual
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
IC – institutional control
QA – quality assurance
QC – quality control
RCRA – Resource Conservation and Recovery Act
STLC – soluble threshold limit concentration
TCLP – toxicity characteristic leaching procedure
USA – Underground Service Alert
U.S. EPA – United States Environmental Protection Agency
XRF – X-ray fluorescence

Table L-6
Cost Estimate Summary for
Alternative AOC 10/12-2: Limited Excavation, Cover, and ICs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Costs for AOC 10-2				
Remedial Design Costs				
Remedial design	$100,000			$100,000
Initial investigation/Predesign sampling	$10,000			$10,000
Preconstruction survey	$8,000			$8,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs with Markups[a]				**$120,000**
Capital Costs				
Removal of existing sod (1,085 square feet)	$3,000			$3,000
Excavation and backfill (40 cubic yards)	$2,000			$2,000
Off-site disposal	$8,000			$8,000
Waste profile sampling	$5,000			$5,000
Confirmation sampling	$6,000			$6,000
Landscape sod (1,085 square feet)	$12,000			$12,000
Subtotal Capital Costs With Markups[a]				**$36,000**
O&M Costs				
ICs and reporting (30 years)		$3,000		$90,000
5-year reviews			$24,000	$144,000
Subtotal O&M Costs With Markups[a]				**$234,000**
Subtotal With Markups[a]				**$390,000**
Contingency (20%)				$78,000
TOTAL COST				**$468,000**
Present Value of Alternative AOC 10-2 (based on 2006 dollars)[b]				**$358,000**

Table L-6 (continued)

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Costs for AOC 12-2				
Remedial Design Costs				
Remedial design	$50,000			$50,000
Initial investigation/Predesign sampling	$4,000			$4,000
Subtotal Remedial Design Costs with Markups[a]				$54,000
Capital Costs				
Removal of sediments (10 cubic yards)	$5,000			$5,000
Off-site disposal	$2,000			$2,000
Waste profile sampling	$4,000			$4,000
Subtotal Capital Costs With Markups[a]				**$11,000**
O&M Costs				
ICs and reporting (30 years)		$3,000		$90,000
5-year reviews			$24,000	$144,000
Subtotal O&M Costs With Markups[a]				**$234,000**
Subtotal With Markups[a]				**$299,000**
Contingency (20%)				$60,000
TOTAL COST				**$359,000**
Present Value of Alternative AOC 12-2 (based on 2006 dollars)[b]				**$252,000**
TOTAL COST FOR ALTERNATIVE AOC 10/12-2				**$827,000**
Present Value of Alternative AOC 10/12-2 (based on 2006 dollars)[b]				**$610,000**

Notes:

[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit

[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:

AOC – area of concern
IC – institutional control
O&M – operation and maintenance
USA – Underground Service Alert

Table L-7
Cost Estimate Summary for
Alternative AOC 10/12-3: Excavation and Off-Site Disposal

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Costs for AOC 10-3				
Remedial Design Costs				
Remedial design	$100,000			$100,000
Initial investigation/Predesign sampling	$10,000			$10,000
Preconstruction survey	$8,000			$8,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs with Markups[a]				**$120,000**
Capital Costs				
Removal of existing sod (1,085 square feet)	$3,000			$3,000
Excavation and backfill (85 cubic yards)	$6,000			$6,000
Off-site disposal	$18,000			$18,000
Waste profile sampling	$10,000			$10,000
Confirmation sampling	$6,000			$6,000
Landscape sod (1,085 square feet)	$10,000			$10,000
Asphalt/concrete cover (1,140 square feet)	$5,000			$5,000
Subtotal Capital Costs With Markups[a]				**$58,000**
O&M Costs				
Closeout report				$28,000
Subtotal O&M Costs With Markups[a]				**$28,000**
Subtotal With Markups[a]				**$206,000**
Contingency (20%)				$41,000
TOTAL COST				**$247,000**
Present Value of Alternative AOC 10-3 (based on 2006 dollars)[b]				**$242,000**

Table L-7 (continued)

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Costs for AOC 12-3				
Remedial Design Costs				
Remedial design	$100,000			$100,000
Initial investigation/Predesign sampling	$11,000			$11,000
Preconstruction survey	$8,000			$8,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs with Markups[a]				**$121,000**
Capital Costs				
Removal of sediments (10 cubic yards)	$5,000			$5,000
Removal of existing asphalt/concrete pavement (performed by others)				
Excavation and backfill (252 cubic yards)	$16,000			$16,000
Off-site disposal	$55,000			$55,000
Waste profile sampling	$11,000			$11,000
Confirmation sampling	$6,000			$6,000
Asphalt/concrete cover (5,525 square feet)	$20,000			$20,000
Subtotal Capital Costs With Markups[a]				**$113,000**
O&M Costs				
Closeout report				$28,000
Subtotal O&M Costs With Markups[a]				**$28,000**
Subtotal With Markups[a]				**$262,000**
Contingency (20%)				$52,000
TOTAL COST				**$314,000**
Present Value of Alternative AOC 12-3 (based on 2006 dollars)[b]				**$305,000**
TOTAL COST FOR ALTERNATIVE AOC 10/12-3				**$561,000**
Present Value of Alternative AOC 10/12-3 (based on 2006 dollars)[b]				**$547,000**

Notes:

[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit

[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used.

Acronyms/Abbreviations:

AOC – area of concern
O&M – operation and maintenance
USA – Underground Service Alert

Table L-8
AOC 12
Cost Estimate Assumptions for Soil Alternatives

Components	Assumptions
Alternative AOC 10/12-2: limited excavation, cover, and ICs	
Predesign soil sampling	All impacted soil areas at AOC 12 are beneath paved surfaces. This alternative involves limited excavations in unpaved areas only. Since no soil excavations would be performed at AOC 12, a predesign sampling program is not needed.
Remedial design and implementation	Remedial design effort (assumed to require 500 hours) Preconstruction survey (two people for 0.5 week; includes report) Sediment removal • Remove impacted sediments in storm drains using a vacuum truck • Total volume of sediments is assumed to be 10 bcy; assume one stockpile • 50 percent of total sediment volume to be disposed (5 bcy) is assumed to be nonhazardous waste going to the Class II landfill at Altamont, Livermore, California, or similar facility • 20 percent of total sediment volume to be disposed (2 bcy) is assumed to be RCRA-characteristic hazardous waste and to be treated by stabilization at the Chemical Waste Management's hazardous waste landfill in Kettleman City, California (200 miles away) or similar facility • 30 percent of total sediment volume to be disposed (3 bcy) is assumed to be California-characteristic hazardous waste going to the Chemical Waste Management's hazardous waste landfill in Kettleman City, California (200 miles away) or similar facility • Waste transportation and disposal costs from local waste company – Assume 1.4 tons per bcy – $45 per ton for nonhazardous waste, including transportation to the Class II landfill at Altamont, Livermore, California, or similar facility; disposal; and landfill taxes – $235 per ton for RCRA-characteristic hazardous waste, including transportation to the Chemical Waste Management's hazardous waste landfill in Kettleman City, California (200 miles away) or similar facility; stabilization; disposal; and landfill taxes – $105 per ton for California-characteristic hazardous waste, including transportation to the Chemical Waste Management's hazardous waste landfill in Kettleman City, California (200 miles away) or similar facility; disposal; and landfill taxes
Waste profile soil sampling	Soil sampling for disposal • Collect two samples (one sample plus 20 percent QA/QC samples) • Analyze samples for CAM 17 metals using U.S. EPA Method 200.7 • Additional laboratory analysis – 50 percent of the stockpile samples (one sample) would be analyzed for STLC-soluble lead and chromium – 25 percent of the stockpile samples (one sample) would be analyzed for TCLP-soluble lead and chromium • Assume 2-week laboratory turnaround time
ICs and reviews	IC implementation • Assume IC design effort included in the remedial design effort above • No fencing or signage

Table L-8 (continued)

Components	Assumptions
Alternative AOC 10/12-2: limited excavation, cover, and ICs (continued)	
ICs and reviews (continued)	• Assume $3,000 per year for IC implementation (annual maintenance costs and reports) • Implemented for an assumed duration of 30 years • Comprehensive reviews would be performed every 5 years under CERCLA
Alternative AOC 10/12-3: excavation and off-site disposal	
Predesign soil sampling	Soil sampling for delineation of excavation boundaries • Preparation of work plan (one person for 1 week) • Advance up to 40 soil borings • Collect up to 48 samples (collect soil samples at depths ranging from 0.5 foot to 2 feet below the pavement's subbase layer from each boring plus 20 percent QA/QC samples) • Analyze samples for lead using a portable XRF instrument • Submit 20 percent of the total number of samples (10 samples) to off-site analytical laboratory for confirmation lead analysis using U.S. EPA Method 6010B • Assume 2-week laboratory turnaround time
Remedial design and implementation	Remedial design effort (assumed to require 1,000 hours) Preconstruction survey (two people for 1 week; includes report) Excavation to an estimated depth ranging from 0.5 foot to 2 feet below the pavement's subbase layer • USA notification and sitewide utility-locating survey (two people for 1 day) • Remove paved surfaces on top of the proposed excavation areas (total paved area is assumed to be 5,525 square feet) and dispose of off-site (for RI/FS purposes, the cost of removing and disposing any existing paved surfaces would be paid by the property developer, not the Navy) • Total volume of excavated soil is assumed to be 252 bcy • Excavated soil would be segregated, stockpiled into 25-cubic-yard batches, and characterized before off-site disposal. Assuming 252 bcy of excavated soil, there would be 10 stockpiles. • Approximately five stockpiles (127 bcy) are assumed to be nonhazardous waste going to the Class II landfill at Altamont, Livermore, California, or similar facility • Approximately two stockpiles (50 bcy) are assumed to be RCRA-characteristic hazardous waste and to be treated by stabilization at the Chemical Waste Management's hazardous waste landfill in Kettleman City, California (200 miles away) or similar facility • Approximately three stockpiles (75 bcy) are assumed to be California-characteristic hazardous waste going to the Chemical Waste Management's hazardous waste landfill in Kettleman City, California (200 miles away) or similar facility • Waste transportation and disposal costs from local waste company (see above rates) • Backfill with purchased clean, imported fill from a local source (same amount) Landscape/hardscape • Reapply asphalt or concrete (3-inch-thick pavement over 9-inch-thick layer of subbase) in areas currently covered with hardscape (total paved area is assumed to be 5,525 square feet)

Table L-8 (continued)

Components	Assumptions
Alternative AOC 10/12-3: excavation and off-site disposal (continued)	
Remedial design and implementation (continued)	Sediment removal • Remove impacted sediments in storm drains using a vacuum truck • Total volume of sediments is assumed to be 10 bcy; assume one stockpile • 50 percent of total sediment volume to be disposed of (5 bcy) is assumed to be nonhazardous waste going to the Class II landfill at Altamont, Livermore, California, or similar facility • 20 percent of total sediment volume to be disposed of (2 bcy) is assumed to be RCRA-characteristic hazardous waste and to be treated by stabilization at the Chemical Waste Management's hazardous waste landfill in Kettleman City, California (200 miles away) or similar facility • 30 percent of total sediment volume to be disposed of (3 bcy) is assumed to be California-characteristic hazardous waste going to the Chemical Waste Management's hazardous waste landfill in Kettleman City, California (200 miles away) or similar facility • Waste transportation and disposal costs from local waste company (see above rates) Remedial action closeout report (two people for 2 weeks)
Confirmation soil sampling	Confirmation soil sampling • Collect 14 samples (one confirmation sample per 500 square feet and an additional 20 percent QA/QC samples) • Analyze samples for lead using a portable XRF instrument • Submit 20 percent of the total number of samples (three samples) to off-site analytical laboratory for confirmation lead analysis using U.S. EPA Method 6010B • Assume 2-day laboratory turnaround time
Waste profile soil sampling	Soil sampling for disposal • Collect 13 samples (one sample for every stockpile of excavated soil and removed sediments plus 20 percent QA/QC samples) • Analyze samples for CAM 17 metals using U.S. EPA Method 200.7 • Additional laboratory analysis – 50 percent of the stockpile samples (seven samples) would be analyzed for STLC-soluble lead and chromium – 25 percent of the stockpile samples (four samples) would be analyzed for TCLP-soluble lead and chromium • Assume 2-week laboratory turnaround time

Acronyms/Abbreviations:
AOC – area of concern
bcy – bank (in place) cubic yards
CAM – California Assessment Manual
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
FS – feasibility study
IC – institutional control
QA – quality assurance
QC – quality control
RCRA – Resource Conservation and Recovery Act
RI – remedial investigation
STLC – soluble threshold limit concentration
TCLP – toxicity characteristic leaching procedure
USA – Underground Service Alert
U.S. EPA – United States Environmental Protection Agency
XRF – X-ray fluorescence

Table L-9
PAH Areas
Cost Estimate Assumptions for Soil Alternatives

Components	Assumptions
Alternative PAH-2: ICs	
Remedial design and implementation	Remedial design effort (assumed to require 500 hours)
ICs and reviews	IC implementation • Assume IC design is included in the remedial design effort • No fencing or signage • Assume $3,000 per year for IC implementation (annual maintenance costs and reports) • Implemented for an assumed duration of 30 years • Comprehensive reviews would be performed every 5 years under CERCLA
Alternative PAH-3a: excavation in unpaved areas to 2 feet bgs and ICs	
Remedial design and implementation	Remedial design effort (assumed to require 1,000 hours) Preconstruction survey (two people for 1 week; includes report) Excavation to 2 feet bgs in unpaved areas • USA notification and utility-locating survey in excavation areas (two people for 1 day) • Assume no additional costs for utility reconstruction or relocation • Total volume of excavated soil in unpaved areas is assumed to be 311 bcy (total unpaved area is assumed to be 4,200 square feet and depth is assumed to be 2 feet) • Excavated soil would be stockpiled and characterized before off-site disposal • All soil to be disposed of (311 cubic yards) is assumed as nonhazardous waste going to Class II landfill at Altamont, Livermore, California, at $45 per ton, including transportation to Class II landfill, disposal, and landfill taxes • Backfill with purchased clean, imported fill from a local source (311 bcy) • Resurface with grass sod over 4,200-square-foot area for erosion protection
Waste profile soil sampling	Soil sampling for disposal • Collect two samples (one sample per every 500 bcy of excavated soil with a total volume of 311 bcy plus one QA/QC sample) • Submit all samples (two samples) to an off-site analytical laboratory for confirmation PAH analysis using U.S. EPA Method 8270C SIM; for TPH-g, TPH-d, and TPH-mo using U.S. EPA Method 8015-M; for VOCs using U.S. EPA Method 8260B; and for CAM 17 metals using U.S. EPA Method 200.7 • Additional laboratory analysis – 25 percent of stockpile samples (one sample) would be analyzed for STLC-soluble arsenic, cadmium, lead, and chromium • Assume 2-week laboratory turnaround time IC implementation • Assume IC design is included in the remedial design effort • No fencing or signage • Assume $3,000 per year for IC implementation (annual maintenance costs and reports) • Implemented for an assumed duration of 30 years • Comprehensive reviews would be performed every 5 years under CERCLA

Table L-9 (continued)

Components	Assumptions
Alternative PAH-3b: excavation to 2 feet bgs and ICs	
Remedial design and implementation	Remedial design effort (assumed to require 1,000 hours) Preconstruction survey (two people for 1 week; includes report) Excavation to 2 feet bgs in unpaved areas and 2 feet below the pavement's subbase layer • USA notification and utility-locating survey in excavation areas (two people for 1 day) • Assume no additional costs for utility reconstruction or relocation • The cost of removing paved surfaces in proposed excavation areas (total area is estimated to be 10,700 square feet) and recycling off-site is listed in this estimation for information only • Total volume of excavated soil is assumed to be 1,105 bcy (total unpaved and paved areas are assumed to be 14,915 square feet and the depth is assumed to be 2 feet) • Excavated soil would be segregated, stockpiled into 500-cubic-yard batches, and characterized before off-site disposal • All soil to be disposed of (1,105 bcy) is assumed as nonhazardous waste going to Class II landfill at Altamont, Livermore, California, at $45 per ton, including transportation to Class II landfill, disposal, and landfill taxes • Backfill with purchased clean, imported fill from a local source (same amount) • Resurface with grass sod over 14,915-square-foot area for erosion protection
Waste profile soil sampling	Soil sampling for disposal • Collect four samples (one sample per every 500 bcy of excavated soil with a total volume of 1,105 bcy plus one QA/QC sample) • Submit all samples (four samples) to an off-site analytical laboratory for confirmation PAH analysis using U.S. EPA Method 8270C SIM; for TPH-g, TPH-d, and TPH-mo using U.S. EPA Method 8015-M; for VOCs using U.S. EPA Method 8260B; and for CAM 17 metals using U.S. EPA Method 200.7 • Additional laboratory analysis – 25 percent of stockpile samples (one sample) would be analyzed for STLC-soluble arsenic, cadmium, lead, and chromium • Assume 2-week laboratory turnaround time
ICs and reviews	IC implementation • Assume IC design is included the remedial design effort • No fencing or signage • Assume $3,000 per year for IC implementation (annual maintenance costs and reports) • Implemented for an assumed duration of 30 years • Comprehensive reviews would be performed every 5 years under CERCLA
Alternative PAH-4a: excavation in unpaved areas to 4 feet bgs and ICs	
Remedial design and implementation	Remedial design effort (assumed to require 1,000 hours) Preconstruction survey (two people for 1 week; includes report) Excavation to 2 feet bgs in unpaved areas at locations where the exceedances are identified at a 0-to-2-foot depth interval • Costs for excavation, waste profiling, and disposal are the same as in Alternative PAH-3a. Since the PAH exceedances at several locations were found only at depths of 0 to 2 feet bgs, excavations deeper than 2 feet bgs are not required.

Table L-9 (continued)

Components	Assumptions
Alternative PAH-4a: excavation in unpaved areas to 4 feet bgs and ICs (continued)	
Remedial design and implementation	Excavation to 4 feet bgs in unpaved areas (for locations where the exceedances are identified at a 2-to-4-foot depth interval) • USA notification and utility-locating survey in excavation areas (two people for 1 day) • Assume no additional costs for utility reconstruction or relocation • Total volume of excavated soil in unpaved areas is assumed to be 12,900 bcy (total excavation area is assumed to be 87,000 square feet, and the depth is assumed to be 4 feet) • The excavated soils from 0 to 2 feet bgs in the excavation area (total volume is estimated to be 6,440 bcy) would be reused on-site for backfill after testing shows B(a)P-equivalent concentrations below 1 mg/kg • The excavated soils from 0 to 2 feet bgs would be segregated, stockpiled into 500-cubic-yard batches, and characterized before reuse • The excavated soils from 2 to 4 feet bgs in the excavation area (total volume is estimated to be 6,440 bcy) would be disposed of • Excavated soil would be segregated, stockpiled into 500-cubic-yard batches, and characterized before off-site disposal • All soil to be disposed of (6,440 cubic yards) is assumed as nonhazardous waste going to Class II landfill at Altamont, Livermore, California, at $45 per ton, including transportation to Class II landfill, disposal, and landfill taxes • Backfill with excavated clean soil from on-site (6,440 bcy) and purchased clean, imported fill from a local source (6,440 bcy) • Resurface with grass sod over 87,000-square-foot area for erosion protection
Waste profile soil sampling	Excavation to 2 feet bgs in unpaved areas at locations where the exceedances are identified at a 0-to-2-foot depth interval. Cost for waste profiling is the same as in Alternative PAH-3a Excavation to 4 feet bgs in unpaved areas (for locations where the exceedances are identified at a 2-to-4-foot depth interval) Soil sampling for on-site reuse (characterizing the excavated soil from 0 to 2 feet bgs to determine/confirm on-site reuse) • Collect 16 samples (one sample per every 500 bcy of excavated soil from upper 2 feet with a total volume of 6,440 bcy plus 20 percent QA/QC samples) • Submit all samples (16 samples) to an off-site analytical laboratory for confirmation PAH analysis using U.S. EPA Method 8270C SIM Soil sampling for disposal (assume sampling of the excavated soil to determine or confirm the off-site disposal) • Collect 16 samples (one sample per every 500 bcy of excavated soil from 2-to-4-foot depth interval with a total volume of 6,400 bcy plus 20 percent QA/QC samples) • Submit all samples (16 samples) to an off-site analytical laboratory for confirmation PAH analysis using U.S. EPA Method 8270C SIM; for TPH-g, TPH-d, and TPH-mo using U.S. EPA Method 8015-M; for VOCs using U.S. EPA Method 8260B; and for CAM 17 metals using U.S. EPA Method 200.7 • Additional laboratory analysis – 25 percent of stockpile samples (four samples) will be analyzed for STLC-soluble arsenic, cadmium, lead, and chromium • Assume 2-week laboratory turnaround time

Table L-9 (continued)

Components	Assumptions
Alternative PAH-4a: excavation in unpaved areas to 4 feet bgs and ICs (continued)	
ICs and reviews	IC implementation • Assume IC design is included in the remedial design effort • No fencing or signage • Assume $3,000 per year for IC implementation (annual maintenance costs and reports) • Implemented for an assumed duration of 30 years • Comprehensive reviews would be performed every 5 years under CERCLA
Alternative PAH-4b: excavation to 4 feet bgs	
Remedial design and implementation	Remedial design effort (assumed to require 1,000 hours) Preconstruction survey (two people for 1 week; includes report) Excavation to 2 feet bgs in unpaved areas at locations where the exceedances are identified at a 0-to-2-foot depth interval • Costs for excavation, waste profiling, and disposal are the same as in Alternative PAH-3b. Since the PAH exceedances at several locations were found only at depths of 0 to 2 feet, excavations deeper than 2 feet bgs are not required. Excavation to 4 feet bgs in unpaved areas and 4 feet below the pavement's subbase layer (for locations where the exceedances are identified at a 2-to-4-foot depth interval) • USA notification and utility-locating survey in excavation areas (two people for 1 day) • Assume no additional costs for utility reconstruction or relocation • The cost of removing paved surfaces in proposed excavation areas (total area is estimated to be 20,000 square feet) and recycling off-site is listed in this cost estimation for information only • Total volume of excavated soil is assumed to be 15,850 bcy (the total excavation area is assumed to be 107,000 square feet, including 20,000 square feet of paved areas, and 86,900 square feet of unpaved areas; the depth is assumed to be 4 feet) • The excavated soils from 0 to 2 feet bgs in the excavation area (total volume is estimated to be 7,930 bcy) would be reused on-site for backfill after testing shows B(a)P-equivalent concentrations below 1 mg/kg • The excavated soils from 0 to 2 feet bgs would be segregated, stockpiled into 500-cubic-yard batches, and characterized before reuse • The excavated soils from 2 to 4 feet bgs in the excavation area (total volume is estimated to be 7,930 bcy) would be disposed of • Excavated soil would be segregated, stockpiled into 500-cubic-yard batches, and characterized before off-site disposal • All soil to be disposed of (7,930 cubic yards) is assumed as nonhazardous waste going to Class II landfill at Altamont, Livermore, California, at $45 per ton, including transportation to Class II landfill, disposal, and landfill taxes • Backfill with excavated, clean soil from on-site (7,930 bcy) and purchased clean, imported fill from a local source (7,930 bcy) • Resurface with grass sod over 107,000-square-foot area for erosion protection • Remedial action closeout report (two people for 2 weeks)

Table L-9 (continued)

Components	Assumptions
Alternative PAH-4b: excavation to 4 feet bgs (continued)	
Waste profile soil sampling	Excavation to 2 feet bgs in unpaved areas at locations where the exceedances are identified at a 0-to-2-foot depth interval. Cost for waste profiling is the same as in Alternative PAH-3b Excavation to 4 feet bgs in unpaved areas and 4 feet below the pavement's subbase layer (for locations where the exceedances are identified at a 2-to-4-foot depth interval) Soil sampling for on-site reuse (characterizing the excavated soil from 0 to 2 feet bgs to determine/confirm on-site reuse) • Collect 20 samples (one sample per every 500 bcy of excavated soil from upper 2 feet with a total volume of 7,930 bcy plus 20 percent QA/QC samples) • Submit all samples (20 samples) to an off-site analytical laboratory for confirmation PAH analysis using U.S. EPA Method 8270C SIM Soil sampling for disposal (assume sampling of the excavated soil from 2 to 4 feet bgs to determine or confirm off-site disposal) • Collect 20 samples (one sample per every 500 bcy of excavated soil from a 2-to-4-foot depth interval with a total volume of 7,930 bcy plus 20 percent QA/QC samples) • Submit all samples (20 samples) to an off-site analytical laboratory for confirmation PAH analysis using U.S. EPA Method 8270C SIM; for TPH-g, TPH-d, and TPH-mo using U.S. EPA Method 8015-M; for VOCs using U.S. EPA Method 8260B; and for CAM 17 metals using U.S. EPA Method 200.7 • Additional laboratory analysis – 25 percent of stockpile samples (five samples) would be analyzed for STLC-soluble arsenic, cadmium, lead, and chromium • Assume 2-week laboratory turnaround time

Acronyms/Abbreviations:
B(a)P – benzo(a)pyrene
bcy – bank (in place) cubic yards
bgs – below ground surface
CAM – California Assessment Manual
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
IC – institutional control
mg/kg – milligrams per kilogram
PAH – polynuclear aromatic hydrocarbon
QA – quality assurance
QC – quality control
SIM – selected ion monitoring
STLC – soluble threshold limit concentration
TPH – total petroleum hydrocarbons
TPH-d – diesel-range TPH
TPH-g – gasoline-range TPH
TPH-mo – motor oil–range TPH
USA – Underground Service Alert
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Table L-10
Cost Estimate Summary for
Alternative PAH-2: ICs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$50,000			$50,000
Subtotal Remedial Design Costs with Markups[a]				**$50,000**
O&M Costs				
ICs and reporting (30 years)		$3,000		$90,000
5-year reviews			$24,000	$144,000
Subtotal O&M Costs With Markups[a]				**$234,000**
Subtotal With Markups[a]				**$284,000**
Contingency (20%)				$57,000
TOTAL COST				**$341,000**
Present Value of Alternative PAH-2 (based on 2006 dollars)[b]				**$235,000**

Notes:
[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit
[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:
IC – institutional control
O&M – operation and maintenance
PAH – polynuclear aromatic hydrocarbon

Table L-11
Cost Estimate Summary for Alternative PAH-3a: Excavation in Unpaved Areas to 2 Feet bgs and ICs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$100,000			$100,000
Preconstruction survey	$8,000			$8,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs with Markups[a]				**$110,000**
Capital Costs				
Removal of existing sod (4,200 square feet)	$4,000			$4,000
Excavation / backfill (311 bcy)	$19,000			$19,000
Disposal off-site (311 cubic yards)	$30,000			$30,000
Waste profile soil sampling	$6,000			$6,000
Landscape sod (4,200 square feet)	$16,000			$16,000
Subtotal Capital Costs With Markups[a]				**$75,000**
O&M Costs				
ICs and reporting (30 years)		$3,000		$90,000
5-year reviews			$24,000	$144,000
Subtotal O&M Costs With Markups[a]				**$234,000**
Subtotal With Markups[a]				**$419,000**
Contingency (20%)				$84,000
TOTAL COST				**$503,000**
Present Value of Alternative PAH-3a (based on 2006 dollars)[b]				**$391,000**

Notes:

[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit

[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:

bcy – bank (in place) cubic yards
bgs – below ground surface
IC – institutional control
O&M – operation and maintenance
PAH – polynuclear aromatic hydrocarbon
USA – Underground Service Alert

Table L-12
Cost Estimate Summary for
Alternative PAH-3b: Excavation to 2 Feet bgs and ICs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$100,000			$100,000
Preconstruction survey	$8,000			$8,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs with Markups[a]				**$110,000**
Capital Costs				
Removal of existing sod (4,200 square feet)	$4,000			$4,000
Excavation and backfill (1,105 cubic yards)	$58,000			$58,000
Off-site disposal (1,105 cubic yards)	$104,000			$104,000
Waste profile sampling	$10,000			$10,000
Landscape sod (14,915 square feet)	$38,000			$38,000
Subtotal Capital Costs With Markups[a]				**$214,000**
O&M Costs				
ICs and reporting (30 years)		$3,000		$90,000
5-year reviews			$24,000	$144,000
Subtotal O&M Costs With Markups[a]				**$234,000**
Subtotal With Markups[a]				**$558,000**
Contingency (20%)				$111,000
TOTAL COST				**$669,000**
Present Value of Alternative PAH-3b (based on 2006 dollars)[b]				**$553,000**

Notes:
[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit
[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:
bgs – below ground surface
IC – institutional control
O&M – operation and maintenance
PAH – polynuclear aromatic hydrocarbon
USA – Underground Service Alert

Table L-13
Cost Estimate Summary for Alternative PAH-4a: Excavation in Unpaved Areas to 4 Feet bgs and ICs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$100,000			$100,000
Preconstruction survey	$8,000			$8,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs with Markups[a]				**$110,000**
Capital Costs				
Removal of existing sod (91,111 square feet)	$45,000			$45,000
Excavation/backfill (13,187 cubic yards)	$533,000			$534,000
Disposal off-site (6,749 cubic yards)	$621,000			$621,000
Waste profile soil sampling	$49,000			$49,000
Landscape sod (91,111 square feet)	$196,000			$196,000
Subtotal Capital Costs With Markups[a]				**$1,445,000**
O&M Costs				
ICs and reporting (30 years)		$3,000		$90,000
5-year reviews			$24,000	$144,000
Subtotal O&M Costs With Markups[a]				**$234,000**
Subtotal With Markups[a]				**$1,789,000**
Contingency (20%)				$358,000
TOTAL COST				**$2,147,000**
Present Value of Alternative PAH-4a (based on 2006 dollars)[b]				**$1,988,000**

Notes:

[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit

[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:

bgs – below ground surface
IC – institutional control
O&M – operation and maintenance
PAH – polynuclear aromatic hydrocarbon
USA – Underground Service Alert

Table L-14
Cost Estimate Summary for
Alternative PAH-4b: Excavation to 4 Feet bgs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$100,000			$100,000
Preconstruction survey	$8,000			$8,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs with Markups[a]				**$110,000**
Capital Costs				
Removal of existing sod (91,111 square feet)	$45,000			$45,000
Removal of existing asphalt/concrete pavement (performed by others, 30,684 square feet)				
Excavation and backfill (16,939 cubic yards)	$738,000			$738,000
Off-site disposal (9,022 cubic yards)	$830,000			$830,000
Waste profile sampling	$61,000			$61,000
Landscape sod (121,796 square feet)	$273,000			$273,000
Subtotal Capital Costs With Markups[a]				**$1,947,000**
O&M Costs				
Project Closeout Report	$50,000			$50,000
Subtotal O&M Costs With Markups[a]				**$50,000**
Subtotal With Markups[a]				**$2,105,000**
Contingency (20%)				$421,000
TOTAL COST				**$2,526,000**
Present Value of Alternative PAH-4b (based on 2006 dollars)[b]				**$2,450,000**

Notes:

[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit

[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:

bgs – below ground surface
O&M – operation and maintenance
PAH – polynuclear aromatic hydrocarbon
USA – Underground Service Alert

Table L-15
AOC 1
Cost Estimate Assumptions for Groundwater Alternatives

Components	Assumptions
Alternative AOC 1-2: MNA and ICs	
Initial investigation and monitoring wells installation	Define extent of naphthalene in groundwater around OWS • Advance 15 borings for HydroPunch or equivalent sampling of groundwater • Assume two soil samples and one groundwater sample per boring are collected for VOC analysis using U.S. EPA Method 8260B • Assume 2 long days (10 hours per day) of direct-push drilling equipment Install three 4-inch-diameter groundwater monitoring wells, 20 feet deep Sample new monitoring wells • Field analysis as described below • Laboratory analysis as described below Preconstruction survey (two people for 3 days, including report) USA notification Utility-locating survey (two people for 1 day)
Remedial design	Engineering and monitoring plan preparation (500 hours) • Design and reporting of initial investigation • MNA monitoring plan • IC implementation plan
Groundwater sampling and MNA	Sampling frequency • Year 1 – assume three wells are sampled quarterly • Years 2 through 10 – assume three wells are sampled annually Field analyses • Rented hand-held equipment: conductivity, temperature, turbidity, pH, ORP, DO Laboratory analyses • MNA parameters – dissolved gases (GC/FID) – total organic carbon (U.S. EPA Method 415.1) – total dissolved solids (U.S. EPA Method 160.1) • VOCs using U.S. EPA Method 8260B • Assume four samples per monitoring event (including one QA/QC sample) • Assume 2-week laboratory turnaround time Annual groundwater monitoring reports
ICs	IC implementation • Assume IC design effort is included in the remedial design effort above • $3,000 per year for IC implementation (maintenance costs) • Implemented for an assumed duration of 10 years (until MNA process reaches cleanup goals) No fencing or signage Annual inspections and reporting to confirm compliance with IC plan
Reviews and reporting	Annual IC report (included in ICs above) Annual groundwater monitoring reports (included in the groundwater sampling above) Five-year reports at the end of years 5 and 10

Table L-15 (continued)

Components	Assumptions
Alternative AOC 1-3: source removal, enhanced aerobic ISB, and ICs	
Initial investigation and monitoring wells installation	Define extent of naphthalene in groundwater around OWS • Advance 15 borings for HydroPunch or equivalent sampling of groundwater • Assume two soil samples and one groundwater sample per boring are collected for VOC analysis using U.S. EPA Method 8260B • Assume 2 long days (10 hours per day) of direct-push drilling equipment Install and sample three monitoring wells as described for Alternative AOC 1-2
Remedial design	Engineering and monitoring plan preparation (500 hours) • Design and reporting of initial investigation • Source removal and enhanced aerobic ISB implementation plan • IC implementation plan
Source removal	Preconstruction survey (two people for 3 days, including report) Excavation and removal of the OWS Excavation to 14 feet bgs • USA notification • Utility-locating survey (two people for 1 day) • Excavation area includes the area around sampling location A01SB03 (40 feet by 40 feet or 1,600 square feet) • Total volume to be excavated assumed to be 830 bcy (assumed total area of 1,600 square feet and assumed depth of 14 feet bgs) • Costs associated with removal and disposal of existing pavement are excluded; these activities are assumed to be performed by the transferee as part of redevelopment of the site • 100 percent of total volume of excavated soil assumed to be disposed of as nonhazardous waste going to Class II landfill at Altamont, Livermore, California, or similar facility • Waste transportation and disposal costs to a local waste company, Altamont Landfill, Livermore (Lodge, pers. com. 2006) – $45 per ton for Class II waste, including transportation and disposal – Assume 1.4 tons per bcy No shoring along the excavation perimeter would be included Dewatering would be required • Assume groundwater table at 5 feet bgs • Assume volume of groundwater to be treated is a maximum of 50 gallons per minute for 4 weeks • Treat groundwater using activated carbon (two vessels in series, with 1,000 pounds of carbon per vessel); rental cost per 1,000-pound vessel is estimated to be $2,900/month (or $5,800/month for two units) including transportation • Forklift rental (per delivery or pick up) estimated to be $600/event • Service one vessel one time during the 1-month treatment operation; estimated service cost is $1,670/unit, for nonhazardous spent carbon, including waste carbon profiling fee (Miller, pers. com. 2006) • Prefilter groundwater using cartridge filters (assume four units); rental cost per unit is estimated to be $615/month (or $2,460/month for four units); assume all four cartridge filters would be replaced weekly for a month ($150/cartridge filter) • Assume extraction pump rental cost and maintenance for a period of 1 month is approximately $1,000/month

Table L-15 (continued)

Components	Assumptions
Alternative AOC 1-3: source removal, enhanced aerobic ISB, and ICs (continued)	
Source removal (continued)	• Discharge groundwater to the storm drain in compliance with substantive provisions of NPDES program • Laboratory analysis as described below Backfill with purchased clean, imported fill from a local source (same amount as excavation amount); backfilling to be performed in conjunction with the enhanced aerobic ISB treatment
Enhanced aerobic ISB (ORC treatment)	*In situ* treatment using ORC – assumed to be supplied by the vendor (product placed and mixed in with soil at bottom of excavation) • Assume one time placement of approximately 15,000 pounds of product (with a product cost of $8/pound) Transportation cost for product is approximately $2,200
Soil sampling	Assume 18 confirmation soil samples (16 plus 2 QA/QC samples) collected from base and walls of excavation are analyzed for VOCs using U.S. EPA 8260B Soil sampling for disposal (assume sampling of all the excavated soil to determine/confirm the off-site disposal versus on-site reuse) • Collect three soil samples (one sample per every 500 bcy of excavated soil with a total excavation volume of 830 bcy plus one QA/QC sample) • Analyze samples for TPH-g, TPH-d, and TPH-mo using U.S. EPA Method 8015-M; for VOCs using U.S. EPA Method 8260B; and for CAM 17 metals using U.S. EPA Method 200.7 (three samples) • Assume 2-week laboratory turnaround time
Groundwater sampling	Excavation dewatering (substantive provisions of NPDES) sampling • Sampling frequency – Influent and effluent sampling (six events in 1 month) • Laboratory analyses – VOCs using U.S. EPA Method 8260B – TPH-g, TPH-d, and TPH-mo using U.S. EPA Method 8015-M – CAM 17 metals using U.S. EPA Method 200.7 – One QA/QC sample per monitoring event – Assume 2-week laboratory turnaround time ISB Performance monitoring • Sampling frequency – Year 1 – assume three wells are sampled quarterly – Years 2 through 10 – assume three wells are sampled annually • Field analyses – Rented hand-held equipment: conductivity, temperature, turbidity, pH, ORP, DO • Laboratory analyses – VOCs using U.S. EPA Method 8260B – Assume four samples per monitoring event (including one QA/QC sample) – Assume 2-week laboratory turnaround time • Annual groundwater monitoring reports

Table L-15 (continued)

Components	Assumptions
Alternative AOC 1-3: source removal, enhanced aerobic ISB, and ICs (continued)	
ICs	IC implementation plan • Assume IC design effort is included in the remedial design effort above • $3,000 per year for IC implementation (maintenance costs) until cleanup goals are achieved • Implemented for an assumed duration of 10 years No fencing or signage Annual inspections and reporting to confirm compliance with IC plan
Reviews and reporting	Groundwater discharge report at end of dewatering program Annual IC report (included in ICs above) Annual groundwater monitoring reports (included in the groundwater sampling above) Five-year reports at the end of years 5 and 10
Alternative AOC 1-5: ISCO	
Initial investigation and monitoring wells installation	Define extent of naphthalene in groundwater around OWS and confirm ISCO treatment area • Advance 15 borings for HydroPunch or equivalent sampling of groundwater • Assume two long days (10 hours per day) of direct-push drilling equipment • Assume two soil samples and one groundwater sample per boring are collected for VOC analysis using U.S. EPA Method 8260B Install and sample three monitoring wells as described for Alternative AOC 1-2 Preconstruction survey (two people for 3 days, including report) USA notification Utility-locating survey (two people for 1 day)
Remedial design	Engineering and monitoring plan preparation (700 hours)
ISCO source area treatment operation	Assume treatment area of 7,500 square feet ISCO materials, injection labor for two injection events at an approximate cost of $100,000 (Haskins, pers. com. 2006) Injection points • Assume 32 injection points are required, with spacing of 20 feet on center • Temporary direct-push injection screens • 10-foot-thick treatment zone for ISCO Number of groundwater sampling events during the first 6 months: three sampling events, three wells sampled • Field analysis as described below • Laboratory analysis as described below
Groundwater sampling	Sampling frequency • Year 1 – assume three wells are sampled quarterly • Year 2 – assume three wells are sampled annually Field analyses • Test Kit: ferrous iron • Rented hand-held equipment: conductivity, temperature, turbidity, pH, ORP, DO

Table L-15 (continued)

Components	Assumptions
Alternative AOC 1-5: ISCO (continued)	
Groundwater sampling (continued)	Laboratory analyses • VOCs (U.S. EPA Method 8260B) • Dissolved metals (U.S. EPA Method 6010B/7000 Series) • Assume four samples per monitoring event (including one QA/QC sample) • Assume 2-week laboratory turnaround time Annual groundwater monitoring report
Reviews and reporting	Annual groundwater monitoring reports (included in the groundwater sampling above) Closeout report

Acronyms/Abbreviations:
AOC – area of concern
bcy – bank (in place) cubic yards
bgs – below ground surface
CAM – California Assessment Manual
DO – dissolved oxygen
FID – flame ionization detector
GC – gas chromatograph
IC – institutional control
ISB – *in situ* bioremediation
ISCO – *in situ* chemical oxidation
MNA – monitored natural attenuation
NPDES – National Pollutant Discharge Elimination System
NRCES – NRC Environmental Services
ORC – oxygen release compound
ORP – oxidation-reduction potential
OWS – oil/water separator
QA – quality assurance
QC – quality control
TPH – total petroleum hydrocarbons
TPH-d – diesel-range TPH
TPH-g – gasoline-range TPH
TPH-mo – motor oil–range TPH
USA – Underground Service Alert
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Table L-16
Cost Estimate Summary for
Alternative AOC 1-2: MNA and ICs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$50,000			$50,000
Initial investigation/predesign sampling (15 borings)	$33,000			$33,000
Preconstruction survey	$5,000			$5,000
USA notification and utility locating	$2,000			$2,000
Subtotal Remedial Design Costs with Markups[a]				**$90,000**
Capital Costs				
Install monitoring wells (3 wells)	$29,000			$29,000
Subtotal Capital Costs With Markups[a]				**$29,000**
O&M Costs				
Long-term groundwater monitoring (average cost for 10 years)		$11,200		$112,000
ICs and reporting (10 years)		$3,000		$30,000
Annual groundwater monitoring report		$10,000		$100,000
5-year reviews			$24,000	$48,000
Subtotal O&M Costs With Markups[a]				**$290,000**
Subtotal With Markups[a]				**$409,000**
Contingency (20%)				$82,000
TOTAL COST				**$491,000**
Present Value of Alternative AOC 1-2 (based on 2006 dollars)[b]				**$439,000**

Notes:

[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit

[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:

AOC – area of concern
IC – institutional control
MNA – monitored natural attenuation
O&M – operation and maintenance
USA – Underground Service Alert

Table L-17
Cost Estimate Summary for
Alternative AOC 1-3: Source Removal,
Enhanced Aerobic ISB, and ICs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$50,000			$50,000
Initial investigation/predesign sampling (15 borings)	$33,000			$33,000
Preconstruction survey	$5,000			$5,000
USA notification and utility locating	$2,000			$2,000
Subtotal Remedial Design Costs with Markups[a]				**$90,000**
Capital Costs				
Install monitoring wells (3 wells)	$29,000			$29,000
Excavation/dewatering	$33,000			$33,000
Off-site waste disposal (830 bcy)	$84,000			$84,000
Waste profile soil sampling	$7,000			$7,000
GAC treatment of dewatering water	$38,000			$38,000
Treatment system (influent/effluent) sampling	$16,000			$16,000
Clean fill soil, backfilling, enhanced aerobic ISB (ORC)	$213,000			$213,000
Confirmation sampling	$12,000			$12,000
Subtotal Capital Costs With Markups[a]				**$432,000**
O&M Costs				
Long-term groundwater monitoring (average cost for 10 years)		$8,900		$89,000
ICs and reporting (10 years)		$3,000		$30,000
Annual groundwater monitoring report		$10,000		$100,000
5-year reviews			$24,000	$48,000
Subtotal O&M Costs With Markups[a]				**$267,000**
Subtotal With Markups[a]				**$789,000**
Contingency (20%)				$158,000
TOTAL COST				**$947,000**
Present Value of Alternative AOC 1-3 (based on 2006 dollars)[b]				**$884,000**

Notes:
[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit
[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Table L-17 (continued)

Acronyms/Abbreviations:
- AOC – area of concern
- bcy – bank (in place) cubic yards
- GAC – granular activated carbon
- IC – institutional control
- ISB – *in situ* bioremediation
- O&M – operation and maintenance
- ORC – oxygen release compound
- USA – Underground Service Alert

Table L-18
Cost Estimate Summary for
Alternative AOC 1-5: ISCO

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$70,000			$70,000
Initial investigation/predesign sampling (15 borings)	$33,000			$33,000
Preconstruction survey	$5,000			$5,000
USA notification and utility locating	$2,000			$2,000
Subtotal Remedial Design Costs with Markups[a]				**$110,000**
Capital Costs				
Install monitoring wells (3 wells)	$29,000			$29,000
ISCO source treatment (7,500 square feet)	$100,000			$100,000
Field oversight, project management, markup	$73,000			$73,000
Monitor ISCO treatment (6 months)	$28,000			$28,000
Subtotal Capital Costs With Markups[a]				**$230,000**
O&M Costs				
Long-term groundwater monitoring (2 years)		$23,000		$46,000
Annual groundwater monitoring report		$10,000		$20,000
Closeout report				$28,000
Subtotal O&M Costs With Markups[a]				**$94,000**
Subtotal With Markups[a]				**$434,000**
Contingency (20%)				$86,000
TOTAL COST				**$520,000**
Present Value of Alternative AOC 1-5 (based on 2006 dollars)[b]				**$504,000**

Notes:
[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit
[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.5 percent (OMB 2006) was used

Acronyms/Abbreviations:
AOC – area of concern
ISCO – *in situ* chemical oxidation
O&M – operation and maintenance
USA – Underground Service Alert

Table L-19
AOC 23
Cost Estimate Assumptions for Groundwater Alternatives

Components	Assumptions
Alternative AOC 23-2: MNA and ICs	
Initial investigation and monitoring wells installation	Define extent of vinyl chloride in groundwater • Advance 20 borings for HydroPunch or equivalent sampling of groundwater • Assume two soil samples and one groundwater sample per boring are collected for VOC analysis using U.S. EPA Method 8260B • Assume 3 long days (10 hours per day) of direct-push drilling equipment Install five 4-inch-diameter groundwater monitoring wells 20 feet deep Sample new monitoring wells • Field analysis as described below • Laboratory analysis as described below Preconstruction survey (two people for 3 days, including report) USA notification Utility-locating survey (two people for 1 day)
Remedial design	Engineering and monitoring plan preparation (500 hours) • Design and reporting of initial investigation • MNA monitoring plan • IC implementation plan
Groundwater sampling and MNA	Sampling frequency • Year 1 – assume 5 wells are sampled quarterly • Years 2 through 10 – assume 5 wells are sampled annually Field analyses • Rented hand-held equipment: conductivity, temperature, turbidity, pH, ORP, DO Laboratory analyses • MNA parameters – dissolved gases (GC/FID) – alkalinity (U.S. EPA Method 310.1) – major anions (U.S. EPA Method 300) – major cations (U.S. EPA Method 6010) – total organic carbon (U.S. EPA Method 415.1) – total dissolved solids (U.S. EPA Method 160.1) • VOCs (U.S. EPA Method 8260B) • Assume six samples per monitoring event (including one QA/QC sample) • Assume 2-week laboratory turnaround time Annual groundwater monitoring reports
ICs	IC implementation • Assume IC design effort is included in the remedial design effort • $3,000 per year for IC implementation (maintenance costs) • Implemented for an assumed duration of 10 years until cleanup goals are achieved No fencing or signage Annual inspections and reporting to confirm compliance with IC plan

Table L-19 (continued)

Components	Assumptions
Alternative AOC 23-2: MNA and ICs (continued)	
Reviews and reporting	Annual IC report (included in ICs above) Annual groundwater monitoring reports (included in the groundwater sampling above) Five-year reports at the end of year 5 and 10
Alternative AOC 23-4: ISCO	
Initial investigation and monitoring well installation	Define extent of vinyl chloride in groundwater • Advance 20 borings for HydroPunch or equivalent sampling of groundwater • Assume two soil samples and one groundwater sample per boring are collected for VOC analysis using U.S. EPA Method 8260B • Assume 3 long days (10 hours per day) of direct-push drilling equipment Install and sample five monitoring wells as described for Alternative AOC 23-2 Preconstruction survey (two people for 3 days, including report) USA notification Utility-locating survey (two people for 1 day)
Remedial design	Assume 700 hours for remedial design effort
ISCO source area treatment operation	Assume two areas of treatment (one area would be 75,000 square feet and one 5,000 square feet) ISCO materials, injection labor for one injection event for an approximate cost of $250,000 (Haskins, pers. com. 2006) Injection points • Assume 115 injection points are required in northern and southern source areas • Temporary direct-push injection screens • 10-foot-thick treatment zone for ISCO • Injection point spacing of 30 feet on center Number of groundwater sampling events during the first 6 months: three sampling events, five wells sampled Field analysis as described below Laboratory analysis as described below
Groundwater sampling	Sampling frequency • Year 1 – assume five wells are sampled quarterly • Year 2 – assume five wells are sampled annually Field analyses • Test Kit: ferrous iron • Rented hand-held equipment: conductivity, temperature, turbidity, pH, ORP, DO Laboratory analyses • VOCs using U.S. EPA Method 8260B • Dissolved metals using U.S. EPA Method 6010B/7000 Series • Assume six samples per monitoring event (including one QA/QC sample) • Assume 2-week laboratory turnaround time Annual groundwater monitoring report
Reviews and reporting	Annual groundwater monitoring reports (included in the groundwater sampling above) Closeout report at end of year 2

Table L-19 (continued)

Acronyms/Abbreviations:
AOC – area of concern
DO – dissolved oxygen
FID – flame ionization detector
GC – gas chromatograph
IC – institutional control
ISCO – *in situ* chemical oxidation
MNA – monitored natural attenuation
ORP – oxidation-reduction potential
QA – quality assurance
QC – quality control
USA – Underground Service Alert
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Table L-20
Cost Estimate Summary for
Alternative AOC 23-2: MNA and ICs

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$50,000			$50,000
Initial investigation/predesign sampling (20 borings)	$43,000			$43,000
Preconstruction survey	$5,000			$5,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs with Markups[a]				**$100,000**
Capital Costs				
Install monitoring wells (5 wells)	$44,000			$44,000
Subtotal Capital Costs With Markups[a]				**$44,000**
O&M Costs				
Long-term groundwater monitoring (average cost for 10 years)		$14,000		$140,000
ICs and reporting (10 years)		$3,000		$30,000
Annual groundwater monitoring report		$10,000		$100,000
5-year reviews			$24,000	$48,000
Subtotal O&M Costs With Markups[a]				**$318,000**
Subtotal With Markups[a]				**$462,000**
Contingency (20%)				$92,000
TOTAL COST				**$554,000**
Present Value of Alternative AOC 23-2 (based on 2006 dollars)[b]				**$497,000**

Notes:
[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit
[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.8 percent (OMB 2006) was used

Acronyms/Abbreviations:
AOC – area of concern
IC – institutional control
MNA – monitored natural attenuation
O&M – operation and maintenance
USA – Underground Service Alert

Table L-21
Cost Estimate Summary for
Alternative AOC 23-4: ISCO

Description	Capital Cost	Annual Average Cost	Every Fifth Year Cost	Total Cost
Remedial Design Costs				
Remedial design	$70,000			$70,000
Initial investigation/predesign sampling (20 borings)	$43,000			$43,000
Preconstruction survey	$5,000			$5,000
USA notification and utility locating survey	$2,000			$2,000
Subtotal Remedial Design Costs with Markups[a]				**$120,000**
Capital Costs				
Install monitoring wells (5 wells)	$44,000			$44,000
ISCO source treatment (75,000 sf and 5,000 sf)	$250,000			$250,000
Field oversight, project management, markup	$178,000			$178,000
Monitor ISCO treatment (6 months)	$32,000			$32,000
Subtotal Capital Costs With Markups[a]				**$504,000**
O&M Costs				
Long-term groundwater monitoring (2 years)		$27,500		$55,000
Annual groundwater report		$10,000		$20,000
Closeout report				$28,000
Subtotal O&M Costs With Markups[a]				**$103,000**
Subtotal With Markups[a]				**$727,000**
Contingency (20%)				$145,000
TOTAL COST				**$872,000**
Present Value of Alternative AOC 23-4 (based on 2006 dollars)[b]				**$849,000**

Notes:
[a] markups include general conditions consisting of overall project management, overhead, bonds and insurance, home office support, taxes, and profit
[b] the present value is calculated by adding the capital costs to the present worth of the O&M annual expenditures and periodic costs priced as of January 2006 (including contingency allowances); because the tasks may be completed at different times, the present value was calculated on the basis of real discount rate; for this report, a discount rate of 2.5 percent (OMB 2006) was used

Acronyms/Abbreviations:
AOC – area of concern
ISCO – *in situ* chemical oxidation
O&M – operation and maintenance
sf – square feet
USA – Underground Service Alert

APPENDIX M

RESPONSES TO COMMENTS ON DRAFT RI/FS REPORT

COMMENTS FROM U.S. EPA

RESPONSE TO COMMENTS* ON
DRAFT REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT, IR SITE 35,
AREAS OF CONCERN IN TRANSFER PARCEL EDC-5
ALAMEDA POINT, ALAMEDA, CALIFORNIA
DATED JULY 2006
CTO-0077

Comments from U.S. EPA, A. Cook, 11/7/2006

GENERAL COMMENTS	RESPONSE TO GENERAL COMMENTS
General Comment 1. Groundwater Designation: Please note that the groundwater beneath IR35 meets the federal criteria for a potential drinking water source. EPA has stated that in some areas, specifically those west of Saratoga Street (which coincides with the Regional Board's local de-designation), MCLs do not necessarily apply as ARARs for CERCLA cleanup purposes when compelling site specific circumstances are taken into account. However the portions of groundwater in IR35 east of Saratoga are subject to MCLs as ARARS. Please revise the discussion on groundwater to accurately reflect the status of the groundwater as a potential, although possibly unlikely, source of drinking water.	**Response to General Comment 1.** The Navy concurs with U.S. EPA's comment that for CERCLA cleanup purposes, portions of groundwater at IR Site 35 east of Saratoga Street are potentially (although unlikely) sources of drinking water; therefore, MCLs are considered potentially relevant and appropriate. This is discussed in the groundwater ARARs section of the RI/FS Report (Section 8.3.2.2). To clarify this, the first nine paragraphs of Section 2.7 were replaced with the following: "Groundwater beneath Alameda Point (including IR Site 35) is not currently used for drinking water, irrigation, or industrial supply. Drinking water is supplied to Alameda Point by the EBMUD. The U.S. EPA and California State Water Resources Control Board (SWRCB) have developed classification categories for groundwater to describe potential use. "U.S. EPA classifies groundwater in one of three categories (Class I, II, or III) based on ecological importance, replaceability, and vulnerability considerations. Class I groundwater is irreplaceable groundwater that is currently used by a substantial population, or groundwater that supports a vital habitat. Groundwater that is currently being used or that might be used as a source of drinking water in the future is considered to be Class II. Groundwater that cannot be used for drinking water due to insufficient quality (e.g., high salinity or widespread, naturally occurring contamination) or quantity is considered to be Class III. U.S. EPA guidelines define Class III groundwater as groundwater with TDS concentrations above 10,000 milligrams per liter (mg/L) and a yield of less than 150 gallons per day (U.S. EPA 1986). Class III groundwater can also be classified on the basis of economic or technological treatability tests as well as on quality or quantity (only one set of criteria is needed, not both).

Comments from U.S. EPA, A. Cook, 11/7/2006

GENERAL COMMENTS	RESPONSE TO GENERAL COMMENTS
General Comment 1 (continued).	**Response to General Comment 1 (continued).** "The California SWRCB Source of Drinking Water Policy Resolution (Res.) 88-63 (SWRCB 1988) defines sources of drinking water and states exemption criteria as groundwater with TDS concentrations above 3,000 mg/L and with a sustainable yield of less than 200 gallons per day. "Beneficial groundwater use at Alameda Point was evaluated in the final Determination of the Beneficial Uses of Groundwater Report, prepared in 2000 (TtEMI 2000a). No Class I groundwater was identified at Alameda Point. Most of the FWBZ at Alameda Point was considered to be Class II groundwater and a potential, although unlikely, source of drinking water. The SWBZ at Alameda Point was considered a Class III aquifer because TDS concentrations exceed 10,000 mg/L. Additionally, shallow groundwater near shorelines at Alameda Point typically contains TDS at concentrations greater than 10,000 mg/L. "IR Site 35 is within the central and southeastern regions of Alameda Point and based on the beneficial use report, groundwater in the FWBZ is considered Class II groundwater. However, the beneficial use evaluation also states that for purposes of CERCLA cleanup decisions, FWBZ groundwater in the central region of Alameda Point, where the majority of the IR Site 35 study areas are located, is unlikely to be used as a potential drinking water source, when considering the following factors (TtEMI 2000a): • safe yield and maximum pumping rates that are inadequate to support common uses of water as well as multiple domestic users • existing saltwater intrusion at the base of the FWBZ that would be accelerated by groundwater extraction • absence of supply wells currently within or downgradient of contaminated groundwater

Comments from U.S. EPA, A. Cook, 11/7/2006

GENERAL COMMENTS	RESPONSE TO GENERAL COMMENTS
General Comment 1 (continued).	**Response to General Comment 1 (continued).** • state and county limitations that exist on well construction because of a thin, vulnerable aquifer "Additionally, the BCT has concurred with cleanup levels above MCLs in some areas of the central region of Alameda Point on the condition that any contaminated groundwater beneath IR sites (IR Sites 5, 6, 7, 8, 10, 12, and 25 are specifically mentioned in the beneficial use report) is remediated to levels such that the threats posed by such exposures as inhalation (groundwater vapors into buildings), dermal contact, and those associated with irrigation use are eliminated, and any significant ongoing degradation of the groundwater from contaminant migration is prevented. "Nonetheless, the SWRCB currently classifies groundwater beneath Alameda Point as potentially suitable for municipal or domestic supply. However, in a letter dated July 21, 2003, the Navy received concurrence from the SWRCB that groundwater in the FWBZ and SWBZ west of Saratoga Street at Alameda Point meets the exemption criteria in the SWRCB Res. 88-63 (SWRCB 1988) and California Regional Water Quality Control Board Res. 89-39 (RWQCB 2003). Hence, groundwater west of Saratoga Street is not considered a potential drinking water source for purposes of CERCLA cleanup decisions. AOCs 1, 2, 18, 20, and 21; EBS Parcel 205; AST 039; and portions of AOCs 3 and 17 are located west of Saratoga Street. "Two study areas at IR Site 35, AOC 25 and the southern portion of AOC 23 (i.e., EBS Parcels 125 and 126), are located in the southeastern groundwater region of Alameda Point, as identified in the beneficial use report (TtEMI 2000a). The southeastern region is considered a potential drinking water source (Class II groundwater) for CERCLA cleanup decisions, with off-base wells located within 1 mile of Alameda Point.

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Comments from U.S. EPA, A. Cook, 11/7/2006

GENERAL COMMENTS	RESPONSE TO GENERAL COMMENTS
General Comment 1 (continued).	**Response to General Comment 1 (continued).** "While it is considered unlikely that groundwater beneath IR Site 35 would be used as a drinking water source, inland groundwater east of Saratoga Street (currently Class II groundwater) may be considered a potential drinking water source for CERCLA decision-making purposes unless saltwater intrusion and/or low yield make development of a sustainable water supply infeasible. TDS data and observations of groundwater yield (described in the following paragraphs) suggest that some inland areas within IR Site 35 east of Saratoga Street may meet Class III criteria; however, groundwater in inland areas east of Saratoga Street is assumed for the purposes of this RI/FS Report to exhibit Class II characteristics and qualify as a potential drinking water source for CERCLA decision-making purposes. This is discussed in Section 8.3.2.2, as it pertains to groundwater ARARs.
General Comment 2. Metals above Background: EPA did not accept the use of the LBNL study for background inorganic concentrations in soil for IR30 FS and IR35 RI [IR31 RI] when the argument used was that the Alameda Point background data set was not representative of soil conditions east of Main Street. There is even less justification for using the LBNL as a comparison for soil west of Main Street where property was included as part of the background data set. All inorganics should be screened against residential PRGs and the Alameda Point "pink" background data set. Please delete all references and comparison to the LBNL study from this document.	**Response to General Comment 2.** Reference to the LBNL data has been included only as a source of general information on the composition of soil and rocks in the Bay Area. All inorganics in soil are screened against the residential PRGs and the Alameda Point "pink" background data set.

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Comments from U.S. EPA, A. Cook, 11/7/2006

GENERAL COMMENTS	RESPONSE TO GENERAL COMMENTS
General Comment 3. Total vs Incremental Risk: Total risk, including the risk contributed by metals at and below established background levels for Alameda Point must be presented in the text for all AOCs. A major factor in determining whether remedial action is warranted for sites with risks falling within the risk management range is the contribution of risk from background metals to the total risk. Therefore a comparison of total and incremental risk is critical to understanding the risk drivers at a site. Total risk has not been included in the text for any AOCs and so a critical part of the risk assessment is missing when reading the document. Please revise the risk presentation in Sections 6.3 and 6.4 and related sections in other portions of the document so that total risk and incremental risk are both presented. This revision may necessitate taking additional AOCs, where the total risk is above 1×10^{-4}, into the FS for evaluation for remedial action.	**Response to General Comment 3.** The risk presentation in Sections 6.3 and 6.4 and related sections in other portions of the document has been revised so that both total and incremental risks are presented. The revision did not necessitate bringing additional AOCs into the FS evaluation for remedial action.
General Comment 4. ICs for PAHs under Housing: The nature and extent, risk assessment and development of remedial alternatives failed to take adequately into account that PAHs beneath existing houses and buildings are likely to be present at pre-TCRA levels. ICs or some other remedy will be necessary to ensure that exposure to the soil beneath the houses does not occur. Please revise the remedial alternatives to address this issue.	**Response to General Comment 4.** At IR Site 35, pre-TCRA cancer risks for PAHs in each decision area (Table 6-1) were within the risk management range for each depth interval, and hazard indices were significantly below 1. Average B(a)P equivalent concentrations remaining after the PAH TCRA were calculated for the IR Site 35 decision areas and depth intervals. All values were below 620 micrograms per kilogram. This information has been added to text and presented in a new table (Table 4-5) of the draft final RI/FS. After extensive excavation, post-TCRA risks in shallow soils at IR Site 35 are slightly lower. This differs from the situation at IR Site 25, where PAH risks were above the risk management range and ICs limiting exposure to soil below 4 feet bgs were warranted. The ICs assumed for FS purposes have been revised to include soil under buildings and hardscape as described in the response to Specific Comment 31. In order to provide a range of

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GENERAL COMMENTS	RESPONSE TO GENERAL COMMENTS
General Comment 4 (continued).	**Response to General Comment 4 (continued)** alternatives to decision makers, PAH alternatives in the FS have been revised to include the following: PAH-1: No further action PAH-2: ICs (this alternative has been revised to include ICs for soil under buildings, and no soil cover component) PAH-3a, -3b, -4a, -4b: Similar to the draft RI/FS Report, except ICs (for Alternatives PAH-3a, -3b, and -4a) are assumed to apply to soil under hardscape and buildings only.
General Comment 5. Human Health Risk Assessment: The different types of risk evaluations were not defined in the RI/FS. Appendix J includes the results of three types of risk evaluations: Tier 1 evaluations, baseline human health risk assessments (BHHRA), and lead evaluations. (An evaluation of PAHs was conducted separately and is included in Section 6 of the main document and in Appendix I.) In the Appendix J evaluations, individual sites were evaluated using one of the three different approaches mentioned above, but the rationale for selection of one screening assessment versus another has not been clearly described. It is understood that the lead evaluations were carried out at only two sites at which lead removals were conducted. However, the use of a Tier 1 evaluation versus a BHHRA has not been clearly described. Page J-1 notes that "Tier 1 evaluations were conducted for 14 study areas where inspection of the analytical results indicated that decisions on whether remediation is warranted could be made based on the results of a Tier 1 approach." The criteria used for making these decisions should be stated. Please revise Appendix J to clearly describe the criteria used to select the need for a Tier 1 evaluation versus a BHHRA at a given site.	**Response to General Comment 5.** The introduction to Section 6 has been revised to include the following text in lieu of the four bullets that follow the first paragraph: "The results of four types of residential risk evaluation are discussed, in the following order: 1. Cancer risk and noncancer hazard values for PAHs in soil are calculated for conditions (pre-TCRA) prior to soil removals conducted in most of the decision areas (DAs) (BEI 2005b). The risks are calculated using a 95 percent upper confidence limit (UCL) exposure point concentration and PRGs. These results are presented along with the post-TCRA results for PAHs published in the Transfer Parcel EDC-5 SI Report (BEI 2005b). 2. Tier 1 risk evaluations for 14 study areas calculate a combined U.S. EPA and Cal/EPA cancer risk and noncancer hazard for non-PAH chemicals in soil and groundwater based on the maximum reported concentrations and generic risk-based levels published by regulatory agencies (Cal/EPA 2005).

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GENERAL COMMENTS	RESPONSE TO GENERAL COMMENTS
General Comment 5 (continued). The summary tables of the Tier 1 evaluations for each site generally lack a level of detail necessary to support an understanding of the data evaluated for each site. The tables, such as Table J2-1 for AOC 2, only present the maximum concentration for each detected analyte. The table does not summarize the number of samples evaluated for each analyte, the detection frequency, the range of detects, or the location at which the maximum concentration was detected. This information is important since in some cases, it is used to support the conclusions drawn. For example, the AOC 2 Tier 1 Conclusions indicate that a majority of the cancer risk at this site is associated with Aroclor 1260, "which had a low detection frequency." Without providing documentation to show that Aroclor 1260 had a low detection frequency, this conclusion is unsupported. Please update the Tier 1 evaluation summary tables to provide more detail with respect to the data that were used in the evaluation. At a minimum, the tables should summarize the number of samples evaluated for each analyte, the detection frequency, the range of detects, and the location at which the maximum concentration was detected.	**Response to General Comment 5 (continued).** 3. Baseline HHRAs for five study areas calculate U.S. EPA and Cal/EPA cancer risk and noncancer hazard using site-specific assumptions and the standard procedures for a baseline risk assessment included with an RI. 4. Lead-only evaluations for two study areas compare concentrations of lead to site-specific PRGs protective of children." The following text has been added after the third paragraph in Section 6 and in Appendix J: "The following factors were considered when determining whether a Tier 1 or baseline risk assessment approach was most applicable for an AOC: • the presence of chemicals with concentrations above the risk-based screening and/or background concentrations • previously stated public interest (e.g., EBS Parcels 78 and 79 were assigned to an HHRA) • the frequency of detection and the distribution of the chemicals in light of the site history "Areas where the review indicated that a site-specific assessment was warranted to determine whether further action was needed were designated for a baseline HHRA. Areas where the review indicated that no further action would be warranted using protective assumptions and generic risk-based guidelines were designated for a Tier 1 assessment. After initial calculations, the assignments were reviewed for a second time to verify adequate AOC risk evaluation for CERCLA decision-making purposes." Text to clarify the above points has also been added to Appendix J. Information on the number of samples evaluated for each analyte, the

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GENERAL COMMENTS	RESPONSE TO GENERAL COMMENTS
General Comment 5 (continued).	**Response to General Comment 5 (continued).** detection frequency, the range of detects, and the location at which the maximum concentration was detected has been added to the Tier 1 tables in Appendix J.

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 1. **Page 1-17, Section 1.6.1**: Please clarify the statement "...pesticides were not reported". Since the TCRA was designed to remove primarily pesticides, and lead and PCBs were added in once they were found to exceed residential PRGs in the soil, confirmation sampling should have verified that the pesticides had been adequately remediated through soil removal.	**Response to Specific Comment 1.** The sixth sentence in Section 1.6.1 has been revised to read as follows: "The results of confirmation sampling indicated that PCBs and lead were present at concentrations below their respective cleanup levels; pesticides were not reported at concentrations above detection limits."
Specific Comment 2. **Page 1-18, Section 1.6.2.2**: There are additional VOCs in groundwater besides those stated in this section, e.g. TCE, DCE and VC.	**Response to Specific Comment 2.** The sentence describing the groundwater plume beneath IR Site 4 has been revised as follows: "The primary COCs (above the risk management range) in groundwater in the OU-2B–wide groundwater plume located beneath IR Site 4 (as well as IR Sites 3, 11, and 21) were identified in the RI Report (SulTech 2005c) as the VOCs TCE and vinyl chloride, resulting from the breakdown of DNAPL at these sites. Secondary COCs (within the risk management range) in the plume were identified as the VOCs PCE, 1,1-DCA, 1,2-DCA, 1,1-DCE, 1,2-DCE (total), 1,4-dichlorobenzene, 1,1,2-TCA, and benzene; the PAHs benz(a)anthracene and B(a)P; the SVOC naphthalene; and the metals hexavalent chromium, iron, and manganese."
Specific Comment 3. **Page 1-18, Section 1.6.2.3, last sentence**: Please revise this sentence to more accurately state that removal actions are ongoing for clean up of the DNAPL portion of the groundwater plume and that the majority of the radiological constituents in the storm drains have been removed or cleaned. The remediation is in no way complete for the groundwater and radiological contaminants and will not be considered complete until the remedial action report is drafted.	**Response to Specific Comment 3.** The final sentences in Section 1.6.2.3 have been revised to read as follows: "Removal action activities are ongoing at IR Site 5 for the cleanup of VOCs and dense, nonaqueous-phase liquid (DNAPL) in the groundwater plume (BEI 2007). Most of the radiological contaminants in the storm drains have been removed; however, remediation of the remaining radiological constituents in the storm drains is ongoing (SulTech 2005b). The Navy is currently preparing a work plan

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 3 (continued).	**Response to Specific Comment 3 (continued).** (BEI 2007) for supplemental sampling to complete the RI at OU-2C, including IR Site 5." New reference added: Bechtel Environmental, Inc. 2007. Draft Final Work Plan for Supplemental Remedial Investigation Sampling at OU-2C, Alameda Point, Alameda, California. February.
Specific Comment 4. **Page 1-19, Section 1.6.2.4**: Update the status of IR06 to include the fact that the Record of Decision selects limited excavation of soil and ISCO, Bioremediation and MNA with ICs for groundwater as the remedy for the site.	**Response to Specific Comment 4.** The Record of Decision for OU- 1, IR Sites 6, 7, 8, and 16, has not been finalized; therefore, a description of the proposed remedy presented in the Proposed Plan has been added to Section 1.6.2.4 as follows: "The preferred soil remediation measure presented in the Proposed Plan for OU-1, IR Sites 6, 7, 8, and 16, includes sampling, limited excavation, and off-site disposal; the preferred remedy for groundwater at IR Site 6 includes *in situ* chemical oxidation (ISCO), accelerated bioremediation, monitored natural attenuation (MNA), and short-term institutional controls (ICs) (DON 2006a)." New reference added: Department of the Navy. 2006a. Proposed Plan, Former NAS Alameda Operable Unit 1, IR Sites 6, 7, 8, and 16. April.
Specific Comment 5. **Page 1-19, Section 1.6.2.5**: Please include information about the former incinerator at the IR07 and describe the metal debris area and the associated COCs.	**Response to Specific Comment 5.** Section 1.6.2.5 has been revised as follows: "IR Site 7, known as the Naval Exchange Service Center, is adjacent to AOC 15. The site contains petroleum-related chemicals. Former Building 68-3 was constructed at the site in 1942 to house an incinerator surrounded by a grassy open space (TtEMI 2004). After Building 68-3 was demolished in 1961,

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 5 (continued).	**Response to Specific Comment 5 (continued).** Building 459, an automotive service station, was constructed on the same location. A blue, crystalline, metallic debris layer thought to be incinerator debris or building debris from demolition was identified in 2002 in shallow soil near the footprint of former Building 68-3. This layer ranges in depth from approximately 18 to 24 inches bgs and is approximately 8 to 12 inches thick (TtEMI 2004). Approximately 1,320 cubic feet of this debris layer was removed and disposed off-site in 2003 (Shaw 2003b). The boundaries of IR Site 7 are coincident with the boundaries of CAA-7. A summary of historical operations and COCs at IR Site 7/CAA-7 is presented in Section 1.6.3.4." For consistency, Section 1.6.3.4 has also been revised to reflect the existence of the former incinerator and the metallic debris layer. (See Response to Specific Comment 8.)
Specific Comment 6. **Page 1-19, Section 1.6.2.6**: Suggest stating that the COCs in groundwater have decreased to below MCLs.	**Response to Specific Comment 6.** Sentences 5 through 8 of Section 1.6.2.6 have been replaced with the following: "The RI Report for IR Site 8 (TtEMI 2004) identified Aroclor 1260, arsenic, B(a)P, and lead as the primary COCs in soil, and benzene and TCE as the primary COCs in groundwater. Concentrations of benzene and TCE in groundwater had decreased to below MCLs as of 2003, and the RI concluded that there appeared to be no continuing source. However, groundwater sampling conducted in June 2006 under the basewide groundwater monitoring program reported a benzene concentration of 16 µg/L at location M08-01 (ITSI 2006). This concentration exceeds the MCL (1.0 µg/L) and is comparable to the maximum concentration (20 µg/L) reported at this location in 1994."

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Comments from U.S. EPA, A. Cook, 11/7/2006

SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 7. **Page 1-20, Section 1.6.2.10**: Please update the description of IR26 to state that the Record of Decision has been finalized selecting no remedial action for soil and ISCO for remediation of groundwater contamination.	**Response to Specific Comment 7.** The following sentence has been added to the end of Section 1.6.2.10: "A ROD for IR Site 26 (DON 2006b) has been finalized, with the selection of no further remedial action for soil and ISCO as the remedial action for groundwater." New reference added: Department of the Navy. 2006b. Final Record of Decision, Site 26, Alameda Point, Alameda, California. August.
Specific Comment 8. **Page 1-21, Section 1.6.3.4**: Please mention that an incinerator was formerly located at this area. Cadmium should be added to the list of COCs in soil and arsenic should be added to the list of COCs in groundwater.	**Response to Specific Comment 8.** Section 1.6.3.4 has been revised as follows: "CAA-7 and IR Site 7 have coincident boundaries and are located adjacent to AOC 15. Historical facilities at CAA-7 included an incinerator (former Building 68-3), an automobile service station (Building 459), and maintenance and equipment storage (Building 506). A layer of metallic debris found in shallow soil near the former incinerator was partially removed in 2003. USTs 459-1 through 459-8 and UST 506-1 were also located within CAA-7. The IR Site 7 RI reported that the primary COCs at IR Site 7 were benzene, xylene, PAHs, arsenic, cadmium, and lead in soil, and PAHs, arsenic, and thallium in groundwater (TtEMI 2004). The groundwater plumes for thallium and PAHs have been defined and do not appear to be migrating off-site."
Specific Comment 9. **Pages 3-6, 3-7, Section 3.4**: This section presented a very well written, concise and easily comprehensible summation of the data quality process used for IR35.	**Response to Specific Comment 9.** No response required.

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 10. **Page 4-1, second paragraph**: Please delete the reference to local rocks. As we have stated in our comments on IR 30 FS and IR 31 RI, EPA's does not accept the validity of the comparison and it is not necessary to include it in the IR35 RI/FS.	**Response to Specific Comment 10.** Reference to local rocks has not been deleted. Please see Response to Specific Comment 16.
Specific Comment 11. **Page 4-1, Section 4.1.1**: Since the vinyl chloride in soil appears to be [sic] responsible for the hit in the groundwater directly beneath, is there any speculation on what the original source of the VC could be? Could there be a leaking sewer above the groundwater at this location?	**Response to Specific Comment 11.** Vinyl chloride was reported at AOC 23 in two soil samples from soil boring A23SB22 (3–4 feet and 5–6 feet bgs). Vinyl chloride was not reported at a concentration above its detection limit in the groundwater sample from this location. The source of this vinyl chloride in soil is unknown. The source for vinyl chloride reported in groundwater samples north and west of soil boring A23SB22 is also unknown. Sampling location A23SB22 is not located close to sanitary sewer lines, but is in the vicinity of storm drain lines. It is unlikely that these lines were the source of vinyl chloride in soil, as leaks from storm drains are typically dilute and affect only the groundwater.
Specific Comment 12. **Page 4-3, Section 4.1.3**: It would be helpful to state that the 57 soil borings taken in the 0 - 2 feet bgs depth were between 0.62 mg/kg and 1.0 mg/kg following the TCRA. As written, the results sound unnecessarily alarming.	**Response to Specific Comment 12.** The third paragraph of Section 4.1.3 has been revised as follows: "While some individual samples had B(a)P equivalent concentrations above 620 µg/kg, average concentrations were below 620 µg/kg (Table 4-5). Average concentrations ranged from 6 to 506 µg/kg. B(a)P equivalent concentrations above the PSC of 620 µg/kg were reported in samples collected at 176 different boring locations throughout IR Site 35 (Table 4-3). A total of 216 samples from varying depths at those 176 locations had reported B(a)P equivalent concentrations above the PSC. B(a)P equivalent concentrations were between 0.62 and 1,000 µg/kg in 57 soil borings from the shallow 0- to 2-foot-bgs interval. The B(a)P equivalent concentrations

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Specific Comment 12 (continued).	**Response to Specific Comment 12 (continued).** were below 1,000 µg/kg because the TCRA removed the top 2 feet of soil, which is where the higher concentrations were previously located. "B(a)P equivalents above the PSC were reported in samples from 71 soil borings from the intermediate 2- to 4-foot-bgs interval, and from 84 soil borings from depths greater than 4 feet bgs. In general, B(a)P equivalent concentrations increased with depth. The PAH TCRA removed PAHs with B(a)P equivalent concentrations greater than 1,000 µg/kg in the top 2 feet of soil in the West Housing Area." Furthermore a new Table 4-5, Benzo(a)pyrene Equivalent Concentrations by Decision Area, has been added that presents the average B(a)P equivalent concentrations by depth for each decision area.
Specific Comment 13. **Page 4-4, Section 4.1.4.1, first paragraph**: State that neither the distribution nor the concentration of heptachlor indicate a routine application.	**Response to Specific Comment 13.** The penultimate sentence in the first paragraph of Section 4.1.4.1 has been revised to read as follows: "The distribution of heptachlor in soil at AOC 3 suggests a localized release, likely to have occurred as a spill during pesticide mixing. The distribution and concentrations of heptachlor were not what would be expected from routine application of this pesticide."
Specific Comment 14. **Sections 4.1 and 4.2 are very well written and informative.** Giving all the concentrations along with the PSCs is extremely helpful.	**Response to Specific Comment 14.** No response required.

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 15. **Section 4.2.5, Metals, Page 4-12**: Data that support the interpretation that high concentrations of dissolved metals in groundwater are associated with pH and anaerobic conditions at AOC 5 have not been provided. Please provide data to support this conclusion and a more detailed explanation.	**Response to Specific Comment 15.** Direct measurements of groundwater chemical parameters (such as pH, turbidity, redox potential, or conductivity) were not conducted during groundwater sampling. However, the elevated concentrations of iron and manganese are indicative of reducing conditions, based on the rules of solubility. Also, during RI drilling activities, evidence of reducing conditions was observed in the saturated soil where the color was noted as dark gray and greenish gray rather than yellowish brown, suggesting a reduced form of iron. More detailed information about metals in groundwater at IR Site 35 and the likely source of these metals in groundwater across IR Site 35 is presented in Section 4.3. The following text has been added to Section 4.3.2.1, Evidence of Reducing Conditions, to support the anaerobic conditions at AOC 5 and other study areas. "The presence of dissolved iron at concentrations above 1,000 µg/L is a reliable indicator of a reducing environment (Kelly et al. 2005). Under reducing conditions, iron and manganese in soil minerals are chemically changed (reduced) to more soluble metal species (e.g., ferric iron to ferrous iron). When groundwater becomes reoxygenated, the dissolved iron and manganese oxidize and precipitate out of groundwater back into the soil. The most stable forms of iron and manganese in minerals in soil are the oxidized forms. "Concentrations of dissolved iron can be used to predict reducing conditions more reliably than either dissolved oxygen (DO) or electrical potential (Eh) measurements (Chapelle et al. 1996, Lindaberg and Runnells 1984). The iron minerals containing ferric iron (Fe^{+3}) are highly insoluble in groundwater over the range of pH levels of 5 to 8 (typical of groundwater at Alameda Point) and the Eh range of -400 to +600 mV (typical of

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 15 (continued).	**Response to Specific Comment 15 (continued).** groundwater in general). Iron is present in many forms in soil, including oxides, hydroxides, and carbonates. One of the most soluble forms is iron hydroxide. The maximum concentration of dissolved ferric iron is 0.0003 mg/L at a pH of 5 (Table 4-13). However, the reduced form, ferrous iron (Fe^{+2}), is highly soluble, as also shown in Table 4-13. Manganese in minerals becomes more soluble as the oxidation-reduction (redox) potential decreases below -400 millivolts (Wetzel 1983); manganese in soil minerals is reduced in this environment and dissolves in groundwater." New references: Lindaberg, R.D. and D.D. Runnells. 1984. Ground water redox reactions: An analysis of equilibrium state applied to Eh measurements and geochemical modeling. *Science 225*: 925–927. Chapelle, F. H, S.K. Haack, P. Adriaens, M. Henry, and P. Bradley. 1996. Comparison of Eh and H_2 measurements for delineating redox processes in a contaminated aquifer. *Environ. Sci. Tech. 30*: 3563–3569. Wetzel, Robert G. 1983. *Limnology.* New York: Saunders College Publishing.
Specific Comment 16. Section 4.3.1.2, Correlation of Concentrations in Fill Soil With Off-Site Sources, Pages 4-17 through 4-19 and Table 4-14, Typical Concentration of Selected Metals in Rocks: The text states that a comparison of typical metals concentrations in common rock types with the concentrations at IR Site 35 "supports the conclusion that metals identified at IR Site 35 (with the exception of lead at AOCs 10 and 12) are likely the result of natural processes rather than site-related activities," but an examination of Table 4-14 reveals that there is no consistent relationship between typical metals concentrations in the various rock types, an average concentration, or	**Response to Specific Comment 16.** The purpose of this section was to clarify for the public that there are other types of soil, not impacted by industrial activities, with different concentrations than those found in the Alameda Point pink background data set. As requested, this section has been deleted. In new Section 4.3.1, Sitewide Metals in Soil, former Table 4-14 remains as Table 4-15, Typical Concentrations of Metals in Sediment, Rocks, and Soil. This table is referenced primarily to show that iron and manganese are major components of soil and common rock assemblages.

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Specific Comment 16 (continued). the median from the Lawrence Berkeley National Laboratory (LBNL) study and the median at IR Site 35. In some cases, the typical concentrations in granite most closely match those at IR Site 35, in others, the closest match is to sandstone, limestone, or shale. In addition, there is no correlation between IR Site 35 concentrations and the LBNL median concentrations; in most cases, the LBNL concentrations are higher by a factor of 2 or 3. Please delete this section of text.	**Response to Specific Comment 16 (continued).** As stated in Response to General Comment 2, reference to the LBNL data is supplementary to the discussion and is provided in Table 4-15 only as a source of general information on the composition of soil and rocks in the Bay Area. Fill soil at Alameda Point consists of dredged bay sediments that represent a combination of multiple rock types derived from the Bay Area. Correlation to a single rock type would not be expected.
Specific Comment 17. **Page 5-5, Section 5.1.2.2, first sentence after bullets**: This sentence is confusing in that the previous section has already stated that AOCs 4, 5, 9, OWS 17, and ASTs 016, 039 and 392 had no impact on soil. It would be expected that there would be no impact on groundwater beneath these particular areas and so use of the phrase "in contrast" is puzzling. Please clarify and reword.	**Response to Specific Comment 17.** "In contrast" has been removed from the first sentence after the bullets. The intent of Section 5.1.2.2 was to list study areas with groundwater impacts and those without impacts.
Specific Comment 18. **Page 5-15, Section 5.2.2 sentence after first set of bullets**: It would be helpful to state how these metals compared to Alameda Point background concentrations.	**Response to Specific Comment 18.** The text and bullets in Section 5.2.2, after the first paragraph and first two bullets, have been replaced with the following: "Section 4.3.3 presents text description and figures on the number and location of metals present at concentrations above background at each study area."
Specific Comment 19. **Page 6-5, Section 6.1.2.5, third paragraph**: The statement that in the future it is unlikely that individual homes would have sufficient space to produce a family's supply of fruits and vegetables is unwarranted. Currently, families on IR35 property do grow their own supply of fruit and vegetables and the Alameda Homeless Collaborative has an agreement with the City of Alameda to be able to continue to do so for the next 50 years. The ingestion of homegrown produce is therefore a very valid current and future exposure pathway.	**Response to Specific Comment 19.** The Navy acknowledges that homegrown produce is a potential pathway at Alameda Point. The response to Specific Comment 24 presents revised text that explains why the Tier 1 risk assessment is protective of the homegrown produce pathway.

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Specific Comment 20. **Page 6-6, Section 6.1.2.5, first bullet**: The first sentence in this bullet seems contradictory. IR35 is part of Alameda Point and the background data included samples taken from EDC-5.	**Response to Specific Comment 20.** This bullet has been deleted. Additional bullets are provided instead to show that the results of the Tier 1 risk evaluation are protective of two pathways (dermal contact with soil and ingestion of homegrown produce). See response to Specific Comment 24.
Specific Comment 21. **Page 6-7, second paragraph, bullets and paragraph following bullets**: The first four bullets do not follow from the preceding sentence since the sentence relates to groundwater use and the bullets relate to soil exposure pathways. The sentence following the bullets does not follow. Recommend deletion of the last sentence and revision of the sentence preceding the bullets.	**Response to Specific Comment 21.** The text has been modified: the first two paragraphs have been combined and discuss soil and groundwater issues for the future resident. The sentence preceding the bullets has been revised to read as follows: "Specific exposure pathways for soil and groundwater evaluated for a future resident include the following:" The paragraph after the bullets has been deleted.
Specific Comment 22. **Page 6-9, Section 6.1.3.5, last paragraph**: Revise second sentence to read "Only EBS Parcel 205 is in an area...". Delete the third sentence since groundwater beneath IR35 does qualify as a potential source of drinking water under federal criteria and that status will not change.	**Response to Specific Comment 22.** Section 6.1.3.5 in the draft RI/FS Report is Section 6.1.3.6 in the draft final RI/FS Report. The second sentence in the third paragraph of Section 6.1.3.6 has been revised to read as follows: "However, AOC 1 and EBS Parcel 205 (HHRA conducted for both) are in areas that the Water Board has concurred meet exemption criteria for drinking water sources in SWRCB Resolution 88-63 (SWRCB 1988) and California Regional Water Quality Control Board Resolution 89-39 (RWQCB 2003)." The third and fourth sentences have been deleted from this paragraph.

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Specific Comment 23. **Page 6-10, first full paragraph**: Please delete this paragraph. Not only is it conjecture, but the current scenario and future scenario do have a significant number of residents growing their own food and cultivating a gardening nursery for commercial use.	**Response to Specific Comment 23.** This paragraph has been deleted.
Specific Comment 24. **Page 6-10, Section 6.3, first and second bullets**: Do the Exposure Groups 1 and 2 include ingestion of homegrown produce? It should be included.	**Response to Specific Comment 24.** Per discussions with U.S. EPA, text was added to Section 6.1.2.5 to show that a Tier 1 risk assessment is protective of the homegrown produce pathway. The following text has been added to Section 6.1.2.5: "Varying degrees of uncertainty exist in each step of the risk assessment process. Tier 1 risk evaluations use risk-based concentrations published by the U.S. EPA (PRGs), Cal/EPA (CHHSLs), and the Water Board (ESLs) as a basis for making decisions. Tier 1 risk evaluations are conducted at sites where a site-specific baseline risk assessment is not warranted based on the lack of evidence of significant releases based on site history, distribution, and concentrations of chemicals in soil. The existing data are considered adequate for each Tier 1 risk evaluation; the evidence that a release did not occur is based on sampling data collected from any area potentially associated with chemical use. "The risk-based concentrations considered in this Tier 1 evaluation address the principal exposure pathways, including ingestion of soil, inhalation of vapors in outdoor air from soil, ingestion of groundwater and inhalation of vapors while showering, and inhalation of vapors in indoor air from soil and groundwater. Uncertainty is associated with two pathways that are not included in this list: dermal contact with soil and groundwater, and ingestion of homegrown produce. The results of the Tier 1 risk evaluation are protective of these two pathways for the following reasons.

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Specific Comment 24 (continued).	**Response to Specific Comment 24 (continued).** • Generic risk-based values are designed to be protective in a range of situations. • The most stringent of the risk-based values for each chemical was used to calculate the cumulative total risk. • The maximum concentration of each chemical (except PAHs) reported above detection limits at the AOC was used. In a baseline risk assessment, an upper bound average concentration is used, which can be much lower than the maximum concentration. • Data from samples from all depths were included in the selection of the maximum concentration. In a site-specific baseline risk assessment, only chemicals reported at particular relevant depths are used." Text to clarify the above points has also been added to Appendix J.
Specific Comment 25. **Page 6-15, Section 6.4.1**: Two cancer risks (EPA and Cal-EPA) are listed for two groups (Exposure Group 1 and Exposure Group 3). Therefore four risk numbers should be presented in the first paragraph in this section. However, only two risk numbers are given and it is not possible to know what they represent. Please revise. The same problem appears in Section 6.4.3, 6.4.4, and 6.4.5.	**Response to Specific Comment 25.** The cancer risk for each exposure group using both U.S. EPA and Cal/EPA methodology is presented in Table 6-5 for the five study areas. Section 6.4.1 has been revised to read as follows: "The U.S. EPA cancer risk for Exposure Group 1 is 1×10^{-6}. The Cal/EPA cancer risk is the same for Exposure Groups 1 and 3, at 4×10^{-3}. The U.S. EPA cancer risk for Exposure Group 3 could not be calculated because none of the COPCs in this exposure group are classified as carcinogens. The noncancer hazard values are 29 for Exposure Group 1, and 27 for Exposure Group 3."

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 25 (continued).	**Response to Specific Comment 25 (continued).** Section 6.4.3 has been revised to read as follows: For AOC 11/EBS Parcels 78–79, the U.S. EPA and Cal/EPA total cancer risks including metals below background are as follows: • **Exposure Group 1** (all soil and groundwater exposure pathways): Total: 3×10^{-3} and 8×10^{-3}, respectively Without metals below background: 2×10^{-3} and 5×10^{-3}, respectively • **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater): Total: 2×10^{-5} and 8×10^{-5}, respectively Without metals below background: 5×10^{-6} and 3×10^{-6}, respectively Without metals below background and PAHs in soil: 4×10^{-6} and 1×10^{-6}, respectively • **Exposure Group 3** (exposure pathways for residential use of groundwater): Total: 3×10^{-3} and 8×10^{-3}, respectively Without metals below background: 2×10^{-3} and 5×10^{-3}, respectively Section 6.4.4 has been revised to read as follows: For AOC 23, the U.S. EPA and Cal/EPA total cancer risks including metals below background are as follows: • **Exposure Group 1** (all soil and groundwater exposure pathways): Total: 2×10^{-2} and 3×10^{-2}, respectively Without metals below background: 2×10^{-2} and 3×10^{-2}, respectively

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 25 (continued).	**Response to Specific Comment 25 (continued).** • **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater): Total: 3×10^{-5} and 2×10^{-4}, respectively Without metals below background: 2×10^{-5} and 5×10^{-5}, respectively Without metals below background and PAHs in soil: 1×10^{-5} and 3×10^{-5}, respectively • **Exposure Group 3** (exposure pathways for residential use of groundwater): Total: 2×10^{-2} and 3×10^{-2}, respectively Without metals below background: 2×10^{-2} and 3×10^{-2}, respectively Section 6.4.5 has been revised to read as follows: For EBS Parcel 205, the U.S. EPA and Cal/EPA total cancer risks including metals below background are as follows: • **Exposure Group 1** (all soil and groundwater exposure pathways): Total: 4×10^{-4} and 2×10^{-3}, respectively Without metals below background: 8×10^{-5} and 6×10^{-5}, respectively • **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater): Total: 4×10^{-5} and 1×10^{-4}, respectively Without metals below background: 2×10^{-5} and 3×10^{-5}, respectively Without metals below background and PAHs in soil: 2×10^{-5} and 3×10^{-5}, respectively

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Specific Comment 25 (continued).	**Response to Specific Comment 25 (continued).** • **Exposure Group 3** (exposure pathways for residential use of groundwater): Total: 3×10^{-4} and 2×10^{-3}, respectively Without metals below background: 8×10^{-5} and 6×10^{-5}, respectively
Specific Comment 26. **Page 6-15, Section 6.4.2**: Please remove the assertion that a future garden is unlikely to be part of this property. Since AOC 3 has been taken into the FS for remedial action, unsubstantiated speculation on future gardening activities does not assist in the decision making and implies that some sort of restriction on gardening activities may be needed.	**Response to Specific Comment 26.** The statement about future gardens has been removed.
Specific Comment 27. **Page 7-7, first paragraph**: Please delete this paragraph. The groundwater beneath AOC 23 meets the federal definition for a Class II aquifer and as such the groundwater is a potential source of drinking water.	**Response to Specific Comment 27.** The paragraph has been revised as follows: "TDS measurement from 38 groundwater samples collected during the RI at AOC 23 ranged from 371 to 21,900 mg/L, and the average TDS concentration was 3,638 mg/L. Yield at six borings was low, based on observations of very slow groundwater recharge during sampling. Groundwater yield was not quantified during sampling; however, yield was low enough that it was difficult to collect enough water for sample analysis. Some samples were collected on a second day due to low yield. However, samples for VOC analysis were taken on the first day."

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Specific Comment 28. **Page 7-7, second paragraph**: The first sentence in this paragraph is contradictory since total risk would include background metals. What is presented here is the incremental risk; the total risk would be even higher. Also, since the PCB hits account for such a high cancer risk and HI number, the assertion that the concentrations are an artifact of sampling needs more support than is given.	**Response to Specific Comment 28.** The first sentence of the second paragraph on page 7-7 has been revised to read as follows: "Results of the baseline HHRA show U.S. EPA and Cal/EPA cancer risks for Exposure Group 1 excluding metals below background were 2×10^{-2} and 3×10^{-2}, respectively, with an HI of 401." The following text has been added after the second sentence in Section 4.2.4 of the main RI/FS Report and before the last sentence in Attachment R (AOC 23), Section 4.2.3: "These concentrations were reported in grab groundwater samples collected from soil borings. It is not uncommon for grab groundwater samples to have suspended material (turbidity) entrained and analyzed with the sample, which could result in undissolved concentrations being reported." Of note, while the PCB concentrations account for a high cancer risk and HI, PCBs were reported in only 1 of 37 groundwater samples at AOC 23 and are below the MCL. Additional monitoring wells are proposed for AOC 23, which will provide more reliable results for PCB analysis.
Specific Comment 29. **Page 7-8, third bullet**: Given that PCBs and PAHs account for the majority of the risk in groundwater, it would seem prudent to propose resampling during the remedial action to verify the assumption that the PCB and PAH hits are an artifact of previous sampling.	**Response to Specific Comment 29.** Aroclors 1016 and 1260 were reported in only 1 of 37 groundwater samples at AOC 23 (grab sample A23SB18). The concentrations in the sample are below the MCL of 0.5 µg/L, which would most likely be selected as the remediation goal for PCBs in groundwater at this study area. For this reason, additional sampling to verify the assumption that PCBs are present in groundwater because of suspended material in the groundwater sample was not included as part of any

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Specific Comment 29 (continued).	**Response to Specific Comment 29 (continued)** of the remedial alternatives. Four PAHs (benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, and benzo[a]pyrene) contributed to the cancer risk. Three of the four were reported only once in groundwater collected from AOC 23 in a sample (071M-013) analyzed by a mobile laboratory during the EBS. The fuel line in this area and some soil along the fuel line were subsequently removed from AOC 23. The groundwater sample collected during the RI at location A23SB05 was within 15 feet of sampling location 071M-013, and none of the PAH risk drivers were reported above detection limits. The other PAH, benz(a)anthracene, was reported in two samples, sample 071M-013 (discussed above) and in sample A23SB25. The concentration of benz(a)anthracene in the groundwater sample from A23SB25 was 0.56 µg/L. The fact that these PAHs were reported once or twice in 45 groundwater samples at AOC 23 indicates that they are not widespread and that the risk is likely overestimated, because it was calculated based on the maximum concentration reported in a grab groundwater sample. For these reasons, additional sampling to verify the assumption that the PAHs were present in groundwater because of suspended material was not included as part of the remedial alternative.
Specific Comment 30. **Page 7-8, last bullet**: Clarify that the PAHs *in soil* are addressed as part of the PAH Areas since the PAH hits in the groundwater are not being addressed.	**Response to Specific Comment 30.** The last bullet on page 7-8 has been modified to read as follows: "PAHs in soil are addressed as part of the PAH Areas (Section 7.1.6)."

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Specific Comment 31. **Page 7-9, Section 7.1.6**: As mentioned in the General Comments, soil beneath existing buildings needs to be addressed in the remedial alternatives evaluated for PAH contamination.	**Response to Specific Comment 31.** ICs associated with Alternatives PAH-2, -3a, -3b, and -4a have been revised to address soil under buildings. The ICs for these alternatives have been revised to require implementation of a soil sampling plan for soil beneath buildings and hardscape in the event that redevelopment involves removal of buildings and/or hardscape.
Specific Comment 32. **Page 7-10, Section 7.2.1, fourth paragraph, first sentence**: Please clarify where the arsenic is found, i.e. soil, groundwater or both.	**Response to Specific Comment 32.** The text has been revised as follows: "Results of the Tier 1 risk evaluation for AOC 2 show a total cancer risk of 2×10^{-3}, due to arsenic in both soil and groundwater below background, and an HI of 7, due primarily to manganese in groundwater."
Specific Comment 33. **Page 7-12, Section 7.2.3, third paragraph and second bullet on page 7-13**: Please delete this paragraph and the bullet. Groundwater in this location is not exempted and meets the federal criteria for a potential source of drinking water.	**Response to Specific Comment 33.** The bullet has been deleted and the paragraph has been revised as follows: "TDS measurements from two groundwater samples collected during the RI at AOC 5 were 3,240 and 13,700 mg/L. Yield at both borings was low, based on observations of very slow groundwater recharge during groundwater sampling."
Specific Comment 34. **Page 7-15, Section 7.2.7, third paragraph**: Please note that the background risk attributable to arsenic is approximately 2×10^{-5} (see OU 1 RI and FS) and not 9×10^{-5}. Arsenic appears to be present at levels above the Alameda Point background value of 9.1 mg/kg. Please provide more information to support the claim that arsenic at this AOC is present at levels below the Alameda Point background.	**Response to Specific Comment 34.** The statements in the RI are correct. The Cal/EPA cancer risk of 9×10^{-5} is based on the maximum concentration of arsenic of 5.5 mg/kg which is well below the 95th percentile in the Alameda Point pink background of 9.1 mg/kg. The U.S. EPA cancer risk of 2×10^{-5} in the OU 1 RI and FS is based on a 95th upper confidence limit of the average concentration in the pink background data set.

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Specific Comment 35. **Page 7-16, third paragraph:** Please delete this paragraph.	**Response to Specific Comment 35.** The paragraph has been revised as follows, "TDS concentrations from eight groundwater samples collected during the RI at AOC 11/EBS Parcels 78-79 ranged from 1,010 to 7,720 mg/L; the average TDS concentration was 3,754 mg/L."
Specific Comment 36. **Page 7-16, fourth paragraph:** Why is the TCE in groundwater and associated inhalation threat not discussed in the Human Health Risk Assessment presented for this AOC in Section 6.4.3 or stated in the second paragraph on page 7-16? Given that this area is used for residential purposes, including day care, it is extremely important to discuss the significance of this contaminant and the potential exposure pathways, and also to provide satisfactory justification for not remediating the contaminant. Additionally, the groundwater ingestion pathway needs to be considered a potentially complete pathway.	**Response to Specific Comment 36.** The second to last paragraph of Section 6.4.3 has been revised to include the following: "For Exposure Group 2, the majority of the cancer risk is due to the potential vapor migration of TCE in groundwater to indoor air." TCE was not discussed in the second paragraph on page 7-16 because none of the TCE concentrations exceeded the PSC (the MCL). However, because TCE contributes to the U.S. EPA cancer risk above 10^{-6}, the following has been added to the second paragraph on page 7-16 preceding the last sentence: "TCE was reported in four groundwater samples at concentrations below the PSC (the MCL) but is mentioned here because the U.S. EPA cancer risk for inhalation of TCE vapors in indoor air is above 10^{-6}. The reported concentrations of TCE ranged from 0.45 J to 1.1 µg/L." The HHRA included ingestion of groundwater in Exposure Group 1. TCE is present at concentrations below the MCL of 5 µg/L, and risks from inhalation of TCE are at the low end of the risk management range; therefore, TCE in groundwater was not recommended for remediation.

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Specific Comment 37. **Page 7-17, second bullet**: What about the TCE hit? Please provide more information.	**Response to Specific Comment 37.** The second sentence on page 7-17 has been revised as follows: "Further evaluation of the extent of TPH and metals in soil, and metals, PCBs, pesticides, and TCE in groundwater, is not recommended for the following reasons." The following has been added as the new fourth bullet: • "TCE was reported in groundwater samples at concentrations below the PSC (the MCL) and, as mentioned in the previous bullet, risk results indicated that U.S. EPA and Cal/EPA cancer risks associated with TCE were within the risk management range."
Specific Comment 38. **Page 7-17, third bullet**: It is not appropriate to delete background metals from total risk and then claim that since the incremental risk is within the risk management range, no further action is recommended. Total risk needs to be presented and then the risk managers can ascertain, if the risk is within the risk management range, whether remedial action should be evaluated.	**Response to Specific Comment 38.** The risk presentation in Sections 6.3 and 6.4 and related sections in other portions of the document has been revised so that total and incremental risk are both presented. Total risk is also presented in tables in Section 6.
Specific Comment 39. **Page 7-17, fourth bullet**: Please delete this bullet.	**Response to Specific Comment 39.** The fourth bullet on page 7-17 has been deleted.
Specific Comment 40. **Page 7-17, Section 7.2.9, third paragraph**: As previously mentioned, the background risk for arsenic is 2×10^{-5}, so the risk at this AOC for arsenic of 1×10^{-4} appears above background. Please provide support for stating that arsenic is below Alameda Point background levels, where the concentration limit for clean up has been set at 9.1 mg/kg.	**Response to Specific Comment 40.** The statements in the RI are correct. The total cancer risk of 1×10^{-4} includes a Cal/EPA cancer risk of 9×10^{-5} based on the maximum arsenic concentration of 5.5 mg/kg, which is well below the 95th percentile in the Alameda Point pink background of 9.1 mg/kg. The cancer risk of 2×10^{-5} in the OU-1 RI and FS is based on a 95th upper confidence limit of the average arsenic concentration in the Alameda Point pink background data set.

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Specific Comment 41. **Page 7-19, Section 7.2.11, fourth paragraph**: Please provide a reference for the stated groundwater concentration for protection of indoor air of 3200 µg/l.	**Response to Specific Comment 41.** In Section 7.2.11, the ESL is referenced in the sentence with the value of 3,200 µg/L for naphthalene. Section 6.1.2.5 explains that the ESLs are one of the generic published screening levels used in the Tier 1 risk evaluation.
Specific Comment 42. **Page 7-22, Section 7.2.14, second, fourth and fifth paragraph**: Please provide more support for the statement that arsenic and iron, while above background, are believed to be naturally occurring. Simply making the statement is not sufficiently convincing.	**Response to Specific Comment 42.** As described in Section 4.3.1.1: "Aluminum and iron oxides are among the most common minerals in soil. Because trace metals (e.g., arsenic) are often found associated with mineral oxides, the naturally occurring metals in natural soils can be strongly correlated to the presence of aluminum and iron (Zheng et al. 2002)." Section 7.2.14 has been modified by replacing the second paragraph. This information is also described in Attachment S. "Metals (arsenic and iron) and TPH were reported at concentrations above PSCs at AOC 24. Arsenic and iron were reported in soil at concentrations above PSCs and background at the same location; however, these metals are not believed to be a result of Navy activities, based on the evaluation in Section 4.3. The soil sample with reported arsenic and iron concentrations above background was collected at 5 to 6 feet bgs in the native BSU and also had concentrations of aluminum, barium, chromium, copper, lead, magnesium, mercury, nickel, potassium, sodium, vanadium, and zinc at concentrations above background. The depth of this sample, the type of sample material (i.e., clay), and the number of metals with concentrations above background support the conclusion that metals concentrations in this sample are naturally occurring. Arsenic was reported in groundwater at concentrations below background."

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Specific Comment 43. **Page 9-1, Section 9.1.1, third bullet, second sentence and Page 9-2, Section 9.1.2, fifth bullet**: Please note that the preference is for reduction of mobility, volume or toxicity through treatment. Containment would not provide treatment.	**Response to Specific Comment 43.** Comment noted. Please see Response to Specific Comment 44.
Specific Comment 44. **Section 9.3.1.1, Effectiveness, Page 9-4**: The criterion in bullet 2 is the reduction of toxicity, mobility, or volume (TMV) *by treatment*, not just the reduction of TMV. Please revise the text of bullet 2 to clearly state that technologies that reduce TMV *by treatment* are preferred.	**Response to Specific Comment 44.** The second bullet in Section 9.3.1.1 has been revised to read as follows: • "permanent reduction in toxicity, mobility, or volume of contaminants in affected soil and groundwater through treatment; technologies that permanently reduce contaminant toxicity, mobility, or volume through treatment are preferred." The following text has also been modified: Section 9.1.1, third bullet and Section 9.1.2, fifth bullet: "Containment may reduce contaminant mobility, but does not provide any treatment and may not necessarily reduce…" Section 11.1.4, first sentence: "…cleanup alternatives use treatment technologies."
Specific Comment 45. **Table 11-4**: Detailed and Comparative Analysis of Soil Remedial Alternatives at AOCs 10 and 12 by Balancing Criteria; Table 11-5, Detailed and Comparative Analysis of Soil Remedial Alternatives for PAH Areas by Balancing Criteria: The evaluation of the reduction of TMV through treatment for AOC 10/12-2, PAH-2, PAH-3a, PAH3b, PAH4a, and PAH4b, indicates that pavement would reduce the mobility of the contaminants in affected soils under the pavement, but pavement is not considered treatment.	**Response to Specific Comment 45.** In Table 11-4, the last sentence in the Reduction of TMV Through Treatment cell for Alternative 10/12-2 has been revised as follows: "Pavement would reduce the mobility of the contaminants in affected soils but would not provide treatment." Alternative PAH-2 has been revised to include ICs only, and not a soil cover. References to a soil cover have been removed from Table 11-7. The last sentence in the Reduction of TMV Through Treatment cell for Alternative PAH-2 has been revised to state the following:

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Specific Comment 45 (continued).	**Response to Specific Comment 45 (continued).** "ICs do not reduce the toxicity, mobility, or volume of contaminants or provide treatment, but are intended to minimize the possibility of public exposure to residual concentrations." The rankings of Alternatives PAH-3a, -3b, -4a, and -4b in the Reduction of TMV Through Treatment criterion have been changed to "Low" in Table 11-7 and Section 11.7.3.4.
Specific Comment 46. **Table 11-13, Detailed and Comparative Analysis of Groundwater Remedial Alternatives at AOC 1 by Balancing Criteria and Table 11-17, Detailed and Comparative Analysis of Groundwater Remedial Alternatives at AOC 23 by Balancing Criteria**: The evaluation of the reduction of TMV through treatment for alternatives AOC 1-1 and AOC 23-1 should not state that some reduction of naphthalene or vinyl chloride concentrations would occur since there is no way to verify this in the no action alternative. Therefore, it cannot be concluded that this reduction occurs and this criterion should be scored "low."	**Response to Specific Comment 46.** Rankings of Alternatives AOC 1-1 and AOC 23-1 in the Reduction of TMV Through Treatment criterion have been revised to "Low." In the last sentence of Sections 11.7.4.4 and 11.7.5.4, Alternative AOC 1-1 (in Section 11.7.4.4) and AOC 23-1 (in Section 11.7.5.4) have been ranked "Low" in reduction of TMV, and a new paragraph has been added at the end of these sections as follows: "...concentrations would continue to decrease through natural attenuation processes, which would be verified through groundwater monitoring. "Alternative AOC 1-1 (23-1) rated low in reduction of toxicity, mobility or volume through treatment because this alternative does not involve active treatment or monitoring to verify if contaminant concentrations are decreasing through natural attenuation processes."
Specific Comment 47. **Appendix H, Background Comparison, Figures H2 through H20, Correlation of metals plots**: It should be noted in the text that each of these plots has a different scale. The differing scales can be misleading when using them to evaluate the relationships between any one metal and each of the other metals. Please indicate	**Response to Specific Comment 47.** The following has been added to the second bullet on page H-1 in Appendix H: "Similar scatter plots are presented for ten metals (i.e., aluminum, arsenic, barium, chromium, cobalt, copper, manganese, nickel, vanadium, and zinc) in soil to show the correlation with iron (Figures H-12 through H-21). The

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Specific Comment 47 (continued). in the text that each of these plots has a different scale and that the x and y-axes also do not have a common scale. Also, the r squared value for each of the trend lines should be listed on the plots; without a record of the r squared values and the variable scales it is not possible to evaluate the significance of the metals correlation results. Please provide the r squared value for each of the plots.	**Response to Specific Comment 47 (continued).** scales for the scatter plots are determined by the range of concentrations for the individual metals. For example, the y axes for the plots of aluminum versus each metal will all be the same but will be different than the y axes for the plots of iron versus each metal. The range of the x axes varies with the range of concentrations for the individual metal." The r squared value was added to the revised plots.
Specific Comment 48. **Appendix L, Table L-15, AOC 1, Cost Estimate Assumptions for Groundwater Alternatives and Table L-15, AOC 23, Cost Estimate Assumptions for Groundwater Alternatives**: The basis for the assumption that MNA will be complete in 10 years is not presented. Please explain the basis for this assumptions. Similarly, the basis for the assumption that a single round of in-situ chemical oxidation (ISCO) would be sufficient is not explained. Please provide the technical basis for the assumption that a single round of ISCO would be sufficient.	**Response to Specific Comment 48.** At AOCs 1 and 23, limited groundwater data were available to assist in predicting the duration of remediation. Of the three grab groundwater samples collected at AOC 1, only one sample contained detectable naphthalene, at a concentration 12 times the preliminary cleanup goal. At AOC 23, the highest reported vinyl chloride concentration in a grab groundwater sample was approximately six times the proposed cleanup goal. The limited amount of groundwater data at these AOCs was not considered sufficient to perform reliable natural attenuation modeling. The assumed 10-year duration of MNA is based on typical natural attenuation rates for stable plumes at similar sites. The following sentence has been added after the second sentence in Section L2.10.2 and the second sentence in Section L2.13.2: "This duration is based on the assumption of a stable plume and typical natural attenuation rates at similar sites (USGS 2003), where an order-of-magnitude reduction in contaminant concentrations in 10 years is common." The scope of ISCO injections was based on discussions with a specialty contractor with extensive ISCO experience with modified Fenton's Reagent at Alameda Point. The reference (Haskins, pers. com. 2006) has been added at the end of the fourth sentence in Section L2.12.2 and the second sentence in the second paragraph of Section L2.14.2.

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Specific Comment 48 (continued).	**Response to Specific Comment 48 (continued).** New reference added: United States Geological Survey. 2003. Methodology for Estimating Times of Remediation Associated with Monitored Natural Attenuation. United States Geological Survey, Water Resources Investigations Report 03-4057, 2003.
Specific Comment 49. **Attachment D, Section 1.5, Adjacent Site, Page D1-6; and Section 5.3, Contaminant Migration, Page D5-3:** The discussion of adjacent sites is limited to IR Site 28; however, results of sediment sampling at IR Site 20 should also be discussed to support the conclusion that contaminant migration by surface water runoff is unlikely. For example, storm water runoff from of AOC 4 discharges to IR Site 20 at Outfall E or by overland flow from the portion of EBS Parcel 62 within AOC 4. Please revise Section 1.5 of Attachment D to include a brief discussion of sediment results from IR Site 20.	**Response to Specific Comment 49.** The title of Section 1.5 in Attachment D has been changed to "Adjacent Sites" and the following paragraph has been added to precede the existing paragraph: "IR Site 20 is a portion of the Oakland Inner Harbor located along part of the northern boundary of Alameda Point. This site extends along a 3,960-foot length of shoreline at the eastern end of Alameda Point, including the northern boundary of AOC 4. This entire shoreline area was developed for industrial use, including port facilities, a ship-building and repair facility, sand and gravel off-loading areas, and marinas. Storm water and industrial wastes have been discharged into the Oakland Inner Harbor via a series of drains located along the shore. The 2006 RI Report for IR Site 20 (Battelle et al. 2006) evaluated offshore sediment samples taken from the surface, subsurface, and deeper core locations for PCBs, PAHs, pesticides, and metals. Results indicated that these chemicals in sediment were not present at concentrations exceeding screening criteria; therefore, contaminant migration from the surface water runoff into Oakland Inner Harbor is unlikely." New reference added: Battelle; BBL, Inc.; and Neptune & Company. 2006. Draft Remedial Investigation Report, IR Site 20 (Oakland Inner Harbor) and IR Site 24 (Pier Area), Alameda Point, Alameda, California. March.

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Specific Comment 50. **Attachment D, Table 3-1, Sample Analysis Summary, AOC 4**: The presentation of metals analyses could be improved. For example, the table does not distinguish between samples analyzed for the full suite of metals (4 samples from MBG-1), and those analyzed for arsenic only (7 samples). Please revise the table to identify samples that were analyzed for arsenic only.	**Response to Specific Comment 50.** A footnote has been added to the soil samples analyzed for metals during the PAH TCRA in Table 3-1 of Attachment D to indicate that they were analyzed for arsenic only.
Specific Comment 51. **Attachment E, Section 5, Conceptual Site Model, Page E5-1; Attachment E, Section 4.2.4, Metals, Page E4-3; and Attachment E, Section 6.2 Risk Characterization, Page E6-1 and E6-2**: The interpretation that high concentrations of dissolved metals in groundwater are associated with pH and/or anaerobic conditions does not present any water quality parameter data in the discussion. If available, please provide water quality parameter data (i.e., pH, dissolved oxygen [DO] and Oxidation Reduction Potential [ORP]) to support this interpretation.	**Response to Specific Comment 51.** As discussed in Response to Specific Comment 15, water quality parameter data are not available for the grab groundwater samples collected at AOC 5 during the RI. However, as documented in response to Specific Comment 15, the concentrations of iron and manganese in groundwater at AOC 5 are more reliable indicators of reducing conditions than these parameters.
Specific Comment 52. **Attachment G, Section 1.4.2, PAH Removal Action, Page G1-3**: The discussion of soil removals does not include the depth of the excavations. In addition, it may not be clear to the public if the soil removal addressed contaminants other than PAHs because the discussion in the first paragraph indicates that twelve samples collected during the Time Critical Removal Action (TCRA) were analyzed for VOCs, Total Petroleum Hydrocarbons (TPH), PAHs, Pesticides, PCBs, and metals. The first paragraph further indicates that only results from soil samples not excavated during the TCRA were reviewed for this report, but it is not clear if there are samples that were collected beneath the excavations that are included. Please revise the text to include the depths of the excavations, to clarify whether the	**Response to Specific Comment 52.** The first paragraph of Section 1.4.2 has been revised as follows: "PAH time-critical removal action (TCRA) soil removals in the West Housing Area were conducted using a grid pattern at several EBS parcels, including an area of EBS Parcel 98 in AOC 7 (FWEC 2004). Soil was removed to a depth of approximately 2 feet bgs from certain grid areas to address elevated concentrations of PAHs. The excavations were backfilled using clean fill material. Locations of the removals at AOC 7 are shown on Figure 1-1. Prior to the TCRA, 12 soil borings were advanced in AOC 7 (BB27 through 30, CC27 through 30, and DD27 through 30). Soil samples collected from these borings were analyzed for one or more of the following analytes: volatile organic

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Specific Comment 52 (continued). TCRA addressed contaminants other than PAHs and to clarify whether data collected from samples deeper than the excavation depth are included in this RI Report.	**Response to Specific Comment 52 (continued).** compounds (VOCs), TPH, PAHs, pesticides, polychlorinated biphenyls (PCBs), and metals. Only laboratory results for soil samples collected outside of or below the TCRA excavations were reviewed for this report, and PAH analytical results are summarized below."
Specific Comment 53. **Attachment H, Section 1.2, Historical Use, Page H1-1:** The report does not describe the current land use of AOC 8 as a community garden or identify the period of time that AOC 8 has been used and is planned for future use as a community garden. Please describe the current and future land use (including dates) in Section 1.2 of Attachment H	**Response to Specific Comment 53.** The requested information has been added to Section 1.1 (Background) of Attachment H, which now reads as follows: "AOC 8 is an approximately 0.5-acre site in the central portion of Transfer Parcel Economic Development Conveyance (EDC)-5, near Pensacola Lane and Corpus Christi Road, in the northeastern portion of Environmental Baseline Survey (EBS) Parcel 98. AOC 8 is a small portion of approximately 34 acres conveyed to the Alameda County Homeless Base Conversion Collaborative (subsequently known as the Alameda Point Collaborative [APC]) under a no-cost, 59-year lease negotiated with the Alameda Reuse and Redevelopment Authority in 1995. Pursuant to an agreement with the City of Alameda, the APC is developing and managing 200+ housing units on this land and offering social services and resources to the homeless and the wider Alameda Point community. "Building 550, a metal shed, is the only structure located in AOC 8; the remainder of the AOC is unpaved and includes portions of a residential backyard and portions of the Alameda Point community garden staging area (Figure 1-1). The Alameda Point community garden project is an APC service project that was begun in June 2002 to provide an opportunity for APC housing residents to grow their own produce to supplement their incomes (Alternatives in Action 2006); the grounds dedicated to this project occupy approximately 1.5 acres.

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Specific Comment 53 (continued)	**Response to Specific Comment 53 (continued).** "The APC garden project currently uses Building 550 at AOC 8 to house gardening equipment and supplies. The open area surrounding Building 550 at AOC 8 is covered with wood chips and is used as a staging area for gardening activities. The actual garden plots are located in an adjacent field to the southeast of AOC 8; the garden plots are not present within the boundaries of AOC 8 (Figure 1-1). Because of the long-term lease to the APC of the land that includes AOC 8, the site is likely to be used by the community garden project or other APC projects for the foreseeable future." In addition to the new text added (above), the location and boundaries of the garden plots relative to AOC 8 have been added to Figure-1-1 in Attachment H. New reference added: Alternatives in Action. 2006. Youth Projects, The Community Garden at Alameda Point. At: http://www.alternativesinaction.org/community_leaders/youth_projects.html.
Specific Comment 54. **Attachment I, Figure 1-1, Study Area and Sampling Location, AOC 9**: The assumed location of the former grease trap at AOC 9 is not identified on Figure 1-1. Please include the location of the former grease trap on Figure 1-1.	**Response to Specific Comment 54.** The assumed location of the grease trap (immediately outside the southwestern corner of Building 17) has been added to Figure I-1 in Attachment I.
Specific Comment 55. **Attachment R, Section 7.2, Conclusions and Recommendations, Pages R7-4 and R7-5**: Data (i.e., groundwater turbidity data) have not been provided to support the interpretation and conclusion that PAHs and PCBs reported in groundwater at AOC 23 are associated with suspended material due to turbidity.	**Response to Specific Comment 55.** PCBs were reported in one grab groundwater sample, and PAHs that are risk drivers were reported in only two grab groundwater samples collected at AOC 23. Turbidity data were not available for these groundwater samples. However, the extremely low solubility of these compounds in water would suggest that they are not present in the dissolved phase. In addition, as discussed

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Specific Comment 55 (continued).	**Response to Specific Comment 55 (continued).** in Response to Specific Comment 29, the PCBs and the maximum reported concentrations of the risk-affecting PAHs were reported in a single sample collected during the EBS and analyzed by the mobile laboratory. The sample collected during the RI within 15 feet of this location did not have reported concentrations of PCBs or of the four PAHs that contribute to cancer risk. Furthermore, the concentrations of PCBs in this sample are below the MCLs. An MCL has not been established for three of the four PAHs.
Specific Comment 56. **Attachment T, Section 7.2, AOC 25 Conclusions and Recommendations, Page T7-2**: Data to support the interpretation that high concentrations of arsenic, iron, lead, and manganese in groundwater are associated with reducing conditions has not been included. Please provide water quality parameters data (i.e., pH, dissolved oxygen [DO] and Oxidation Reduction Potential [ORP]) to support this conclusion.	**Response to Specific Comment 56.** The high concentrations of iron and manganese are more reliable indicators of reducing conditions than dissolved oxygen or ORP measurements. Water quality measurements (such as pH, turbidity, redox potential, or conductivity) were not collected at the discrete groundwater sampling locations at AOC 25 during the RI, and are not available. Also, please refer to Response to Specific Comment 15.
Specific Comment 57. **HHRA**: Section 6 of the main RI/FS document notes that risks for PAHs have been divided into pre-TCRA PAH risks and post-TCRA PAH risks. The calculations for the pre-TCRA PAH risks are presented in Appendix I, but the calculations for post-TCRA PAH risks apparently have not been provided, even though a summary of the results is presented as Table 6-2 of the main document. Please provide the risk calculations for the post-TCRA PAH results.	**Response to Specific Comment 57.** The text in Section 6.2 has been clarified to explain that the post-TCRA risk results were taken from the EDC-5 SI Report and were not calculated for this RI/FS. The following sentence was added to the paragraph in Section 6.2: "The post-TCRA cancer risk and noncancer hazard calculations are presented in Appendix B of the SI Report for Transfer Parcel EDC-5 (BEI 2005b)."

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Specific Comment 58. **Section J1.2.3, Calculation of Cancer Risk and Noncancer Hazard Values, Page J-3.** Cancer risk and noncancer hazard values for the Tier 1 data evaluations were calculated for three separate exposure groups, one of which is exposure pathways for soil and vapors from volatile organic compounds (VOCs) in groundwater (Exposure Group 2). However, it does not appear that a quantitative evaluation of VOCs in groundwater was included in the Exposure Group 2 calculations for most of the individual sites. For example, the results for AOC 2 for Exposure Group 2 (exposure pathways for soil and vapors from VOCs) are presented in Section J2.1.3, but the cancer risk and noncancer hazard values do not actually include potential inhalation risks/hazards attributable to volatilization of VOCs from groundwater. Since inhalation of VOCs stemming from groundwater was not actually included in the Exposure Group 2 calculations of risk/hazard, it should be removed from explanation of the exposure group and evaluated exclusively in the uncertainty analysis.	**Response to Specific Comment 58.** The reference to protection of indoor air from vapors in groundwater has been left in the Exposure Group descriptions because the ESLs for protection of indoor air from vapors in soil and groundwater are used as part of the quantitative evaluation. The Tier 1 risk evaluation is protective for all pathways listed, including indoor air vapors from groundwater, because the most stringent of the published criteria for each chemical, including VOCs, was used. In some cases, the published criteria address different pathways. For example, at AOC 2, four VOCs were reported in soil. The ESLs for protection of indoor air are more stringent than the PRGs for soil for three of these VOCs, but not for the fourth, carbon disulfide. So for carbon disulfide, the more stringent PRG is used for calculating risk, even though it is not based on indoor air, because it is the more protective criterion for the indoor air pathway.

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ALAMEDA POINT, ALAMEDA, CALIFORNIA
DATED JULY 2006
CTO-0077

Comments from U.S. EPA, Regional Counsel, 10/30/2006

GENERAL COMMENTS	RESPONSE TO GENERAL COMMENTS
General Comment 1. Page 9-6, Sec. 9.3.2.2. The document states, "ICs might also be effective as an interim strategy to ensure the effectiveness of other remedial process options by preventing disturbance of portions of the remedy (e.g., pavements or soil covers) ... until site redevelopment occurs or cleanup goals are achieved." This implies that ICs to protect the integrity of a landfill cap are an interim remedy and would go away once the active remediation has been accomplished. This is misleading, as ICs to protect the integrity of a landfill cap must be maintained in perpetuity unless a subsequent determination is made that the property is suitable for unrestricted user.	**Response to General Comment 1.** The second paragraph in Section 9.3.2.2 has been replaced with the following: "ICs would not treat impacted soil, but would prohibit unacceptable exposure to constituents in the soil. ICs might also be effective as a temporary measure until the property is suitable for unrestricted use."
General Comment 2. Page 10-3, Sec. 10.2.2. Soil alternatives involving cover and ICs – pavement maintenance issues. (a) Requiring pavement to be maintained is a type of IC and should be described as such in the document. (b) The document in the first whole sentence on p. 10-3 states that existing pavement would be maintained until redevelopment, at which time the transferee would be responsible for pavement removal and excavation of underlying lead-impacted soil. This is confusing. It suggests that eventual removal of pavement and excavation of soil underneath is part of the remedy. The discussion of remedy AOC 10/12-2 in Sec. 11, however, does not include removal of pavement and excavation as part of the remedy. It may be that the Navy's intent is that pavement maintenance will be required as an IC but that the IC could be lifted if the transferee chooses to remove the pavement and excavate the underlying soil pursuant to an enforceable agreement with EPA and the State. This should be clarified.	**Response to General Comment 2.** Section 10.2.2 has been revised to change "maintenance" of pavements to "ICs restricting removal" of pavements over contaminated soil. Section 10.2.2 has been revised to read as follows: "The cover and/or ICs alternatives involve installation of a cover to act as a barrier and provide separation between the underlying impacted soil and potential receptors, and/or the use of ICs to restrict removal of existing pavements, hardscape, or buildings over contaminated soil. ICs would prohibit actions that could damage or reduce the effectiveness of the cover. Cover and/or IC alternatives include AOC 3-2, AOC 10/12-2, and PAH-2. "For Alternative AOC 3-2, a soil cover would be placed over the impacted soil and graded to prevent ponding and direct surface water drainage off the site. The source material for the soil cover is assumed to be clean, imported soil from an off-site area. ICs would be put in place prohibiting actions that could damage the cover or reduce its effectiveness.

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GENERAL COMMENTS	RESPONSE TO GENERAL COMMENTS
General Comment 2 (continued).	**Response to General Comment 2 (continued).** "For Alternative AOC 10/12-2, limited excavation and off-site disposal of lead-impacted soil exceeding the preliminary RG in unpaved areas would be performed. The storm drain with sediment containing lead at concentrations above the preliminary RG would also be cleaned out and disposed off-site as part of this alternative. Existing hardscape and pavements over lead-impacted soil would remain in place, and ICs prohibiting removal of the hardscape and pavements would be put in place. "For Alternative PAH-2, ICs would be put in place that would require a soil sampling plan to be implemented when existing buildings and/or hardscape are removed in the IC area. Once human-health risk is demonstrated to be similar to or less than the risk for soil in unpaved areas, the ICs would no longer be required. (The previous TCRA for PAHs removed shallow soil with B[a]P equivalent concentrations above the preliminary RG in unpaved areas, so a soil cover was not considered necessary for Alternative PAH-2.) The area of ICs would include the northeastern portion of Transfer Parcel EDC-5, where the majority of higher PAH concentrations in soil remain. "In the event of future site work that could damage soil covers, pavement, or buildings subject to ICs, prior approval would be required from regulatory agencies and the Navy. ICs would be put in place for each covered area to prohibit actions that could result in unacceptable exposure to underlying impacted soil or otherwise reduce the effectiveness of the cover. In the event of future site work in the vicinity of impacted soil addressed by the cover/ICs alternatives, prior approval from regulatory agencies and the Navy would be required. The site work would also be subject to a soil management plan. The soil management plan would consider possible subsurface hazards (such as exposure to impacted soil) that may be

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GENERAL COMMENTS	RESPONSE TO GENERAL COMMENTS
General Comment 2 (continued).	**Response to General Comment 2 (continued).** encountered during future excavation, and soil management requirements for stockpiles, characterization, and proper disposal. No fencing or signage would be included in any of the cover/ICs alternatives."
General Comment 3. **Page 10-7, Sec. 10.3.5, GW remedies, ISCO.** This discussion indicates that "a 2-year duration is assumed" and that ICs are assumed not to be required for this alternative. This suggests that interim ICs are not necessary for an active remedy that will take two years. However, page 11-43 suggests that the ISCO is expected to achieve RGs within 6 months, and that it is monitoring that is expected to last 2 years. EPA recommends that this be clarified in Sec. 10.3.5.	**Response to General Comment 3.** Descriptions in Section 10 were intended to be brief summaries of alternatives. Section 11 provides a more detailed description and key assumptions. For clarity, the fifth sentence in the second paragraph in Section 10.3.5 has been revised as follows: "For FS cost-estimating purposes, a 2-year duration is assumed, including up to 6 months of ISCO followed by groundwater confirmation sampling."
General Comment 4. **Page 11-9, Sec. 11.2.2.4, AOC 3-2, soil cover, reviews and reporting.** In the last sentence of Sec. 11.2.2.4, the document states that comprehensive reviews of the ICs would be performed every 5 years. However, EPA considers it necessary to review the effectiveness of the ICs at least every year. Additionally, the document states that for the purposes of the RI/FS, the project life is defined as 30 years. This also presents a problem with regard to ICs, as it must be assumed that the ICs are in place in perpetuity. We have the same concerns regarding other sections discussing reviews and reporting on IC effectiveness.	**Response to General Comment 4.** Section 11.2.2.3 describes in detail the Navy's process for implementing institutional controls (ICs), including maintenance and periodic inspections. The details of any maintenance activities and periodic inspections would be described in the remedial design stage. These activities would be in addition to the CERCLA 5-year reviews. The last sentence in Sections 11.2.2.4 and 11.3.2.7 has been revised to remove reference to the effectiveness of ICs as follows: "Comprehensive reviews of the selected remedy would be performed every 5 years under CERCLA." The penultimate sentence in these sections has been revised to state that a 30-year duration has been assumed for costing purposes.

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GENERAL COMMENTS	RESPONSE TO GENERAL COMMENTS
General Comment 5. **p. 11-12, sec. 11.3.1.1, and p. 11-19, sec. 11.4.1.1.** These two sections analyze the no-action remedy for AOC 10/12 and PAH areas as to the first criterion, overall protection of HH and the environment. In both cases, the Navy concludes that the no action alternative may meet this threshold criterion by taking into consideration anticipated soil surcharge during development. However, it is not appropriate to consider the possible soil surcharge in analyzing the protectiveness of any remedy unless adding a soil cover is considered to be an element of the remedy. Obviously, with a no-action remedy, this is not the case. Also, how can the no action alternative be considered protective for the PAH areas when "time until protection is achieved is indefinite" (p. 11-50, sec. 11.7.3.5)?	**Response to General Comment 5.** At AOCs 10 and 12, and PAH areas, extensive soil excavation has already occurred. Therefore, Alternatives 10/12-1 and PAH-1 have been renamed "no further action." The text in Section 11.3.1.1 has been deleted and replaced with the following new paragraph: "Significant removal actions have already been completed at AOCs 10 and 12 as part of NTCRAs to remove lead-contaminated soil from unpaved areas, as described in Section 8.1.2.2. The areas where soil removal actions occurred in AOCs 10 and 12 are shown on Figures 11-2 and 11-3, respectively. As a result of the NTCRA, the average lead concentration and EPC at each of these AOCs is below the preliminary RG of 184 mg/kg. Eight of 107 samples in AOCs 10, and 12 of 184 samples in AOC 12 exceeded the preliminary RG for lead of 184 mg/kg. The average lead concentration in soil at AOC 10 is 67 mg/kg, with an EPC of 105 mg/kg. The average lead concentration in soil at AOC 12 is 52 mg/kg, with an EPC of 77.5 mg/kg. Because the EPCs for lead in soil at AOCs 10 and 12 are significantly below the preliminary RG of 184 mg/kg, the no further action alternative is considered protective of human health and the environment." The reference to soil surcharge in the third paragraph in Section 11.4.1.1 has been removed. New paragraphs have also been added at the end of Section 11.4.1 to describe current PAH-related health risk and existing ICs for PAHs at IR Site 35. Please see the attached text of Section 11.4 for revisions.
General Comment 6. **p.11-22, sec. 11.4.3.2, pavement maintenance.** The document states that the pavement maintenance activities are assumed to continue over a period of 30 years. While that may be a reasonable assumption for costing purposes, no reason is given	**Response to General Comment 6.** As described in the Response to ORC General Comment 2, the term "pavement maintenance" has been removed from the document and replaced with ICs restricting removal of existing pavement, hardscape, or buildings.

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GENERAL COMMENTS	RESPONSE TO GENERAL COMMENTS
General Comment 6 (continued). why the pavement maintenance activities will not have to continue in perpetuity. If there are actual reasons, other than costing, that they may last only 30 years, that should be explained.	**Response to General Comment 6 (continued).** Section 11.4.3.2 has been deleted. Section 11.4.3.3 of the Draft RI/FS has been renumbered 11.4.3.2 and revised as described in the Response to Specific Comment 31.
General Comment 7. **Page 11-52, Sec. 11.7.4.4.**, how can no action be considered "medium" in terms of reduction of toxicity, mobility, or volume through treatment when no action would be taken? We have the same concerns regarding the analysis for AOC 23 on page 11-54, sec. 11.7.5.4.	**Response to General Comment 7.** The rankings of Alternatives AOC 1-1 and AOC 23-1 have been revised to "Low" as described in the response to Specific Comment 46.
General Comment 8. **Page 11-38, sec. 11.5.4.5.** The third paragraph states that there are no specific federal or state ARARs identified concerning injection of nutrients/adjuvants and/or chemical reagents into the groundwater. The discussion distinguishes RCRA Section 3020(a). However, it does not discuss the Underground Injection Control regulations. The FS should discuss whether UIC requirements are ARARs for the injection remedies at AOC 1 and AOC 23 (especially AOC 23, where the aquifer may qualify as an underground source of drinking water). See especially 40 CFR 144.12 (prohibits injection of a fluid containing "any contaminant" into a USDW); 40 CFR 144.3 (definitions, including "contaminant" and "USDW"); and 40 CFR 144.82 (injection can't otherwise adversely affect human health).	**Response to General Comment 8.** The UIC regulations have been reviewed and included in the ARARs evaluation. The proposed injection of treatment products would be a Class V injection under the UIC regulations. In Section K4.4 for the ISB alternative, the sentence stating that no federal or state ARARs were identified for injecting was removed and replaced with the following: "The Safe Drinking Water Act Underground Injection Control Program regulations at 40 C.F.R. Part 144 were evaluated as potential ARARs for this alternative. The injection wells for this alternative would be considered Class V wells under these regulations. The substantive provisions of 40 C.F.R. § 144.12 (a) and § 144.82 (a)(1) are potentially applicable for the injection of treatment chemicals for this alternative. Section 144.12 (a) prohibits injections that allow movements of fluids containing contaminants into underground sources of drinking water in violation of primary drinking water standards or that could adversely affect human health. Section 144.82 (a)(1) states that the injection

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GENERAL COMMENTS	RESPONSE TO GENERAL COMMENTS
General Comment 8 (continued).	**Response to General Comment 8 (continued).** "cannot allow the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of the primary drinking water standards under 40 C.F.R. Part 141, other health based standards, or may adversely affect the health of persons." The injection of treatment chemicals under this alternative is not expected to result in a violation of primary drinking water standards or to adversely affect human health. The treatment chemicals will treat VOCs and reduce the threat to water quality and human health. Section K4.5 was revised to state that the UIC ARARs for ISB were also potential ARARs for the ISCO alternative. An entry on page 8 of Table K4-1 has been added under the Clean Water Act row as follows: "Safe Drinking Water Act (42 U.S.C. § 300[f–j]-26)*." **"Action:** Underground injection **"Requirement:** The UIC program prohibits injection activities that allow movement of contaminants into underground sources of drinking water that may result in violations of MCLs or other health-based standards, or adversely affect health. **"Prerequisite:** Any underground injections are prohibited unless permitted. **"Citation:** 40 C.F.R. § 144.12 (a) and 144.82 (a)(1). Applicable for ISB and ISCO. **"Comments:** Injection wells for ISB and ISCO alternatives would be Class V wells under the UIC program. Substantive provisions of 40 C.F.R. § 144.12 (a) and 144.82 (a)(1) are potentially applicable. The injection of treatment products

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GENERAL COMMENTS	RESPONSE TO GENERAL COMMENTS
General Comment 8 (continued).	**Response to General Comment 8 (continued).** would not cause the shallow groundwater at IR Site 35 to violate MCLs or to adversely affect human health."
General Comment 9. **p. 11-53, Sec. 11.7.5.1.** It is not appropriate to find that the no action remedy satisfies the threshold protectiveness criterion when MCLs are exceeded.	**Response to General Comment 9.** At AOC 23, grab groundwater sampling results revealed that vinyl chloride concentrations are slightly above the MCL. At IR Site 27, vinyl chloride concentrations in grab groundwater samples were approximately ten times higher than groundwater samples collected from co-located monitoring wells. The last sentence in the third paragraph in Section 11.6.1 has been replaced with the following: "Vinyl chloride in groundwater samples collected and analyzed from co-located monitoring wells may be below the preliminary RG of 0.5 µg/L. The Navy plans to install and sample two to three monitoring wells at AOC 23 prior to the ROD, and to use the analytical results in the remedy selection process" The following sentence has also been added to the end of Section 11.7.5.1: "This alternative would be selected only if the results of monitoring well sampling (described in Section 11.6.1) indicate that vinyl chloride concentrations in representative groundwater samples are below MCLs."

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ARARs COMMENTS	RESPONSE TO ARARs COMMENTS
ARARs Comment 10. Page K2-1 states that GW beneath AOC 1 has been determined not to be potential drinking water because it is west of Saratoga Street. This is not an adequate analysis. The document needs to discuss whether this groundwater is considered potential drinking water for the purposes of CERCLA remediation under EPA's groundwater guidance. It either must show the groundwater can be classified as Class III under the groundwater guidance, or discuss site specific conditions, as has been done for other sites west of Saratoga Street (e.g. Site 26). There is some discussion of the Site 35 groundwater in the document in Sec. 2.7, but no specific discussion of AOC 1.	**Response to ARARs Comment 10.** The words "...because it is west of Saratoga Street..." have been deleted from the third sentence in Section K2.1.1. The remainder of the paragraph describes the rationale for exclusion of AOC 1 from the MUN designation.
ARARs Comment 11. Page K2-7, third paragraph, is confusing. It is not clear whether or not the Navy considers the portions of the Water Code to be ARARs.	**Response to ARARs Comment 11.** The Navy acknowledges the state statute authority of the Water Code for other state requirements addressed in discussions later in the text and tables. The text has been revised to clarify that the Water Code sections are applicable ARARs providing authority for the state requirements. Table K2-2 was revised to include an entry for the Water Code sections determined to be applicable as enabling legislation for other State requirements.
ARARs Comment 12. P. K4-3, second full paragraph. Please remove second full paragraph beginning with "U.S. EPA" and instead state that U.S. EPA considers Sections a, b, d and e of 22 CCR 67391.1 to be relevant and appropriate.	**Response to ARARs Comment 12.** The last full paragraph of Section K4.2 has been replaced with the following paragraph: "DTSC promulgated a regulation on April 19, 2003, regarding requirements for land-use covenants at Cal. Code Regs. tit. 22, § 67391.1." "U.S. EPA agrees that the substantive portions of the state statutes and regulations referenced in this section are ARARs. U.S. EPA specifically considers Cal. Code Regs., tit. 22 § 67391.1 (a), (b), (d), and (e) to be ARARs

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ARARs COMMENTS	RESPONSE TO ARARs COMMENTS
ARARs Comment 12 (continued).	**Response to ARARs Comment 12 (continued).** for IR Site 35. DTSC's position is that all of the state statutes and regulations referenced in this section are ARARs." Table K4-2 was also revised by adding the following to the comments for the row for Cal. Code Regs. tit. 22, § 67391.1 on page 1 of 6: "U.S. EPA considers substantive provisions of Cal. Code Regs. tit. 22, § 67391.1 (a), (b), (d), and (e) to be ARARs for IR Site 35."
ARARs Comment 13. P. K4-4, discussion of ISB and ISCO. Please see comment above regarding UIC.	**Response to ARARs Comment 13.** Text relating to the UIC has been added as described in the response to ORC General Comment 8. Please refer to the Response to General Comment 8.
ARARs Comment 14. Table K2-2, page 2 of 4, discussion of SWRCB Resolution 92-49. Please add that USEPA considers subsection 92-49 (III) (G) to be an ARAR.	**Response to ARARs Comment 14.** There are other signed RODs in which the U.S. EPA has not identified subsection 92-49(III)(G) as an ARAR. In the past, U.S. EPA has agreed that even though subsection 92-49 (III) (G) was a substantive provision, it was not an ARAR because it was not more stringent than the identified federal ARAR. The Navy does not accept subsection 92.49 (III)(G) as an ARAR for the reasons set forth above and in Section K2.2.1.2.
ARARs Comment 15. Table K3-1, page 5. Please state the reason the coastal zone is considered to include only areas within 100 feet of shoreline.	**Response to ARARs Comment 15.** The text of the comments on the CZMA as a potential federal location-specific ARAR in Table K3-1 has been revised as follows: "The CZMA specifically excludes federal lands from the coastal zone (16 U.S.C. § 1453[1]). Therefore, the CZMA is not potentially applicable. The areas considered in the FS are not within the coastal zone defined by the state (see Table K3-2). Therefore, this requirement is not appropriate."

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ARARs COMMENTS	RESPONSE TO ARARs COMMENTS
ARARs Comment 15 (continued).	**Response to ARARs Comment 15 (continued).** Table K3-2 was also revised as follows: "Shoreline areas regulated by the California Coastal Act are not potentially affected by the proposed actions. The San Francisco BCDC is the state agency responsible for regulating the coastal zone in San Francisco Bay. BCDC regulations at Cal. Gov. Code 66610(b) define the 100-foot shoreline band as their jurisdiction, and areas considered for remedial action in this RI/FS are not within 100 feet of the shoreline." The text of Section K3.1.5 was replaced with the following: "Since areas of IR Site 35 considered in the FS portion of this RI/FS Report are not adjacent to the San Francisco Bay, no coastal zone management ARARs were identified." The following two sentences have been inserted at the beginning of Section K3.2.4: "The San Francisco Bay Conservation and Development Commission (BCDC) is responsible for implementing coastal zone regulations within the San Francisco Bay. The BCDC regulations at Cal. Gov. Code § 66610(b) define their jurisdiction as within 100 feet of the shoreline."
ARARs Comment 16. NPDES requirements as potential federal ARARs for discharges to Bay. Page K2-2 and K2-13 discusses CWA 301(b), best control technology and best available technology requirements, as chemical-specific ARARs. (a) NPDES requirements may fit better as action-specific ARARs since they are activity-based.	**Response to ARARs Comment 16.** (a). The Navy includes those regulations with chemical-specific provisions in this section even if the regulations have action-specific provisions as well. This reduces repetition in the document. (b) and (c). Best professional judgment requirements are described in Section K2.2.2.1 under the heading, "Other Clean Water Act Requirements." Additional discussion of the criteria and standards for imposing technology-based treatment

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ARARs COMMENTS	RESPONSE TO ARARs COMMENTS
ARARs Comment 16 (continued). (b) We agree with including CWA 301(b) as an ARAR and also recommend including the criteria and standards for imposing technology-based treatment requirements from 40 CFR Part 125, Subpart A. Technology-based effluent limitations will have to be developed using best professional judgment. (See discussion p. 3-7and following in USEPA CERCLA Compliance with Other Laws Manual, EPA/540/G-89/006 (August 1988). (c) Discharges to surface waters must meet not only the technology-based requirements from CWA 301(b), but also, if necessary, water quality-based effluent limitations (CWA 301(b)(1)(C)) and other substantive requirements from EPA permitting regulations in 40 CFR Parts 122-125. These should be included as ARARs. (Again, see EPA 1988.	**Response to ARARs Comment 16 (continued).** requirements from 40 C.F.R. Part 125, Subpart A and discussion of water quality–based requirements under CWA 301(b)(1)(C) have been added to the ARARs evaluation in Section K2.2.2.1 as suggested. The paragraph under the heading, "Other Clean Water Act Requirements" in Section K2.2.2.1 has been revised as follows: "CWA 301(b) requires that all direct discharges meet technology-based requirements, including the BCT and BAT, to the extent economically achievable. The regulations at 40 C.F.R. § 125.3 codify the CWA 301(b)(2) technology-based treatment requirements. These requirements are made on a case-by-case basis using best professional judgment. Under CWA 301(b)(1)(C), effluent limits must meet any more stringent limitation, including those necessary to meet water quality standards, treatment standards, or schedules of compliance. These are generally water quality–based effluent limitations. If the remedial actions at IR Site 35 include direct point source discharge to the Oakland Inner Harbor or Seaplane Lagoon, the BCT and BAT effluent limits and water quality–based effluent limits would be potentially applicable federal ARARs." The water quality standards were identified as ARARs in the section just above on page K2-12. The third bullet under Surface Water ARARs Conclusions on page K2-2 has been updated as follows to match the changed text: • "CWA 301(b) best control technology (BCT) and best available technology (BAT) economically achievable at C.F.R. § 125.3 and water quality–based effluent limits at CWA 301(b)(1)(C)" The water quality standards are identified in the first bullet on page K2-2.

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ARARs COMMENTS	RESPONSE TO ARARs COMMENTS
ARARs Comment 17. ARARs table K4-2 includes the IC statutes but not the regulation. Please include the regulation and also please note in the ARARs table, as well as in the text discussed above, that U.S. EPA considers Sections a, b, d and e of 22 CCR 67391.1 to be relevant and appropriate.	**Response to ARARs Comment 17.** Substantive provisions of Cal. Code Regs. tit. 22, § 67391.1 are identified in Table K4-2 as relevant and appropriate ARARs. The Navy has included a statement in the Comments column of this table that U.S. EPA considers subsections (a), (b), (d), and (e) to be relevant and appropriate.

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INCONSISTENCIES AND ERRATA	RESPONSE TO ERRATA COMMENTS
Errata 1. Section 2.3.1.4, Merritt Sand Formation, Page 2-3: The last sentence of this section discusses the Bay Sediment Unit (BSU) rather than the Merritt Sand Formation. Please resolve this discrepancy.	**Response to Errata Comment 1.** The last sentence has been revised to state: "The Merritt Sand Formation thickens to approximately 43 feet beneath Alameda Point, with the thickest portion toward the southeast."
Errata 2. Section 2.5.1, Regional Hydrogeology: The presentation of information in this section is inconsistent. Some sections provide the depth to water bearing zone and others provide the thickness. Neither is provided for the Bay Sediment Unit. Please revise the text to provide both the depth to the unit and the thickness of each unit.	**Response to Errata Comment 2.** Both the depth and unit thickness have been provided for each water-bearing zone or aquitard.
Errata 3. Figure 2-9, Geologic Cross Section F-F, G-G', H-H' and I-I'; Section 2.3.2, IR Site 35 Geology, Page 2-3 through 2-6; and Appendix D, Boring Logs: According to boring logs A01SB01 and A01SB03, the BSU was encountered at AOC 1 at 5 ft bgs and 8 ft bgs, respectively; however, cross section F-F' depicts the BSU contact below 12 ft bgs (i.e., below the total boring depth) in the vicinity of these borings. In addition, the eighth paragraph of Section 2.3.2 states that the depth to the BSU is approximately 12 to 14 ft bgs at AOC 1. Please resolve these discrepancies. According to boring log 32EDC-5-32, the BSU was encountered at approximately 5.2 ft bgs adjacent to the southern boundary of AOC 2; however, cross section G-G' depicts the BSU contact at approximately 12 ft bgs in this area. Please resolve this discrepancy. According to Figure 2-1, the extreme southeastern corner of IR Site 35, including most of AOC 25, lies on dune sand (i.e., the Qds geologic unit). However, cross section I-I' indicates that AOC 25 is underlain by 7 to 10 feet of fill material. Please resolve this discrepancy.	**Response to Errata Comment 3.** The contact between the artificial fill material and the Bay Sediment Unit (BSU) was reevaluated for each cross section presented on Figures 2-8 and 2-9. An explanation of this reevaluation is provided before specific comments are addressed. This reevaluation was conducted by a CA Professional Geologist using a combination of items including individual boring logs, historical geodetic maps, and other historical maps and aerial photographs. Based upon these sources of information, global interpretations were made to create a consistent interpretation of the BSU contact. Individual boring logs are the most detailed and reliable source of information for determining the BSU contact. However, the exact contact between units in the field is sometimes difficult to determine because fill material is similar in lithology to natural sediments of the BSU. The presence of a laterally continuous clay layer was generally recognized as the BSU. This clay is typically dark greenish gray and occasionally contains Marsh Crust sediments. Fine-grained sand overlying this clay layer could also be BSU; however, in many cases it is

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INCONSISTENCIES AND ERRATA	RESPONSE TO ERRATA COMMENTS
Errata 3 (continued). Cross section I-I' depicts the top of the BSU at eight feet above mean sea level (msl) in the vicinity of AOC 15 and Aboveground Storage Tank (AST) 152; however, according to Figure 2-3 this area was filled in 1930. In addition, stratigraphy in the vicinity of boring 32EDC-5-134 is not interpreted consistently between cross sections D-D' and I-I'. Cross section I-I', indicates that boring 32EDC-5-134 encountered the BSU at 4 ft bgs; however, top of the BSU is depicted below 8 ft bgs (i.e., total depth) at boring 32EDC-5-134 on cross section D-D'. Please resolve these discrepancies.	**Response to Errata Comment 3 (continued).** difficult to distinguish in the field between fine-grained fill material and fine-grained natural sediment. Distinct changes in color (i.e., from brown to dark greenish gray) may also represent this contact, yet these features are not definitive. Review of hundreds of boring logs from multiple projects and experience working at Alameda indicate that the BSU contact on these logs is generally consistent and likely correct, yet some discrepancies or errors do occur when a global perspective is taken and all logs are reviewed simultaneously. To aid in the interpretation, a geodetic map from 1903 (United States Coast and Geodetic Survey 1903) was used to estimate the depth of the bay at that time in the area of the cross section lines. This map is presented as new Figure 2-10 and subsequent figures in the section (i.e., Figures 2-10 through 2-12) were increased by one number. The new Figure 2-10 presents the IR Site 35 study areas and lines indicating the cross sections. The figure also shows historical features such as the location of Alameda Island, the shoreline, mud flat areas, tidal zone area, and the depth of the bay prior to emplacement of artificial fill material. These features provide an estimate of the relative elevation of the BSU. The mud flats are above MSL, the tidal zone area is about at MSL (plus or minus a couple feet), and offshore sediments are below MSL. One important feature is the presence of a mud flat area that existed on the eastern portion of Transfer Parcel EDC-5, east of Main Street, and both north and south of Oakland Inner Harbor. The exact elevation of this mud flat area is unknown; however, it covered a large area and had well-developed drainage channels. The presence of these mud flats and channels is evidenced by thick clay units in local borings at elevations up to 8 feet above sea level. West of the mud flat area was a tidal zone area, and its westernmost boundary was represented by the low lower sea level. Farther west, the water depth in the

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INCONSISTENCIES AND ERRATA	RESPONSE TO ERRATA COMMENTS
Errata Comment 3 (continued).	**Response to Errata Comment 3 (continued).** bay is shown in fathoms. These features show a westward-sloping contact of natural sediments from the top of the mud flats to the former tidal zone area to open water of the bay. Additional details on the historic features are presented in new Section 2.3.2.2, Relationship Between Geology and Historic Features. Using this information, specific questions can be answered. Boring logs A01SB01 and A01SB03 from AOC 1, which show the BSU at 5 feet and 8 feet bgs, respectively, are incorrect. Depths of only 5 and 8 feet bgs would place the contact above MSL, which is incorrect since this area was formerly submerged. Cross section F-F', which depicts the BSU contact below 12 feet bgs, is correct, based upon information from adjacent borings and interpretation of the 1903 geodetic map. Boring log 32EDC-5-32, which shows the BSU encountered at approximately 5.2 feet bgs, is also incorrect. This depth would place the contact above sea level, which would be inconsistent with adjacent borings and the elevation of historical features on the geodetic map. Cross section G-G', which depicts the BSU contact at approximately 12 feet bgs, is correct. Some boring logs indicate that sediments are from the BSU. Many of these descriptions are correct; however, as shown above, a few are incorrect. If a boring log shows that a contact is significantly above sea level and historical maps show that this location was below sea level, then logically this would be fill material rather than BSU. Since many of the logs have been published in final reports, they have not been revised. The southernmost portion of AOC 25 is located on the northwestern edge of the original Alameda Island, mapped as Quaternary dune sands. Soil borings A25SB04 and 32EDC-5-128 contain an olive-brown fine-grained sand located

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INCONSISTENCIES AND ERRATA	RESPONSE TO ERRATA COMMENTS
Errata Comment 3 (continued).	**Response to Errata Comment 3 (continued).** from approximately 1 to 6 feet bgs and may likely represent dune sand. Below this depth, the color changes to dark greenish grey and the sand becomes more clayey, typically characteristic of the BSU. Cross section I-I' has been revised to show contact lines for the artificial fill layer, dune sand, and BSU. Cross section I-I' is correct in presenting the top of the BSU at an elevation of 8 feet above MSL in the vicinity of AOC 15. Review of the 1903 geodetic map indicates the area in the vicinity of AOC 15 consisted of elevated mud flats. These mud flats include laterally continuous clay units representative of the BSU. As shown on Figure 2-3, the area contains fill material in place by 1930. This material was placed on top of and around the natural mud flats. In some locations such as near boring A15SB03, the fill material is very thin, less than 1 foot thick, and is underlain by nearly 6 feet of clay. Other areas within the 1930 fill event area may contain 10 or more feet of fill material. The contact line between the fill material and the BSU at boring 32EDC-5-134 has been revised and made consistent by tying cross sections D-D' and I-I'. The correct depth is approximately 7.5 feet bgs. Overall, the interpretation of the cross sections lines has not changed. Some refinement of contact lines has been made as a result of the reevaluation of boring logs and interpretation of the geodetic map and other data sources. Modifications were made to cross section I-I', the central portion of cross section lines D-D' and G-G', and the eastern portion of C-C'.
Errata 4. Page 7-9, first paragraph: Correct 1,000 mg/kg B(a)P equivalent to be 1.0 mg/kg B(a)P equivalent.	**Response to Errata Comment 4.** The concentration has been changed to 1,000 µg/kg.

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INCONSISTENCIES AND ERRATA	RESPONSE TO ERRATA COMMENTS
Errata 5. Appendix L, Table L-17, Cost Estimate Summary for Alternative 1-3: Source Removal, Enhanced Aerobic ISB and ICs: The cost of in-situ bioremediation (ISB) in Table L-17 ($213,000) appears to be different than costs calculated from the assumptions in Table L-15 (122,200 – based on 15,000 pounds at $8 per pound and transportation costs of $2,200). Please resolve this discrepancy.	**Response to Errata Comment 5.** The $213,000 line item in Table L-17 reads as follows: "Backfilling/Enhanced Aerobic ISB (ORC) $213,000." This amount includes $122,200 for the ISB additive, plus purchase of clean fill and backfilling. To clarify this point, the text of this line item has been revised as follows: "Clean fill soil, backfilling, enhanced aerobic ISB (ORC) $213,000"
Errata 6. Appendix L, Table L-18, Cost Estimate Summary for Alternative 1-5: ISCO: The cost of ISCO ($173,000) does not match the assumption of $100,000 in Table L-15. Please resolve this discrepancy.	**Response to Errata Comment 6.** The cost of ISCO for Alternative AOC 1-5 in Table L-18 ($173,000) includes field oversight of the ISCO contractor, project management, contractor markup, etc. To clarify this point, the $173,000 line item in Table L-18 has been divided into the following two items: ISCO source treatment (7,500 square feet) $100,000 Field oversight, project management, markup $73,000
Errata 7. Appendix L, Table L-21, Cost Estimate Summary for Alternative 23-4: ISCO: The cost of ISCO ($428,000) appears to be different than the assumption of $250,000 in Table L-19. Please resolve this discrepancy. In addition, it is unclear if "75,000 sf and 5,000 sf" implies that two rounds of injection will be necessary. Table L-19 indicates that a single round of ISCO injections is assumed. Please explain the quoted phrase and clarify if one round or two rounds of ISCO injections were costed in Table L-21. If two rounds were costed, please resolve the discrepancy between the assumption in Table L-19 and the costs in Table L-21	**Response to Errata Comment 7.** The cost of ISCO for Alternative AOC 23-4 in Table L-21 ($428,000) includes field oversight of the ISCO contractor, project management, contractor markup, etc. To clarify this point, the $428,000 line item in Table L-21 has been divided into the following two items: ISCO source treatment (7,500 square feet) $250,000 Field oversight, project management, markup $178,000

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INCONSISTENCIES AND ERRATA	RESPONSE TO ERRATA COMMENTS
Errata 8. Attachment B, Section 6.2, Risk Characterization, Page B6-1 and B6-2; and Attachment B, Table 4-1, Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 2: According to Table 4-1, Aroclor 1260 was reported in four soil samples; however, the discussion of results in Section 6.2 indicates that Aroclor 1260 was reported 1 of 17 soil samples, and exceeded the PSC in 2 of 17 soil samples. Please resolve this discrepancy.	**Response to Errata Comment 8.** Table 4-1 is correct, reference to the number of exceedances in Section 6.2 has been deleted.
Errata 9. Attachment C, Section 6.1, Contaminants of Potential Concern (COPC) Identification, Page C6-1; and Attachment B, Table 4-1, Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 3: According to Table 4-1 of Attachment C, Volatile Organic Compounds (VOCs) were not reported in soil at AOC3 (i.e., VOC analysis was not performed at AOC 3 [Table 3-1 of Attachment C]); however, the second paragraph of Section 6.1 of Attachment C states that nine VOCs were identified as COPCs in soil. In addition, although the text states that 8 SVOCs were present in soil, Table 4-1 indicates that 17 SVOCs were detected. For consistency, please revise the discussion of COPCs in to indicate that seventeen SVOCs and 7 Pesticides were identified as COPCS in soil at AOC 3.	**Response to Errata Comment 9.** The second paragraph in Section 6.1 of Attachment C has been revised as follows: "There are 24 COPCs in soil: 17 semivolatile organic compounds (including PAHs; 9 of the SVOCs are considered volatile for indoor and outdoor air risk calculations) based on 4 samples, and 7 pesticides based on 13 samples."
Errata 10. Attachment D, Section 1.4.2, 2002 Polynuclear Aromatic Hydrocarbon (PAH) Study, Page D1-6; and Attachment D, Figure 1-1, Study Area and Sampling Locations: The discussion in Section 1.4.2 of Attachment D indicates that the PAH results for boring 32EDC-5-89 are shown on Figure 1-1; however, PAH results for 32EDC-5-89 can only be found in Table 4-3 of Attachment D. Please resolve this discrepancy.	**Response to Errata Comment 10.** Section 1.4.2 has be rewritten as follows: "Some soil samples collected in AOC 4 during the 2002 PAH study had PAHs at concentrations above the screening criterion. Excavation conducted for the time-critical removal action (TCRA) removed PAH-contaminated soil to approximately 2 feet bgs, thereby removing soil that contained PAHs exceeding the screening criterion. The excavation locations are shown on Figure 1-1.

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INCONSISTENCIES AND ERRATA	RESPONSE TO ERRATA COMMENTS
Errata 10 (continued).	**Response to Errata Comment 10 (continued).** "Because deeper soil from one boring (32EDC-5-89) advanced in AOC 4 during the 2002 PAH study was not removed during the PAH TCRA, the sample location is shown in yellow on Figure 4-1. The soil sample from the 4- to 8-foot bgs interval (beneath the depth to which soil was removed) from boring 32EDC-5-89 had a B(a)P equivalent concentration above the PSC (620 µg/kg). PAH concentrations in the other soil samples collected at AOC 4 during the 2002 PAH study were below the PSC (BEI 2005a)."
Errata 11. Attachment E, Section 4.1.4, Metals, Page E4-2: The second paragraph states that iron and manganese were the only metals reported above PSC; however, the first paragraph states that arsenic was also reported above PSC. Please resolve this discrepancy.	**Response to Errata Comment 11.** The first sentence of the second paragraph in Section 4.1.4 on page E4-2 has been changed to read: "Iron and manganese were two other metals...."
Errata 12. Attachment H, Section 4.3, TPH, Page H4-1: The maximum concentration of TPH measured at AOC 8 and the PSC for TPH are incorrect; for example, the maximum concentration of TPH was 240,000 ug/kg, not 240 ug/kg. Please resolve this discrepancy.	**Response to Errata Comment 12.** The units for the TPH PSC and for the maximum concentration of TPH on page H4-1 have been changed from µg/kg to mg/kg.
Errata 13. Attachment I, Section 1.4, Previous Investigations, Page I1-3: The text in the last sentence of the first paragraph references AOC 8. Please revise the sentence to reference AOC 9.	**Response to Errata Comment 13.** The last sentence of the first paragraph in Section 1.4 of Attachment I has been corrected to refer to AOC 9.

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INCONSISTENCIES AND ERRATA	RESPONSE TO ERRATA COMMENTS
Errata 14. Attachment J, Figure 4-1, Soil Sampling Results for Analytes Above PSC – AOC 10: Lead results and station ID numbers for SS-36B-SE50 and SS-36B-SW50 appear to have been transposed on Figure 4-1 of Attachment J. Please revise this figure.	**Response to Errata Comment 14.** Figure 4-1 of Attachment J and Figure 11-2 have been revised. The data boxes for station ID numbers SS-36B-SE50 and SS-36B-SW25 were transposed.
Errata 15. Attachment R, Section 4.2.1, VOCs, Page R4-7 through R4-9; and Attachment R, Table 4-10b, Groundwater Sampling Results, AOC 23 EBS Parcel 126: 1,2-Dichloroethane (1,2-DCA) was reported at a concentration of 2.4 ug/L in monitoring well 398-MW1 during the RI (i.e., December 2005); however, the last bullet of the second paragraph states current sampling as part of the RI did not confirm the presence of VOCs above PSCs in well 398-MW1. Please address this discrepancy.	**Response to Errata Comment 15.** The last sentence of the fifth bullet on page R4-8 has been deleted. Current sampling of 398-MW1 as part of the RI identified the presence of 1,2-DCA at a concentration above the PSC.
Errata 16. Attachment W, Section 4, Nature and Extent of Contamination, Page W4-1: The third sentence of the third paragraph states, "...during previous locations above the PAH Time Critical Removal Action (TCRA) removal action objective..." Please replace "during previous locations" with "during previous investigations".	**Response to Errata Comment 16.** The third sentence of the third paragraph has been changed to read: "...during previous investigations."

Note:
* These responses identify changes to the subject document text, tables, and/or figures. The specific wording that appears in the document may differ slightly from that presented in these responses to comments. The edited version of the document was reviewed by Bechtel Environmental, Inc., to ensure that there are no substantive differences that would warrant further Navy and/or agency review and concurrence.

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COMMENTS ON METALS IN SOIL AND BACKGROUND	
GENERAL COMMENTS	**RESPONSE TO GENERAL COMMENTS**
General Comment 1. The Department of Toxic Substances Control (DTSC) does not accept the Oakland Hills Great Valley Complex as the proposed source of fill material with inorganic element concentrations in excess of the 'pink', 'yellow' or 'blue' Alameda Point background concentrations, as described in Section 4.3.1.2, page 4-18. Detailed description of analysis completed by DTSC Human and Ecological Risk Division (HERD) for this proposal can be found in the HERD memorandum dated June 26, 2006 reviewing the *Draft Soil Remedial Investigation Report for IR Site 31* and the HERD memorandum dated May 31, 2006 reviewing the *Draft Soil Feasibility Study Report IR Site 30.* In addition, based on discussion at an Alameda Point meeting on August 24, 2006 regarding 'ambient' concentrations for IR Site 30 and IR Site 31, it was our understanding that the Great Valley Complex was no longer being proposed as a source of fill material for Alameda Point IR Sites 30 and Site 31. Therefore, it is inconsistent to propose the Great Valley Complex as the source of fill material for sites located within IR 35.	**Response to General Comment 1.** No off-site source of fill material (including the Oakland Hills Great Valley Complex) is proposed in the draft final RI/FS Report. Reference to the Great Valley Complex and the study performed by the Lawrence Berkeley National Laboratory (LBNL) are only included for general information on composition of soil and rocks in the Bay Area.
General Comment 2. The description of the history of the development of the Alameda Point 'ambient' fill concentrations (Section 4.3.1, page 4-14) contains an inaccuracy regarding DTSC participation. The Alameda Point background data set sample locations were not agreed upon with the regulatory agencies, as stated in the text. The samples results which entered into the development of the 'pink', 'yellow' and 'blue' estimates of Alameda Point fill ambient were selected by the Navy consultant, based on the fill history, iron concentration and manganese concentration (PRC, 1997; Tetra Tech, EMI, 2001) and presented to the U.S. Environmental Protection Agency (EPA) Region 9 and DTSC as a *fait accompli.* The DTSC HERD has repeatedly stated in comment memoranda that these	**Response to General Comment 2.** The phrase "...were agreed upon with the regulatory agencies." has been removed from the third paragraph in Section 4.3.1.

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COMMENTS ON METALS IN SOIL AND BACKGROUND	
GENERAL COMMENTS	**RESPONSE TO GENERAL COMMENTS**
General Comment 2 (continued). estimates of inorganic 'ambient' have not been approved, while repeatedly requesting an electronic copy of the original 'pink', 'yellow' and 'blue' data sets to perform an independent analysis. HERD received an electronic copy of the 'pink', 'yellow' and 'blue' soil sampling data when requested as part of the review of the Final Closure Report for Industrial Wastewater Treatment Plant (IWTP) 32 (Shaw, 2005) in September, 2005. HERD forwarded the results of the initial independent review of the inorganic element concentrations of the 'pink', 'yellow' and 'blue' data sets in the June 12, 2006 HERD memorandum to Dot Lofstrom dated June 12, 2006. The phrase "...were agreed upon with the regulatory agencies," must be removed from the text.	**Response to General Comment 2 (continued).**
General Comment 3. The proposed Preliminary Screening Criterion (PSC) cannot be used as a 'bright line' criterion (Section 3.5, page 3-7) where Contaminants of Potential Concern (COPCs) are dropped from further analysis when their specific concentration (e.g., maximum or 95 percent upper confidence limit on the mean [95UCL]) does not exceed the applicable PSC. Use of a 'bright line' selection criterion does not account for possible additive cancer and/or non-cancer effects. Past Alameda Point Human Health Risk Assessment (HHRA) methodology has used one-tenth (0.1) of the applicable PSC, providing that no more than 10 COPCs are dropped (HERD memorandum to Mary Rose Cassa dated October 29, 1998). HERD is currently negotiating use of one-twentieth (0.05) the applicable PSC for Department of Defense (DoD) sites. However, those discussions have not reached a consensus. Certainly, COPCs which are orders of magnitude less than the applicable PSC will present minimal risk and/or hazard. A comparison table presenting the IR Site 35 concentrations, the applicable PSC, the ratio of the IR Site 35 concentration to the	**Response to General Comment 3.** PSCs were not used as a "bright line criterion" to exclude chemicals from the HHRA. As noted in the first paragraph on page 3-8, "COPCs identified in the human-health risk evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs." The first sentence of Section 3.5 has been changed to read as follows: "PSCs were used in assessing the nature and extent of contamination at IR Site 35; they were not used as comparison criteria to eliminate chemicals from further analysis in the HHRA." Inclusion of a comparison table as requested in the comment is unnecessary because no chemicals were excluded from the HHRA.

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<table>
<tr><th colspan="2">COMMENTS ON METALS IN SOIL AND BACKGROUND</th></tr>
<tr><th>GENERAL COMMENTS</th><th>RESPONSE TO GENERAL COMMENTS</th></tr>
<tr><td>General Comment 3 (continued).
applicable PSC and any COPCs recommended to not be carried forward in the HHRA must be presented in the detailed HHRA appendix for HERD review (Appendix J) and referenced in the main text. This comparison table should also indicate the Frequency of Detection, the Reporting Limit (RL), and provide a qualitative indication of historic use at Alameda Point.</td><td>Response to General Comment 3 (continued).</td></tr>
<tr><td>General Comment 4.
A subset of IR Site 35 soil samples is designated as 'soil type A' based on concentrations below the inflection point of a cumulative frequency plot (Section 4.3.1.1, page 4-16). A significant fraction of the 'pink' ambient data set samples for the inorganic elements were reported as non-detect or estimated 'J-qualified':
<table>
<tr><th></th><th>% Detects in 'pink' dataset</th><th>% Detects and J-qualified in 'pink' dataset</th></tr>
<tr><td>Aluminum</td><td>65.45</td><td>100</td></tr>
<tr><td>Arsenic</td><td>63.64</td><td>81.82</td></tr>
<tr><td>Barium</td><td>60.0</td><td>100</td></tr>
<tr><td>Chromium</td><td>54.55</td><td>100</td></tr>
<tr><td>Cobalt</td><td>65.45</td><td>87.27</td></tr>
<tr><td>Copper</td><td>85.45</td><td>94.55</td></tr>
<tr><td>Iron</td><td>65.45</td><td>100</td></tr>
<tr><td>Lead</td><td>78.18</td><td>92.73</td></tr>
<tr><td>Manganese</td><td>70.91</td><td>100</td></tr>
<tr><td>Nickel</td><td>85.45</td><td>100</td></tr>
<tr><td>Vanadium</td><td>80.00</td><td>100</td></tr>
<tr><td>Zinc</td><td>90.91</td><td>98.18</td></tr>
</table>
</td><td>Response to General Comment 4.
In all the statistical plots and evaluations, one-half the detection limit was used for results reported as nondetect. Estimated or "J-qualified" data were used as they were reported without adjustment. Results below the reporting limit were identified on any similar graphs included in the draft final RI/FS Report.
Description of subpopulations of data called "soil Type A and B" are not included in the draft final RI/FS Report. Probability plots for Alameda Point pink background data and IR Site 35 data are included but the comparative description is simplified and does not refer to subpopulations.</td></tr>
</table>

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COMMENTS ON METALS IN SOIL AND BACKGROUND	
GENERAL COMMENTS	**RESPONSE TO GENERAL COMMENTS**
General Comment 4 (continued). Please state whether one half the reporting limit is a surrogate value applied to samples reported as non-detect in these cumulative frequency plots, as was done for the Area of Concern (AOC) 23 statistical tests (Appendix H, page H-2). Also indicate the samples for which a surrogate value was utilized in the cumulative frequency plot figures. Please investigate whether the slope change in the cumulative frequency plots occurs in the concentration range which bridges the non-detected samples, which had surrogate values substituted ('soil Type A'), and the samples with reported concentrations ('soil Type B').	**Response to General Comment 4 (continued).**
General Comment 5. The RI/FS report presents a statistical analysis of a combined IR Site 35 sitewide data set for metals in soil and concludes that all metals in soil (except lead at two AOCs) are naturally occurring. It is not surprising that many samples collected from IR Site 35 and analyzed for metals have metals concentrations that represent background, and that the probability plots for both data sets appear, in some ways, to be similar. However, several outliers were removed from the probability plots for the sitewide data set. Further evaluation of the outliers was not presented. It is not clear, on a site-specific basis, which outliers might be significant. Moreover, there are exceptions to the assumption that metals concentrations are highly correlated within samples, as discussed in specific comment #3 in the section below. Without a site-specific evaluation of all metals that are above background, there is uncertainty as to whether or not site-related metals contamination exists. This reduces the confidence in the determination that metals have been adequately characterized and that no further action is required.	**Response to General Comment 5.** The probability plots in the draft final RI/FS Report have been revised to include all samples and none are excluded as outliers. In the draft final RI/FS Report, outliers are identified based on the results of the correlation analysis and the scatter plots. The likelihood that each outlier represents a release is discussed for each AOC. An example of the detail that was added is presented in the Response to Specific Comment 9. Section 4 has been revised to include a discussion of the study areas with all metals present at concentrations above Alameda Point background. Tables have been added that list metals present at concentrations above Alameda Point background, as well as the frequencies and concentration ranges above background. Maps showing metals present in soil at concentrations above background are also presented, as needed. Additional statistical information, including population parameters and figures such as histograms, have been added for arsenic, iron, manganese, and

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COMMENTS ON METALS IN SOIL AND BACKGROUND	
GENERAL COMMENTS	**RESPONSE TO GENERAL COMMENTS**
General Comment 5 (continued). The discussion for each site within IR Site 35 should include an analysis of the frequency of detection of metals above Alameda Point background, regardless of the PSC, to increase the confidence in the conclusions regarding whether or not metals are naturally occurring. Additional statistical methods should be used to evaluate outliers such as histograms, box plots, and univariate plots.	**Response to General Comment 5 (continued).** vanadium, which are significantly positively correlated. This information provides additional tools for use in technical evaluation of the data.
General Comment 6. All three Tier I exposure groups evaluated exposure to inorganic elements 'below background' (Section 6.1.2.3, page 6-3). Metals were included in the Tier I list of COPCs regardless of whether the concentrations were above or below the Alameda Point 'pink' 95 UCL. HERD comments contained in this attachment regarding the impact of 'background' in the more detailed HHRA performed for sites other than those with a simple Tier I analysis are not, therefore, applicable to the Tier I methodology or results.	**Response to General Comment 6.** Comment noted.

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COMMENTS ON METALS IN SOIL AND BACKGROUND	
SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 1. **Section 4.1.5 – Metals.** This section provides a discussion and presentation of only those metals that exceed both the PSC and Alameda Point background. Based on this information, uncertainty remains as to whether or not site-related metals contamination exists. A site-specific evaluation of metals above Alameda Point background should be completed, regardless of the PSC, and included in the RI/FS report.	**Response to Specific Comment 1.** Discussion of all metals above background, regardless of PSC, has been added to Section 4. See response to General Comment 5 and Specific Comment 12 in the comments on Metals and Background.
Specific Comment 2. **Section 4.3.1.1 – Statistical Analysis of IR Site 35 Soil Data.** The validity of the statistical analysis provided in this section is in question for the following reasons: i. A combined data set for all AOCs does not provide sufficient detail to evaluate outliers on a site-specific basis. Inappropriate pooling of datasets is not recommended, thereby decreasing the reliability of the statistical evaluation. An area-by-area statistical evaluation is recommended for those sites with sufficient metals data. ii. For the probability plots presented in Appendix H, extreme outliers are removed from the data set without an evaluation as to whether or not the outliers are significant and indicative of site-specific contamination. Additional analysis such as univariate plots should be used to evaluate the spatial distribution and significance of outliers. iii. Interpretation of populations in probability plots is subjective. The Navy should provide histograms and/or box plots to support the interpretations presented in this section.	**Response to Specific Comment 2.** i. Area-by-area statistical evaluations were performed for several study areas and were included in the draft RI/FS Report (and will be included in the draft final RI/FS Report). For those AOCs where the statistical evaluations were not performed, the approach of comparing the study area maximum to the 95th percentile of the background data set was used. This approach is conservative and tends to overestimate the number of samples with concentrations above Alameda Point pink background. Use of the 95th percentile has been agreed upon with the agencies as an appropriate way to identify metals above Alameda Point background. ii. See Response to General Comment 5. Outliers are included in all figures and additional analyses have been provided. iii. See Response to General Comment 5. Additional analyses have been provided. Interpretation of the probability plots has been simplified.

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COMMENTS ON METALS IN SOIL AND BACKGROUND	
SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 2 (continued). iv. The determination of two populations (designated soil types A and B) is not supported by the probability plots for key metals that are known or suspected contaminants at Alameda Point (such as arsenic, chromium, cobalt, copper, and nickel). v. Scatter plots presented in Appendix H do not show compelling correlations for several metals which are known or suspected contaminants at Alameda Point.	**Response to Specific Comment 2 (continued).** iv. See Response to General Comment 4. Probability plots for Alameda Point pink background data and IR Site 35 data are included but the comparative description is simplified and does not refer to subpopulations. v. See Response to General Comment 5. Scatter plots and correlation analyses are used in the draft final RI/FS Report to identify outliers. Text has been added to discuss the likelihood that the outliers represent a release.
Specific Comment 3. **Section 4.3.1.1 – Correlation of Concentrations in Fill Soil with Off-Site Sources.** Section 4.3.1.1 asserts that a qualitative analysis supports the conclusions that metals identified at IR Site 35 are likely the result of natural processes rather than site-related activities. DTSC disagrees that the "qualitative" analysis presented in this section is supportable. For example, the IR Site 35 median concentration for cobalt in soil is 4 milligrams per kilogram (mg/kg). However, the highest value detected in soil samples collected from IR Site 35 is 259 mg/kg. This elevated concentration of cobalt may be related to a site-specific release at AOC 2. In addition, at AOC 12, three soil samples were found to contain elevated arsenic concentrations that are represented as site-related. However, the analysis presented in this section fails to identify these outliers. The analysis has limited usefulness because it may fail to identify other potentially site-related metals in soil at IR Site 35. Therefore, the Navy should perform a site-specific evaluation of metals above Alameda Point background values.	**Response to Specific Comment 3.** The draft final RI/FS Report has been revised to remove general statements that all metals above background are naturally occurring. The statements regarding metals at ambient concentrations refer to those metals supported by the correlation analysis after outliers have been considered or to metals that site-specific evidence such as geology indicates are naturally occurring. Specific Comment 9 presents additional text added to address the sample containing cobalt at 259 mg/kg. The revised text in Section 4 and the appropriate attachments discuss the cobalt and arsenic outliers listed in this comment as well as other outliers. As discussed in the Response to Specific Comment 2-i in the comments on Metals in Soil and Background, additional site-specific statistical evaluations of metals above background at each study area are not included.

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SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 4. **Section 4.3.1.1, page 4-16.** A statistical test should be performed to determine whether the IR Site 35 soil concentrations are statistically significantly different from the 'pink' Alameda Point data set after the IR Site 35 samples for which a surrogate value may have been substituted are determined. This approach is recommended rather than relying on a comparison of percent of samples greater than some estimate of the central tendency, such as median or 95UCL.	**Response to Specific Comment 4.** Response to Specific Comment 2-i in the Comments on Metals in Soil and Background discusses the reasons why additional site-specific statistical evaluations of metals above background at each study area are not included. The comparison to background relies on the 95th percentile and not the median or the 95th UCL.
Specific Comment 5. **Section 4.3.1.1, page 4-17.** Barium is proposed as a 'common' inorganic element which might be useful in correlation analysis to identify releases because barium has 'not been associated with Navy activities.' Barium nitrate ($BaNO_3$) is used in signal flares and barium titanate ($BaTiO_3$) is used as a dielectric in capacitors (http://education.jlab.org/itselemental/ele056.html), both of which conceivably are associated with Navy activities. The selection of any element other than aluminum or iron for soil concentration correlation analysis must be discussed with the DTSC HERD prior to incorporation into the IR Site 35 RI/FS Report.	**Response to Specific Comment 5.** As requested in the comment, all reference to barium as a common inorganic element has been deleted.
Specific Comment 6. **Section 4.3.3, page 4-25.** DTSC does not agree that the correlations reported on Table 4-13 for many of the inorganic elements are sufficiently strong to be of use in support of the conclusion that there has been no release. A statistical test against the Alameda Point 'pink' inorganic element data set coupled with an analysis of the geographic pattern of the relatively elevated concentrations in IR Site 35 samples must be completed. This is particularly critical for evaluation of the potential health effects associated with manganese which occurs at concentrations in excess of the 'pink' Alameda Point 'ambient' concentration. The manganese	**Response to Specific Comment 6.** The draft final RI/FS Report only considers correlations with r values equal to or greater than 0.7 to be statistically significant in accordance with Specific Comment 8. Response to General Comment 5 presents revisions to discussion of outliers and whether they could represent potential releases. As discussed in the response to Specific Comment 2-i, additional site-specific statistical evaluations of metals above background at each study area are not included.

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SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 6 (continued). toxicity reference value (RfD) is based on human exposures with minimal uncertainty factors.	**Response to Specific Comment 6 (continued).** As requested in the comment, sitewide maps showing the distributions of manganese in soil and groundwater have been included in the draft final RI/FS Report.
Specific Comment 7. **Section 4.3.3, page 4-25.** Discussions or demonstrations of the weathering of common rock types as a greater source of 'overall mass flux of metals' into the environment' is not pertinent to the HHRA. The risk assessment methodology attempts to present estimates of the incremental cancer risk and/or non-cancer hazard associated with elevated concentrations of carcinogens or non-carcinogens. The critical risk management decision, which relies on 'ambient' concentrations, is whether any increase in risk and/or hazard is sufficiently great to require evaluation of remedial alternatives. The significant HHRA-related question for inorganic elements, which can be resolved by following the steps outlined in Specific Comment Number 6 above, is whether IR Site 35 concentrations are in the range of, or exceed, Alameda Point 'ambient'. Please provide the statistical tests and geographic assessment requested.	**Response to Specific Comment 7.** The term "mass flux" has been deleted from the text. There is evidence that the concentrations of iron and manganese, and perhaps other metals, while above the Alameda Point pink background 95th percentile, are not due to releases associated with Navy activities. Alameda Point was built over a period of many years with dredged hydraulic fill soil and inland construction fill soil. It is reasonable to conclude that these fill materials came from multiple sources and that not all these sources were sampled as part of the Alameda Point pink background study. The metals with concentrations above the 95th percentile in the Alameda Point pink background data set were identified as above background and are included in the incremental cancer risk and noncancer hazard calculations. Generalizations that all metals are present at ambient concentrations have been deleted. The Responses to General Comment 5 outlines revisions to the statistical approach and geographical assessment for the draft final RI/FS Report.

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Specific Comment 8. **Appendix H- Background Comparison.** DTSC does not agree that bi-coordinate plots of aluminum against ten inorganic elements demonstrate a 'strong correlation among the metals and aluminum' (Appendix H, page H-1). One categorization of the strength of a correlation (r) (Franzblau, 1958) is:	**Response to Specific Comment 8.** As requested in the comment, the text in Section 4 in the draft final RI/FS Report has been revised to reference correlations greater than an r value > 0.7 or an r^2 value > 0.5 as significant. Note that the correlation coefficients in Table 4-13 have changed slightly in the draft final RI/FS Report due to re-analyses of correlation.

Strength of correlation	Lower Category Bound (r)	Upper Category Bound (r)
No or negligible correlation	0	0.2
Low degree of correlation	0.2	0.4
Moderate degree of correlation	0.4	0.6
Marked degree of correlation	0.6	0.8
High correlation	0.8	1.0

A more general statement of the lower bound strength of a correlation (r) (Hinkle, et al., 1988) is that correlations less than 0.30 indicate little if any relationship between variables. DTSC HERD generally considers correlations in which more than 50 percent of the variance in one component is accounted for by the variance in the other variable (i.e., $r>0.7$ or $r^2>0.50$) as useful in the site characterization necessary for a risk assessment. Using the 50 percent variance criterion, the following shaded correlations (Table 4-13) would be considered sufficiently strong to be considered in the discussion of background as it impacts the HHRA:

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Specific Comment 8 (continued).	**Response to Specific Comment 8 (continued).**

IR 35 Sites Table 4-13 Inter-Element Correlations		
	Al Correlation (r)	Fe Correlation (r)
Aluminum	1.0	0.92
Arsenic	0.64	0.74
Barium	0.51	0.66
Chromium	0.65	0.58
Cobalt	0.64	0.83
Copper	0.79	0.80
Iron	0.92	1.00
Lead	0.39	0.36
Manganese	0.68	0.80
Nickel	0.59	0.53
Vanadium	0.87	0.89
Zinc	0.66	0.68

The variance among the strength of these correlations would indicate that there was no single source for the IR Site 35 soil samples analyzed. The statistical test of IR Site 35 soils samples against the 'pink' background data set outlined in Specific Comment 11 above should be performed to determine if IR Site 35 soils exceed Alameda Point 'ambient'. Discussion of the range in strength among the inter-element correlations should be part of the future discussions of 'ambient' for IR Site 35.

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SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 9. **Attachment B AOC 2, Section 4.1.5 – Metals.** The comparison of metals concentrations at AOC 2 to PSCs is not supported in the text to determine whether metals are site-related or naturally occurring. For example, cobalt was detected in the sample from 1 foot below ground surface (bgs) at soil boring A02SB02 at a concentration of 259 mg/kg. Other metals were not detected above background in this sample. This site-specific outlier, and any others, should be discussed. The evaluation of metals should be revised to include a discussion of metals above Alameda Point background values, and not be limited to just those values above PSCs.	**Response to Specific Comment 9.** For AOC 2, the following discussion of cobalt in soil has been added: "Cobalt was reported in all soil samples collected at AOC 2 and was reported at concentrations above background in 2 of 14 samples. The maximum reported concentration at A02SB02 (259 mg/kg, 1.5 to 2 feet bgs), however, is an order of magnitude greater than other cobalt concentrations at AOC 2 (next highest concentration is at A02SB03, 41 mg/kg, 1.2 to 2 feet bgs). It is also the only metal at a concentration above background in that sample. The two concentrations of cobalt above background (but below the PSC) were identified as outliers in the sitewide statistical evaluation (Section 4.3.1.2). It is not known whether the cobalt concentrations in soil at AOC 2 represent a release from Navy activities or are naturally occurring." Discussion of all metals above background, regardless of PSC, has been added to Section 4. See Responses to General Comment 5 and Specific Comment 12 in the Comments on Metals in Soil and Background.
Specific Comment 10. **Attachment B AOC 2, Section 5.3 – Contaminant Migration.** DTSC does not concur with the Attachment B determination that metal concentrations above PSC values and Alameda Point background values are naturally occurring without further site-specific analysis of metals data. The conclusion that the metals in soil contributing to human health risks are naturally occurring, and therefore require no further action, cannot be supported without additional site-specific evaluation. This comment also applies to the following sections:	**Response to Specific Comment 10.** As discussed in response to General Comment 5, a detailed explanation of the site-specific evaluation of metals for each study area is presented in Section 4.3.3 of the main RI/FS report (this includes the study areas identified in the comment).

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Specific Comment 10 (continued). • Attachment E AOC 5, Section 7.2 – AOC 5 Conclusions and Recommendations. • Attachment L AOC 12, Section 7.2 – AOC 12 Conclusions and Recommendations (refers to thallium, vanadium, and iron). • Attachment R AOC 23, Section 4.1.5 – Metals. • Attachment R AOC 23, Section 7.2 – AOC 23 Conclusions and Recommendations (refers to metals in soil and groundwater).	**Response to Specific Comment 10 (continued).**
Specific Comment 11. **Attachment E AOC 5, Section 4.1.4 – Metals.** The discussion of metal concentrations includes only those metals that were found to exceed both background values and the PSC values. The comparison of metal concentrations to PSC values does not provide sufficient information to determine whether metals are site-related or naturally occurring. The Navy should present and discuss all metal concentrations detected above Alameda Point background values to provide greater confidence in the determination as to whether or not a release has occurred.	**Response to Specific Comment 11.** As discussed in the Response to General Comment 5 for Metals in Soil and Background, text, tables and figures have been added to Section 4.3.3 of the main RI/FS Report to assess each study area (including AOC 5) where samples were analyzed for metals. The new text, tables, and figures address results for metals in soil or groundwater that are above Alameda Point background. Additional details on metal outliers are included in Section 4 of each attachment.
Specific Comment 12. **Attachment K AOC 11/EBS Parcels 78-79, Section 4.1.5 – Metals.** The discussion of metals includes only those metals that were found to exceed both background values and its respective PSC values. The comparison of metal concentrations to PSC values does not provide sufficient information to determine whether metals are site-related or naturally occurring. The Navy should present	**Response to Specific Comment 12.** As discussed in the Response to General Comment 5 for Metals in Soil and Background, text, tables and figures have been added to Section 4.3.3 of the main RI/FS Report to assess each study area (including AOC 11/EBS Parcels 78–79) where samples were analyzed for metals. The new text, tables, and figures address results for metals in soil or groundwater that are above Alameda Point background.

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Specific Comment 12. (continued). values to provide greater confidence in the determination as to whether or not a release has occurred.	**Response to Specific Comment 12. (continued).**
Specific Comment 13. **Attachment L AOC 12, Section 5.1 – AOC 12 Conceptual Site Model.** The RI report states that metals other than lead are believed to be naturally occurring. However, arsenic was found at concentrations more than two to three times the background value in samples collected along the railroad tracks, and thallium which was detected in soil above the PSC, does not have a background value established for Alameda Point. The soil samples with elevated arsenic concentrations were not found to contain other metals above background. The soil samples with elevated thallium concentrations were found to contain several metals above background values, but arsenic was not detected in these samples. While it is understood that arsenic is addressed with lead in the FS, it remains unclear whether or not other metal contaminant impacts occur at AOC 12 above background values. The Navy should perform a site-specific evaluation of metals focusing on exceedences of the Alameda Point background data set.	**Response to Specific Comment 13.** As discussed in the Response to General Comment 5 for Metals in Soil and Background, text, tables and figures have been added to Section 4.3.3 of the main RI/FS Report to assess each study area (including AOC 12) where samples were analyzed for metals. The new text, tables, and figures address results for metals in soil or groundwater that are above Alameda Point background. Aluminum, chromium, cobalt, copper, manganese, and nickel were reported at concentrations greater than their maximum background concentrations in the two samples (107-0001 and field duplicate 107-0002) in EBS Parcel 107 that also contained iron, thallium, and vanadium above PSCs. Cadmium and chromium were reported at concentrations above the maximum background concentration in three samples from EBS Parcel 107: Grid 23 Tower 61 and Grid 28 Tower 61 (and a field duplicate). Zinc was reported at concentrations greater than the maximum background concentration in three samples: Grid 29 Tower 61, Parcel 106 Grid Tower 20 field duplicate, and Parcel 106 Grid 24.
Specific Comment 14. **Attachment S AOC 24, 4.1.4 – Metals.** Most of the metals found in soil at concentrations above background values were from the sample collected from five to six feet bgs. Several metals were reported above background values in this	**Response to Specific Comment 14.** Section 4.1.4 in Attachment S has been revised to include the following: "Arsenic and iron were the only two metals reported at concentrations above PSCs at AOC 24. Arsenic was reported at 11.2 mg/kg, above the PSC

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Specific Comment 14 (continued). sample. While this may support the conclusion that metals in this sample are naturally occurring, a discussion of this finding should be provided in the report.	**Response to Specific Comment 14 (continued).** (California residential PRG of 0.062 mg/kg) and above the background concentration (9.14 mg/kg) in the 5- to 6-foot-bgs sample from boring A24SB01 but below the maximum Alameda Point background concentration of 15.6 mg/kg. Iron was reported at concentrations above the PSC (residential PRG of 23,000 mg/kg) and background concentration (22,280 mg/kg) in two samples from this same boring (34,200 J and 34,500 J mg/kg, from depths of 3 to 4 and 5 to 6 feet bgs, respectively). Based on the evaluation in Section 4.3 of the main RI/FS Report, these metals are believed to be naturally occurring. The soil sample containing arsenic and iron, while above background, was collected at a depth of 5 to 6 feet bgs in the native BSU (Bay Mud) and also had concentrations of aluminum, barium, chromium, copper, lead, magnesium, mercury, nickel, potassium, sodium, vanadium, and zinc at concentrations above Alameda Point pink background. The depth of this sample, the type of sample material (i.e., clay), and the number of metals with concentrations above Alameda Point background 95th percentile concentrations support the conclusion that metals concentrations present in this sample are naturally occurring."

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COMMENTS ON GROUNDWATER ISSUES	
SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 1. **Section 1.5.10 – Basewide Groundwater Monitoring Program.** The Navy should verify the information provided in this section with respect to the monitoring schedule of wells MBG-1 and 398-MW1. It is unclear whether the Basewide Groundwater Monitoring Program (BGMP) includes these wells on a quarterly schedule.	**Response to Specific Comment 1.** Page 1-13, Section 1.5.10, the sentence beginning "Five of these monitoring wells…" has been revised as follows: "Three monitoring wells located within IR Site 35 (13-MW-03, MBG-3, and M03-11) are included in the BGMP and sampled either quarterly or semiannually." Attachment R, AOC 23, Page R1-19, Section 1.2.8.2. The third sentence in the Basewide Groundwater Monitoring Program subsection has been replaced with the following: "None of the BGMP wells are located in AOC 23 in EBS Parcel 126. However, BGMP wells located south (OU2B-MW05 and M07B-01) of AOC 23 EBS Parcel 126 had reported concentrations of 1,1-DCA; cis-1,2-DCE; and TCE. A well located east of AOC 23 EBS Parcel 126 (398-MW4) had no VOCs reported above detection limits during sampling conducted in spring 2006 (ITSI 2006). All reported concentrations were below the PSC."
Specific Comment 2. **Section 1.6.2.2 – IR Site 4.** The Navy should indicate that the groundwater contamination emanating from dense nonaqueous-phase liquid (DNAPL) sources at IR Site 4 is comprised predominantly of TCE, 1,1-dichloroethylene (1,1-DCE), and related breakdown products (i.e. cis-1,2-DCE and vinyl chloride).	**Response to Specific Comment 2.** The sentence describing the groundwater plume beneath IR Site 4 has been expanded to read as follows: "The primary COCs (above the risk management range) in the OU-2B–wide groundwater plume located beneath IR Site 4 (as well as IR Sites 3, 11, and 21) were identified in the RI report (SulTech 2005c) as the VOCs TCE and vinyl chloride, resulting from the breakdown of DNAPL at these sites. Secondary COCs (within the risk management range) in the plume were

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Specific Comment 2 (continued).	**Response to Specific Comment 2 (continued).** identified as the VOCs PCE; 1,1-DCA; 1,2-DCA; 1,1-DCE; 1,2-DCE (total); 1,4-dichlorobenzene; 1,1,2-TCA, and benzene; the PAHs benz(a)anthracene and B(a)P; the SVOC naphthalene; and the metals hexavalent chromium, iron, and manganese (SulTech 2005c)."
Specific Comment 3. **Section 1.6.2.9 – IR Site 21.** Data from the OU-2B RI indicate that a release of chlorinated solvents has occurred in the vicinity of the northeast corner of Building 398, approximately 100 feet west of the AOC 23 site boundary and well 398-MW1. Chlorinated solvents detected in this area include 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethane (1,1-DCA), TCE, PCE, and cis-1,2-DCE. The Navy should verify that there is a chlorinated solvent plume in this area of IR Site 21 that possibly contributed chlorinated solvents to groundwater at well 398-MW1.	**Response to Specific Comment 3.** Page 1-21, Section 1.6.2.9, has been revised to include the following text after the fourth sentence: "The OU-2B RI Report documented VOCs (1,1-DCE; 1,2-DCE [total]; PCE; 1,1,1-TCA; TCE; and vinyl chloride) in groundwater at the northeastern corner of Building 398 (adjacent to AOC 23). All VOCs except vinyl chloride were reported at concentrations below their respective PSCs. PCE and TCE were reported at concentrations below their PSCs in a groundwater sample from monitoring well 398-MW1, which is located in AOC 23 (SulTech 2005c)."
Specific Comment 4. **Section 2.5.2.2 – Groundwater Flow Direction and Gradient at IR Site 35.** The first bullet on page 2-10 states that localized groundwater flow direction is influenced by groundwater extraction at IR Site 5 and by groundwater mounding at IR Site 3. DTSC is unaware of any groundwater extraction occurring at IR Site 5. Also, the probable cause of the groundwater mounding at IR Site 3, an area of known DNAPL contamination, is not provided in the RI. The Navy should explain the cause of the mounding and also include the groundwater elevation data for well 398-MW1 on Figure 2-11, if available.	**Response to Specific Comment 4.** Section 2.5.2.2, first bullet, has been revised as follows to delete an erroneous reference to IR Site 5 and add additional information about mounding: • "Localized groundwater flow direction in the FWBZ has been influenced by groundwater extraction at IR Site 7 and by apparent groundwater mounding at IR Site 3. The apparent mounding is caused by local irrigation and is centered under the grass-covered open space (oval) dividing eastbound and westbound lanes of traffic on West Atlantic Avenue."

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Specific Comment 4 (continued).	**Response to Specific Comment 4 (continued).** Figure 2-11 has not been modified as suggested because groundwater elevation data are not available for monitoring well 398-MW1. The previous Figure 2-11 in the draft RI/FS Report is now Figure 2-12 in the draft final RI/FS Report.
Specific Comment 5. **Section 4.3.2, page 4-19**. A comparison of the groundwater 'background' dataset to the IR Site 35 groundwater dataset similar to that performed for the IR Site 35 soil data set should be performed for those groundwater elements which are dropped from the HHRA based on the 'naturally occurring' argument (Section 5.2.2, page 5-15).	**Response to Specific Comment 5.** As discussed in the Response to General Comment 3 in the Metals in Soil and Background section, no chemicals were excluded from the total risk based on background; however, risks are also presented without metals below background.
Specific Comment 6. **Section 4.4.2, page 4-26.** The summary of the groundwater COPCs exceeding PSCs for a small number of exceedances should also indicate the total number of groundwater samples. Thus, rather than stating "two exceedances of 1,2-DCA," the RI should state that there were, "two exceedances of 1,2-DCA in 8 groundwater samples."	**Response to Specific Comment 6.** As discussed in response to General Comment 5, a detailed explanation of the site-specific evaluation of metals for each study area is presented in Section 4.3.3 of the main RI/FS report.
Specific Comment 7. **Section 4.4.2, page 4-27**. Benzo(a)pyrene at AOC 23 above the PSC in groundwater is dismissed as 'not expected to be dissolved in groundwater' without any discussion of co-solvents such as benzene which were detected in groundwater at AOC 23. Further discussion of the potential effect of co-solvents on PAH groundwater concentrations should be included.	**Response to Specific Comment 7.** The concentrations of potential solvents such as benzene are well below levels that could result in cosolvent effects. Cosolvent effects are found when concentrations of potential solvents are 10 percent or greater (Corseuil, et al, 2004). The maximum concentration of a potential solvent was 1.1 µg/L of benzene. Benzene was only found in only one sample at AOC 23 at a concentration that exceeded the PSC.

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COMMENTS ON GROUNDWATER ISSUES	
SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 7 (continued).	**Response to Specific Comment 7 (continued).** It should be noted that sample 071M-013 was the only groundwater sample at IR Site 35 with a B(a)P concentration above the laboratory detection limit. This sample was collected in 1995 as part of the EBS and was located within CAA-B, in an area where soil was subsequently removed as part of pipeline removal activities. B(a)P was not reported in groundwater collected from a recent nearby RI boring (A23SB05).
Specific Comment 8. **Section 4.4.2, page 4-27**. A deed restriction on the use of groundwater is likely to be necessary for locations such as EBS Parcel 205, where presence of organic compounds in groundwater is considered 'not significant' based on the assumption that it is 'unlikely' that groundwater would be used for drinking water rather than presenting a risk-based analysis.	**Response to Specific Comment 8.** The fact that groundwater is unlikely to be used as drinking water was not used to make recommendations on whether or not further action was needed, except for locations west of Saratoga. As discussed in the Response to U.S. EPA General Comment 1, the Water Board in their letter dated July 21, 2003, concurred that groundwater west of Saratoga Street meets the exemption criteria in the SWRCB Source of Drinking Water Policy Resolutions 88-63 and California Regional Water Quality Control Board Resolution 89-39.
Specific Comment 9. **Section 4.1.1 – Volatile Organic Compounds.** The RI states that the concentrations of two detections of 1,2-DCA in groundwater were above the PSC in the eastern portion of AOC 23 and are likely associated with Corrective Action Area (CAA)-3A. However, chlorinated solvents, such as 1,1,1-TCA, have been found in groundwater in the vicinity of the northeast corner of Building 398 at IR Site 21, located approximately 100 feet east of AOC 23. Trace levels of chlorinated hydrocarbons (1,2-DCA, TCE, and PCE) were reported in groundwater samples collected from well 398-MW1 in AOC 23. It is possible that the source of	**Response to Specific Comment 9.** The fourth paragraph of Section 4.1.2 has been revised as follows: "Two concentrations of 1,2-DCA in groundwater were reported above the PSC in the southeastern portion of AOC 23 (samples collected from locations 398-MW1 and A23SB37). These concentrations may have been associated with the VOCs reported in groundwater at Building 398 (located in CAA-3A within IR Site 21). During the 2001 data gap investigation at CAAs (TtEMI 2001b), VOCs (1,1-DCA; 1,2-DCA; PCE; and TCE) were reported in groundwater sampled at Building 398 (adjacent to AOC 23). All VOCs were reported at

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COMMENTS ON GROUNDWATER ISSUES	
SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 9 (continued). the 1,2-DCA in groundwater at AOC 23 may be related to chlorinated solvent sources at IR Site 21, and is not necessarily related to the petroleum contamination at CAA-3A. DTSC recommends that the Navy include this information in the RI/FS report.	**Response to Specific Comment 9 (continued).** concentrations below their respective PSCs. During the data gap investigation, PCE and TCE were reported at concentrations below their PSCs in a groundwater sample collected from monitoring well 398-MW1, which is located on the west side of Building 398 and within AOC 23. The EBS documented storage of approximately 5,000 gallons of halogenated and nonhalogenated solvents in Building 398 (IT 2001a). A less likely source for the 1,1-DCA found at AOC 23 during the IR Site 35 RI activities is the VOC plume located beneath Building 162 in the southern portion of IR Site 21 and approximately 200 feet south of AOC 23." "
Specific Comment 10. **Attachment D AOC 4, Section 1.4.1 – Basewide Groundwater Monitoring Program (BGMP).** Although the RI states that the BGMP was initiated in 2002 and is ongoing, only groundwater results from 1998 are discussed. The Navy should include a discussion of more recent analytical data from well MGB-1, if available. The Navy should also provide monitoring well MGB-1 construction details or as-built diagram to document total well depth and screen interval.	**Response to Specific Comment 10.** Background monitoring well MBG-1 is not being included as part of the BGMP. Table 4-4 includes the interval sampled in this well, which is the same as the screened interval and total depth (5 to 15 feet bgs, and 15 feet bgs, respectively). A copy of the well construction diagram is available in the PRC and Montgomery-Watson reference document (1995). The title for Attachment D, AOC 4, Section 1.4.1 has been changed to "Remedial Investigation and Feasibility Study for IR Sites 4 and 5" and the first paragraph has been replaced with the following text: "Background sampling of soil and groundwater was conducted as part of the NAS Alameda RI/FS in 1992. At four locations within NAS Alameda, soil borings were sampled and then converted to monitoring wells MBG-1 through MBG-4 (PRC and MW 1995). An additional round of background groundwater sampling from these wells was conducted in 1998 (TtEMI 1999)."

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COMMENTS ON GROUNDWATER ISSUES	
SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 10 (continued).	**Response to Specific Comment 10 (continued).** New reference: PRC Environmental Management, Inc. and Montgomery-Watson Consulting Engineers, Inc. 1995. Data Summary Report Background and Tidal Influence Studies and Additional Work at Sites 4 and 5, Naval Air Station Alameda, Alameda, California. October 16.
Specific Comment 11. **Attachment R AOC 23, Section 2 – Physical Setting.** The RI states that groundwater yield at several borings was very low, taking up to two days for groundwater to recharge so that sufficient sample volume could be obtained. As a result of this slow recharge, volatile organic compound (VOC) data obtained from these sampling locations is likely biased low. DTSC recommends that the Navy flag questionable analytical data for wells with excessive recharge times. This request applies to VOC data for all AOCs in IR Site 35 for which excessively slow recharge was encountered.	**Response to Specific Comment 11.** Groundwater samples were collected in accordance with the Sampling and Analysis Plan (SAP) that is part of the final RI Work Plan dated March 2006. Standard operating procedures (SOPs) for groundwater sampling (SOP 8) are referenced in Section 2.2.1 of the SAP. SOP 8 states that groundwater samples for VOC analysis are to be collected before any other samples for other analyses. While collection of sufficient volume for all analyses may have taken up to 2 days from some borings, sample bottles for VOC analyses were filled first and are considered representative of aquifer conditions. Samples for non-VOCs, metals, and TDS were collected after the VOC samples. As stated in Appendix C (Field Methodology) of the RI/FS Report, the CLEAN Program Quality Manager has provided controlled copies of all CLEAN Program SOPs to the Navy, DTSC, Water Board, and U.S. EPA Region 9.

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COMMENTS ON FATE AND TRANSPORT OF CONTAMINANTS	
SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 1. **Section 5.2.3 – Mobility of Contaminants.** The Navy should specify which data were used to estimate the site-specific average values for bulk density and effective porosity, and indicate how the site-specific averages were derived.	**Response to Specific Comment 1.** The first sentence of the second paragraph in Section 5.2.3 was revised as follows: "Retardation factors for organic compounds and the primary metal contaminants were estimated and are shown on Tables 5-2 and 5-3, respectively. The values for bulk mass density (approximately 106 pcf or 1.7 grams per cubic centimeter) and effective porosity (0.37) used in the calculations were based on an average of the values reported for soil samples collected at IR Site 35 that were classified as silty sand (Table 3-5)."
Specific Comment 2. **Section 5.2.3 – Mobility of Contaminants.** The abbreviation "R" is not defined in the footnotes on Table 5-2. Also, it is unclear how the value for R was derived. If distribution coefficient (K_d) was estimated using octanol-water partition coefficient (K_{oc}) and fractional organic carbon (f_{oc}), the site-specific f_{oc} values should be provided. If, on the other hand, published K_d values were used, these should be provided along with the appropriate reference(s).	**Response to Specific Comment 2.** The definition of R (retardation) has been added to Table 5-2. R was calculated as described in Section 5.2.3. The following has been added to the end of the second paragraph of Section 5.2.3: "For organic compounds, K_d was calculated using the values for K_{oc} listed in Table 5-2 and a value of 0.015 for the fraction of organic carbon. This value is in the range of the fractions of organic carbon reported for soil samples collected at study areas at IR Site 35 (Table 3-5). For selected metals, the K_d values listed in Table 5-3 were used to calculate the retardation factor." The sources of the K_{oc} and K_d values in Tables 5-2 and 5-3 are cited on the respective tables. A note has been added to Table 5-2 to indicate that a value of 0.015 was used as the fraction of organic carbon to calculate R. The definition of R (Retardation Factor) has also been added to Table 5-2.

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COMMENTS ON FATE AND TRANSPORT OF CONTAMINANTS	
SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 3. **Section 5.3, page 5-16.** Please indicate in the text why Solid Waste Management Units (SWMUs) are not included in the evaluation of contaminant migration.	**Response to Specific Comment 3.** The following has been added before the last sentence in Section 5.3: "Per the DQOs for SWMUs (Table 3-3), fuel-related contamination identified at SWMUs during the RI is recommended for further evaluation under the Alameda Point TPH Program."
Specific Comment 4. **Section 5.3.1.2, page 5-17.** Release of fugitive dusts is not considered possible for a subset of the IR Site 35 locations based on the presence of paving or landscaping. Some mechanism must be put in place to evaluate this transport pathway should the pavement or landscaping be significantly altered in the future. The same requirement for future re-evaluation should be placed on IR Site 35 locations where the surface water runoff pathway (Section 5.3.2, page 5-18) and the soil to groundwater pathway (Section 5.3.3, page 5-18) are not evaluated based on current pavement or landscaping.	**Response to Specific Comment 4.** Section 5.3 discusses viable transport pathways for contaminants at study areas of IR Site 35 and draws conclusions regarding current complete pathways. However, the HHRA also considers potential current and future exposure pathways for the study areas at IR Site 35, including the release of fugitive dust if the site pavement and landscaping were removed. The conclusion that the other pathways mentioned in the comment, transport by surface water runoff and transport from soil to groundwater, are not significant and would not change if the pavement or landscaping were removed. As discussed in Sections 5.3.2 and 5.3.3, there are contributing factors (e.g., grade of the site, and nature and location of contaminants) other than pavement which tend to lessen the impact of these pathways.

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COMMENTS RELATED TO RISK ASSESSMENTS	
SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 1. **Section 6.5, page 6-16 and Appendix J, Section J8, pages J-68 through J-70.** The lead-only site evaluations indicate that soil lead in the 'high-impact' areas, defined as under hardscape, for AOC 10 (Appendix J, Table J8-1) and AOC 12 (Appendix J, Table 8-4) exceed the site-specific health protective lead concentration without home grown produce (322 mg/kg) only in AOC 10. The AOC-wide soil lead concentration is less than the site-specific health protective lead concentration with home grown produce (184 mg/kg) for both AOC 10 and AOC 12. Future removal of the hardscape with potential residential use of AOC 10 would require further risk management evaluation.	**Response to Specific Comment 1.** Alternative AOC 10/12-2, Limited Excavation, Cover, and ICs, includes ICs to address possible future removal of hardscape in areas with lead concentrations above the preliminary RG (described in Section 11.3.2.6).
Specific Comment 2. **Section 7.2, page 7-9 and 7-10.** DTSC agrees with the inclusion of AOC 1, AOC 3, AOC 10, AOC 12, AOC 23 and PAH areas in the FS (Section 8 through 11). Based on the site descriptions and the site-specific COPCs, the range of risk and/or hazard for the following sites are within the risk management range, and DTSC supports the recommendation for No Further Action (NFA) only for • AOC 6 (polychlorinated biphenyls [PCBs] only), • AOC 7 (PCBs only, metals below background), • AOC 8 (no metals), • AOC 9 (HI<1), • AOC13 (primarily chlorinated pesticides), • AOC 18 (risk management range cancer risk associated with naphthalene in groundwater) and • AOC 21 (cancer risk *de minimis* and hazard index less than 1).	**Response to Specific Comment 2.** The proposal for NFA for the remaining areas has been enhanced for each attachment, to clarify use of the PSC and to address "ambient" metals issues. As discussed in the Response to General Comment 3 for the Metals in Soil and Background section, PSCs were not used as a "bright line criterion" to exclude chemicals from the HHRA. Discussion of all metals above background, regardless of PSC, has been added to Section 4. See Response to General Comment 5 and Specific Comment 12 for Metals in Soil and Background.

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COMMENTS RELATED TO RISK ASSESSMENTS	
SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 2 (continued). The proposal for NFA for the remaining areas listed cannot be evaluated until the impact of the use of each PSC as a 'bright line' criterion and IR Site 35 'ambient' issues are resolved.	**Response to Specific Comment 2 (continued).**

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COMMENTS RELATED TO STORMWATER DRAINS	
SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 1. **Section 1.6.4.1 – Storm Sewer Lines.** The RI states that IR Sites 5, 6, and 7 are the only areas where storm sewer lines traverse groundwater plumes that are located upgradient from IR Site 35, and that these lines are in areas that are marginally impacted by chemicals in groundwater. This statement is based on quarterly sampling data and interpretations presented in the Basewide Groundwater Monitoring Report from spring 2005. However, these data and interpretations are incomplete and cannot be relied upon for this analysis. The following additional information should be evaluated: There are possible impacts due to historical sources and contaminant distribution that are not represented by the recent sampling data. For example, at IR Site 5, a DNAPL source was present in the vicinity of the storm sewer lines emanating from the eastern central portion of Building 5. The current monitoring well network for some of the IR sites with groundwater contamination does not include wells located in high concentration (source) areas. Therefore, the contaminant distribution is not accurately represented by the current monitoring well network. Storm sewer lines emanating from areas within IR Site 21 have not been included in the discussion even though these lines traverse areas of known groundwater contamination. Two of the storm sewer segments originating at IR Site 21 pass through the areas of vinyl chloride contamination found at AOC 23. Potential preferential migration of contaminants from groundwater plumes should be re-evaluated to include a discussion of the historical data from IR sites in source areas that may not be monitored by the current BGMP.	**Response to Specific Comment 1.** Figure 1-5 has been revised to include plume information provided in the Spring 2006 basewide groundwater monitoring program annual report. This information includes results of recent groundwater sampling within areas impacted by chemicals. Specifically, data are available for monitoring wells located within IR Site 5 "DNAPL source areas" beneath the central portion of Building 5 and at the eastern margin of Building 5 and also for a monitoring well located within the center of the benzene plume at IR Site 8. Page 1-25, Section 1.6.4.1, first two paragraphs, have been revised as follows: "IR Sites 5, 6, 7, and 8 are the only areas where storm sewer lines traverse groundwater plumes located upflow from IR Site 35 (Figure 1-5). Storm sewer lines crossing IR Site 21 that intersect AOC 23 do not appear to intersect the current extent of the VOC plume at IR Site 21 (Figure 1-5). Additionally, storm sewer lines at AOC 25 traverse a portion of the IR Site 3 Group groundwater plumes; however, the lines flow away from IR Site 35. The storm sewer segments that traverse groundwater plumes upflow from IR Site 35 include the following (shown on Figure 3-1 from the TtEMI 2001a report): • three segments of the storm sewer line that flow to Outfall G traversing a source area or the periphery of the IR Site 5 groundwater plume and IR Site 35: – 15G to 11GA (source area east of Building 5) – 6G-18-1B to 6G-18 – 5G-6A to 5G-5

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COMMENTS RELATED TO STORMWATER DRAINS	
SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 1 (continued).	**Response to Specific Comment 1 (continued).** • a fourth segment (4G-3 to slightly beyond 4G-1) of the storm sewer line that flows to Outfall G, traversing the IR Site 6 plume and Transfer Parcel EDC-5 • a fifth segment (11GA to slightly beyond 10G) of the storm sewer line that flows to Outfall G, likely traversing a benzene plume at IR Site 8 and IR Site 35 • two segments of the storm sewer line that flows to Outfall H, traversing the IR Site 7 plume and Transfer Parcel EDC-5: – 6G-13A,B,C,D to 6G-12 – 6G-15A,B,C to 6G-11A "With the possible exception of the portion of the storm sewer line originating in the DNAPL source area at northeastern portion of Building 5 at IR Site 5 and crossing the benzene plume at IR Site 8, there is little potential for contaminants to be transported downflow to IR Site 35 via the storm sewer lines for the following four primary reasons: 1. The portions of the storm sewer lines that traverse groundwater plumes are in areas marginally impacted by chemicals in groundwater (concentrations near or below maximum contaminant levels [MCLs]). This is based on results of the basewide groundwater monitoring report of spring 2006 (ITSI 2006) and is illustrated on Figure 1-5. – The distribution of VOCs at the IR Site 5 plume is represented by the 5 microgram per liter (µg/L) isoconcentration contour in the BGMP report of spring 2006

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COMMENTS RELATED TO STORMWATER DRAINS	
SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 1 (continued).	**Response to Specific Comment 1 (continued).** (ITSI 2006). Based on these results, concentrations of 1,1-DCA (and the approximate concentration of other VOCs) in the vicinity of these storm sewer lines at the southeastern margin of IR Site 5 range from less than the laboratory detection limit of 0.5 µg/L to approximately 5 µg/L." Note that remaining text in this section has not been revised.
Specific Comment 2. **Section 5.1.2.3, page 5-5.** Sediment traps in stormwater drains in AOC 12 had elevated lead concentrations up to 972 mg/kg and should be cleaned of that sediment.	**Response to Specific Comment 2.** The FS includes two alternatives in addition to the no action alternative for AOCs 10 and 12. Both of the active alternatives include removing sediment from the storm drain where the concentration of lead was reported above the preliminary remediation goal (this is described in Sections 11.3.2.5 and 11.3.3.4 and the location [sediment sample 3G] is shown on Figure 11-10).

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COMMENTS ON FEASIBILITY STUDY ISSUES	
GENERAL COMMENTS	**RESPONSE TO GENERAL COMMENTS**
General Comment 1. The treatment alternatives retained for detailed analysis of alternatives are appropriate for the proposed groundwater treatment remedies. Specifically, these include: • Monitored Natural Attenuation (MNA); • Enhanced Aerobic In Situ Biodegradation (EA ISB); and • In Situ Chemical Oxidation (ISCO). However, the detailed analyses of these treatment alternatives are deficient. These deficiencies are described in more detail below.	**Response to General Comment 1.** Comment noted. See responses to more detailed comments below.
General Comment 2. The RI/FS for Site 35 does not contain a reference for the use of modeling in conjunction with site-specific data for the purpose of screening or detailed analysis of alternatives of the MNA treatment alternative. The Final RI/FS should address this issue. Past feasibility studies from Alameda Point pertaining to MNA have contained at a minimum, the use of Biochlor® modeling as a screening tool to assess the applicability of MNA to the site being evaluated. In addition, the modeling process was developed using parameters derived from site-specific sample analysis. The use of Biochlor® modeling is acceptable for the purpose of screening a site to determine if a MNA technology is applicable. However, DTSC has continually recommended the use of a more robust modeling tool for use during the detailed analysis of alternatives in order to assure the choice of an appropriate recommended alternative. The FS for OU-2B used FSR (SEAM3D) modeling, in conjunction with site-specific data, to analyze this treatment alternative in detail. The DTSC ESU	**Response to General Comment 2.** Modeling to assist in predicting the time for MNA to reach remediation goals was not conducted for this site for the following reasons: • No dissolved oxygen or ORP data was collected as part of the RI at AOC 1 or AOC 23. • No groundwater monitoring wells are present in the naphthalene plume at AOC 1 or the vinyl chloride plume at AOC 23, so no time-series VOC data are available. • Release scenarios (such as exact locations, age, and quantities of releases) are unknown. • At AOC 23, concentrations of vinyl chloride are very low (maximum 2.8 µg/L), and approach the preliminary cleanup goal of 0.5 µg/L. Without sufficient analytical and site data to support assumptions for release scenarios for input to a model such as Biochlor, SEAM3D, or the USGS Time of

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GENERAL COMMENTS	**RESPONSE TO GENERAL COMMENTS**
General Comment 2 (continued). concurred with the use of this type of model as a solution to the past request for more robust MNA modeling in the detailed analysis of alternatives, and requests that the Draft Final RI/FS include similar type of modeling.	**Response to General Comment 2 (continued).** Remediation (TOR) model, resulting MNA durations are not reliable. In Section 11.5.2.2, the text has been modified to clarify the basis for the assumed duration of the MNA period as follows: "Sufficient groundwater data are not available to predict the duration of the MNA program to reduce contaminant concentrations to preliminary RGs. To assist in estimating the time of remediation, typical attenuation rates for hydrocarbon sites were reviewed (USGS 2003), and a duration of 10 years was assumed to be sufficient to reduce concentrations by one order of magnitude. For RI/FS Report cost estimating purposes, ..." New reference: USGS. 2003. Methodology for Estimating times of Remediation Associated With Monitored Natural Attenuation, USGS. Water-Resources Investigations Report 03-4057.
General Comment 3. For both the EA ISB and ISCO alternatives, the development and implementation of treatability studies to assess the applicability of these technologies should be completed in order to adequately conduct a detailed analysis of alternatives for these treatment technologies. The Draft Final RI/FS should contain, at a minimum, the use of results from lab-scale treatability studies in the assessment of the applicability of these treatment technologies. The lab-scale treatability studies should be based on the use of soil and groundwater samples obtained from the saturated zones of each specific AOC to be addressed by the relevant treatment technology.	**Response to General Comment 3.** The EA ISB alternative (AOC 1-3) involves source removal, overexcavation, dewatering (up to 30 days) to remove dissolved-phase naphthalene, and placement of an oxygen releasing compound to enhance ISB of residual naphthalene. The ISB component is an additional treatment step after source removal. Additional ISB-specific data (such as pH, DO, ORP, dissolved gases, total organic carbon) would be collected as part of the initial groundwater investigation. Any additional treatability studies, if needed, would be specified in the remedial design work plan.

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COMMENTS ON FEASIBILITY STUDY ISSUES	
GENERAL COMMENTS	**RESPONSE TO GENERAL COMMENTS**
General Comment 3 (continued). Specifically, the lab-scale treatability studies should address an evaluation of the multiple ISCO treatment technologies (i.e., Fenton's Reagent (H_2O_2/Fe), Ozone, Permanganate (K/Na), Ozone/H_2O_2) that may be the most appropriate for the specific AOC.	**Response to General Comment 3 (continued).** ISCO alternatives assume that the modified Fenton's reagent process would be used. The advantages of this process include neutral pH, minimal temperature rise (approximately 2 degrees Celsius or 4 degrees Fahrenheit), and a reduced potential for mobilization of metals. The modified Fenton's process has been used successfully at several other IR sites at Alameda Point with similar geology (hydraulic dredge fill). Treatability studies and full-scale implementations have been performed at other Alameda Point sites. Treatability testing is not considered necessary to evaluate ISCO because of the Navy's extensive experience with this technology at Alameda Point. Nevertheless, the ISCO discussion under the subheading Chemical Treatment in Section 9.3.3.8 has been expanded to include specific benefits and drawbacks of Fenton's reagent, ozone, permanganate, activated persulfate, and modified Fenton's reagent. Two new tables have been added to Section 9 summarizing the benefits and drawbacks of the various ISCO options. The total cost of implementing modified Fenton's reagent is considered similar to activated persulfate, so for FS purposes modified Fenton's reagent is used as the representative ISCO technology.
General Comment 4. The Draft Final RI/FS should contain a more complete cost analysis, one of the most important alternative comparison parameters. The completion of the recommended treatability studies can provide the information to properly develop a cost estimate. The Draft Final RI/FS cost estimates for both soil and groundwater treatment alternatives should contain:	**Response to General Comment 4.** A description of the RACER cost program and summary tables of cost assumptions for the remedial alternatives are provided in Appendix L of the RI/FS Report. In the main RI/FS Report text, Section 11.1.7, Cost, the reader is referred to Appendix L. For the reader's convenience, the following sentence has been added to the end of the first paragraph of the

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GENERAL COMMENTS	**RESPONSE TO GENERAL COMMENTS**
General Comment 4 (continued). • A list of the assumptions made in the development of soil and groundwater cost estimates; • The method used to develop the cost estimates (i.e., RACER); • Additional cost detail (i.e., Number of ISCO or EA ISB injection wells/ Related cost, MNA Sentry well/ Related cost) necessary to properly evaluate the estimates.	**Response to General Comment 4 (continued).** Evaluation By Criteria section for each alternative (Sections 11.2.2.5, 11.2.3.5, 11.3.2.8, 11.3.3.6, 11.4.2.3, 11.4.3.4, 11.4.4.4, 11.4.5.5, 11.4.6.3, 11.5.2.5, 11.5.3.6, 11.5.4.5, 11.6.2.5, and 11.6.3.5): "Cost estimate details and assumptions are presented in Appendix L."
General Comment 5. The findings of the initial groundwater investigations may impact decisions for the most appropriate alternative at AOC 1 and AOC 23. Thus, the proposed initial groundwater investigations should be performed prior to selection of the preferred remedial alternative.	**Response to General Comment 5.** The Navy often conducts additional sampling during the remedial design stage to collect remedy-specific data and refine or confirm the extent of contaminant concentrations above preliminary RGs. Data at AOC 1 suggest that the downgradient extent of naphthalene impact is limited. Additional sampling will be used to confirm the upgradient extent of naphthalene impact. The Navy considers the information currently available at AOC 1 to be sufficient for FS and remedy selection purposes. At AOC 23, groundwater "grab" sampling results revealed that vinyl chloride concentrations are slightly above the MCL. At IR Site 27, vinyl chloride concentrations in grab groundwater samples were approximately ten times higher than groundwater samples collected from co-located monitoring wells. The Navy plans to install two to three monitoring wells at AOC 23 before the ROD to assess whether vinyl chloride concentrations in groundwater samples from wells exceed the MCL. The last sentence in the third paragraph in Section 11.6.1 has been replaced with the following:

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GENERAL COMMENTS	**RESPONSE TO GENERAL COMMENTS**
General Comment 5 (continued).	**Response to General Comment 5 (continued).** "Vinyl chloride in groundwater samples collected and analyzed from co-located monitoring wells may be below the preliminary RG of 0.5 µg/L. The Navy plans to install and sample two to three monitoring wells at AOC 23 prior to the ROD, and to use the analytical results in the remedy selection process."

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SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 1. **Section 7.1.1 – AOC 1.** The noncancer hazard index (HI) for naphthalene is greater than 1 and the extent of naphthalene is not defined. The Navy should state that these are additional reasons to carry AOC 1 forward into the FS.	**Response to Specific Comment 1.** The last bullet in Section 7.1.1 has been revised as follows: "The cancer risk without residential groundwater use is driven by inhalation of naphthalene in indoor air. While the cancer risk is within the risk management range for a future resident, the noncancer HI (without domestic use of groundwater) is 2. The Navy is recommending an FS for AOC 1 to be sensitive to possible public concerns about naphthalene while U.S. EPA revises its toxicity factor."
Specific Comment 2. **Section 11.5.4.3 – Effectiveness Sampling for Naphthalene.** Since metals may be mobilized to groundwater by the ISCO process, performance monitoring should include analyses for dissolved metals. This comment also applies to Section 11.6.3.3 – Effectiveness Sampling for Vinyl Chloride.	**Response to Specific Comment 2.** Comment noted. Analysis for dissolved metals has been added to the ISCO groundwater alternatives. Additional information regarding mobilization of metals has been added to a newly expanded ISCO discussion in Section 9.3.3.8. The first sentence in the second paragraph of Sections 11.5.4.3 and 11.6.3.3 has been revised to include dissolved metals in the list of analyses for the performance monitoring program.
Specific Comment 3. **Section 11.7.4.4 – Reduction of Toxicity, Mobility, or Volume through Treatment.** It is unclear why Alternatives AOC 1-1 and AOC 1-2 rated medium in this category since these two alternatives do not involve any form of treatment.	**Response to Specific Comment 3.** Rankings of Alternatives AOC 1-1 and 23-1 in the Reduction of TMV Through Treatment criterion have been revised to "Low." In the last sentence of Sections 11.7.4.4 and 11.7.5.4, Alternative AOC 1-1 (in Section 11.7.4.4) and AOC 23-1 (in Section 11.7.5.4) have been ranked Low in Reduction of TMV, and a new paragraph has been added at the end of these subsections as follows: "...concentrations would continue to decrease through natural attenuation processes which would be verified through groundwater monitoring.

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SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 3 (continued).	**Response to Specific Comment 3 (continued).** "Alternative AOC 1-1 (23-1) was rated low in reduction of toxicity, mobility or volume through treatment because this alternative does not involve active treatment or monitoring to verify if contaminant concentrations are decreasing through natural attenuation processes." Alternatives AOC 1-2 and AOC 23-2, MNA and ICs, are *in situ* biological treatment alternatives relying on natural processes to reduce contaminant concentrations below preliminary RGs. Groundwater monitoring tracks the effectiveness of the treatment strategy. The rankings of MNA alternatives are unchanged.
Specific Comment 4. **Section 11.7.5.4 – Reduction of Toxicity, Mobility, or Volume through Treatment**. It is unclear why Alternatives AOC 23-1 and AOC 23-2 rated medium in this category since these two alternatives do not involve any form of treatment.	**Response to Specific Comment 4.** The rating of Alternative AOC 23-1 has been revised to "Low" in the Reduction of TMV Through Treatment criterion. The rating for Alternative AOC 23-2 is unchanged, as described in the Response to Specific Comment 3.

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SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 1. **Section 1.5.7.2 – Operable Units 1 and 2 Data Gap Investigation.** Contaminants originating from OU-2B that may have impacted IR Site 35 parcels are more extensive than what is listed. The list of contaminants should include TCE, PCE, cis-1,2-DCE, and 1,2-DCA.	**Response to Specific Comment 1.** The third sentence in the second paragraph of Section 1.5.7.2 has been revised as follows: "Contaminated groundwater originating from OU-2B (IR Sites 3, 4, 11, and 21) may have impacted groundwater in the southern portion of AOC 23 and in the western portion of AOC 25 with TPH, TCE, vinyl chloride, PCE, 1,1-DCA, 1,2-DCA, 1,1-DCE, 1,2-DCE (total), 1,4-dichlorobenzene, 1,1,2-TCA, and benzene. The Navy is currently proposing extensive sampling at IR Site 21. This sampling may help determine if groundwater contamination at IR Site 21 and AOC 23 is related. In addition, it is possible, though unlikely, that contaminated groundwater originating from IR Site 6 has impacted the western and northwestern area of AOC 23 with TPH and chlorinated VOCs (primarily cis-1,2-DCE and vinyl chloride)."
Specific Comment 2. **Attachment F AOC 6, Section 5.1 – AOC 6 Conceptual Site Model.** The RI states that the western extent of PCBs in shallow soil has not been defined but that, based on the direction of the PCB-containing oil spray, concentrations of PCBs in the soil are expected to decrease toward the west. Because the precise location of the former transformer that ruptured is unknown, and the direction and distance of the spray cannot be verified, confirmation samples should be collected to define the extent of PCBs in soil to the west of borings A06SB02 and A06SB03 where Aroclor 1260 concentrations exceeded the California Human Health Screening Level for soil. This comment is also applicable to Attachment F AOC 6, Section 7.2 – AOC 6 Conclusions and Recommendations.	**Response to Specific Comment 2.** The Navy will perform confirmation sampling to define PCBs in soil to the west of borings A06B02 and A06SB03 during a future environmental investigation. Approximately three soil borings for shallow soil samples will be collected. The text has been changed in the recommendations column on Table ES-1, Section 7.2.4 of the main report, and Section 7 of Attachment F.

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SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 3. **Attachment A AOC 1, Section 7.1 – AOC 1 Conclusions and Recommendations.** Attachment A states that the cancer and non-cancerous risks are within the risk management range, if domestic drinking water use of groundwater is not considered. However, a HI of 2 is not within the risk management range.	**Response to Specific Comment 3.** The last sentence of Section 7.1 of Attachment A has been revised to read as follows: "Without residential use of groundwater, the cancer risk (within the risk management range) and hazard value are due to the presence of naphthalene in indoor air." The last sentence in the fourth paragraph of Section 7.1.1 in the main text of the RI/FS Report has also been corrected to delete "but are still within the risk management range" from the text.
Specific Comment 4. **Attachment R AOC 23, Section 4.1.1 – Volatile Organic Compounds.** The Navy should: • provide the station identifier for the soil sample with vinyl chloride above the PSC. • clarify whether the 25 VOC concentrations reported at concentrations below PSC suggest that a source of VOCs exists at AOC 23 that requires further investigation, or whether these VOC concentrations would act as a continuing source of groundwater contamination.	**Response to Specific Comment 4.** The second sentence in Section 4.1.1 has been revised as follows: "Vinyl chloride was reported at a concentration of 210 µg/kg in a soil sample collected at A23SB22 in EBS Parcel 123 from 5 to 6 feet bgs; the concentration was above the PSC (residential PRG of 79 µg/kg)." Review and evaluation of the analytical data does not indicate that VOCs in soil are acting as a continuing source to groundwater at AOC 23.
Specific Comment 5. **Attachment R AOC 23, Section 4.2.1 – Volatile Organic Compounds.** The Navy should clarify whether there is a relationship between VOC soil concentration distribution patterns and the pattern of ground water VOC concentrations to indicate a source of VOCs at AOC 23 that would warrant further investigation.	**Response to Specific Comment 5.** Review and evaluation of the analytical data does not indicate sources of VOCs in groundwater at AOC 23 that warrant further investigation. As stated in Section 4.2.1 in Attachment R, benzene (at EBS Parcel 71), vinyl chloride (at EBS Parcels 123, 124, and 125), and 1,2-DCA (at EBS Parcel 126) were the only VOCs reported in groundwater samples collected within

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SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 5 (continued).	**Response to Specific Comment 5 (continued).** AOC 23 at concentrations above their PSCs. For all three of these compounds, soil and groundwater detections were not co-located, with one exception (discussed in the following paragraph). Benzene was reported at nine locations at AOC 23 (A023SB03, -04, -18, -22, -31, -32, -37, and -39), with one concentration (at 1.1 µg/L) slightly above the PSC of 1 µg/L at AOC 23 in boring A23SB03. However, benzene was not reported above the detection limit in the soil samples collected from this boring and nearby borings. The nearest locations with benzene reported in soil (071M-004M and 071M-012) are approximately 200 feet away to the southeast. These two locations had the highest reported benzene concentrations; however, benzene was not reported above laboratory detection limits in soil or groundwater samples collected around these locations, or in RI soil and groundwater samples collected a few feet from these locations. These two soil sampling locations were within CAA-B, and were most likely removed as part of the pipeline removal activities. Benzene concentrations in soil (1.7 and 3 µg/kg) and groundwater (0.4 µg/L) were co-located at only one location, A023SB031. Vinyl chloride was reported in four borings: A23SB18 and A23SB20 at EBS Parcel 123, A23SB31 at EBS Parcel 124, and S21-DGS-DP20 at EBS Parcel 125. In all four of these borings groundwater concentrations were above the PSC of 0.5 µg/L. Vinyl chloride was not reported in the soil samples collected from borings A23SB18 and A23SB31. No soil samples were collected from borings A23SB20 and S21-DGS-DP20. At AOC 23, vinyl chloride was only reported in soil at boring A23SB22; however, it was

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Specific Comment 5 (continued).	**Response to Specific Comment 5 (continued).** not reported in the groundwater sample collected from this same boring. Boring A23SB22 is located at least 100 feet away from the four borings where vinyl chloride was reported. As described in the Response to General Comment 5 related to feasibility study issues, additional groundwater sampling is planned. Collection of additional data (groundwater and soil) is also included in the two active FS alternatives for AOC 23 to assess the concentrations and distribution of vinyl chloride. 1,2-DCA was reported in groundwater samples collected from two sampling locations at AOC 23 (monitoring well 398-MW1 and boring A23SB22). In both these samples, 1,2-DCA concentrations were above the PSC of 0.5 µg/L; however, it was not detected in soil at boring A23SB22 and any borings in AOC 23. No soil samples were collected from location 398-MW1.

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SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 1. **Section 3.5, page 3-8.** The frequency of detection for several inorganic elements in the Alameda Point 'ambient' data set is less than 50 percent. Please include the frequency of detection in the tabular representation of the Alameda Point inorganic element concentrations (Table 3-10) referenced in the text.	**Response to Specific Comment 1.** Table 3-10 in the draft final RI/FS Report has been updated to include the requested information. Based on the summary statistics for pink soil data set and background groundwater data set presented in the Appendix E of the draft OU-1 RI Report for Sites 6, 7, 8 and 16, Alameda Point, Alameda, California (TtEMI 2004), a new column with the detection frequency of the ambient soil metal data set for the pink area was included in Table 3-10, and a new column with detection frequency of the ambient groundwater metal data set was also included. Details of the construction of the ambient soil and groundwater data sets are provided in Samples for Use as Background (Tetra Tech, Inc. 1997) and the Technical Memorandum for Estimation of Ambient Metal Concentrations in Shallow Groundwater (Tetra Tech, Inc. 1998). New references: Tetra Tech, Inc. 1997. Samples for Use as Background, Naval Air Station, Alameda Point, Alameda, California. February 7 and March 14. _____. 1998. Technical Memorandum for Estimation of Ambient Metal Concentrations in Shallow Groundwater. August.
Specific Comment 2. **Section 4.3.1.1, page 4-16.** The comparison of the median and 95th percentile values in the IR Site 35 and Alameda Point 'pink' background data sets is presented in Table 4-12, not 4-13 as indicated in the text.	**Response to Specific Comment 2.** Table 4-12 and reference to this table has been deleted. As discussed in the Response to Specific Comment 4 for Metals in Soil and Background, comparison to background relies on the 95th percentile and not the median. Reference to the median was therefore incorrect and has been deleted.

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Specific Comment 3. **Section 6.4.3, page 6-15.** Please amend the text describing the groundwater sampling event which reported 10 samples with elevated PCB concentrations for AOC 11/EBS Parcels 78-79. The text currently states 'in one possibly anomalous sample containing PCBs in ten samples' rather than one sampling event of ten samples.	**Response to Specific Comment 3.** Section 6.4.3 on page 6-15 has been revised as follows: "The majority of the risk is associated with ingestion of PCBs in groundwater based on the reported concentration of PCBs in one possibly anomalous sample out of ten groundwater samples."
Specific Comment 4. **Section 1.6.2.4 – IR Site 6.** Please clarify that AOCs 19 and 22 were removed from IR Site 35 and are being addressed as part of IR Site 6.	**Response to Specific Comment 4.** The following text has been added to the end of Section 1.6.2.4: "AOC 19 was removed from IR Site 35 and will be addressed as part of IR Site 6." The following text has been added to the end of Section 1.6.3.2: "AOC 22 was removed from IR Site 35 and will be addressed as part of CAA-B."
Specific Comment 5. **Section 1.6.2.5 – IR Site 7.** Include a brief discussion about the former incinerator and soil debris area at IR Site 7.	**Response to Specific Comment 5.** Section 1.6.2.5 has been revised as follows: "IR Site 7, known as the Naval Exchange Service Center, is adjacent to AOC 15. The site contains petroleum-related chemicals. Former Building 68-3 was constructed at the site in 1942 to house an incinerator surrounded by a grassy open space (TtEMI 2004). After Building 68-3 was demolished in 1961, Building 459, an automotive service station, was constructed on the same location. A blue, crystalline, metallic debris layer thought to be incinerator debris or building debris from demolition was identified in 2002 in shallow soil near the footprint of former Building 68-3. This layer ranged in depth from approximately 18 to 24 inches bgs and was approximately 8 to

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Specific Comment 5 (continued).	**Response to Specific Comment 5 (continued).** 12 inches thick (TtEMI 2004). Approximately 1,320 cubic feet of this debris layer was removed and disposed off-site in 2003 (Shaw 2003b). The boundaries of IR Site 7 are coincident with the boundaries of CAA-7. A brief summary of historical operations and COCs at IR Site 7/CAA-7 is presented in Section 1.6.3.4." For consistency, Section 1.6.3.4 has also been revised to reflect the existence of the former incinerator and the metallic debris layer.
Specific Comment 6. **Section 1.6.2.6 – IR Site 8.** Clarify that there was a washdown area and oil-water separator on site that likely contributed to groundwater contamination.	**Response to Specific Comment 6.** Section 1.6.2.6 (IR Site 8) has been revised to include discussion of the presence of WD-114 and OWS-114. Because IR Site 8 occupies approximately the same area as CAA-8, Section 1.6.3.5 (CAA-8) has also been revised, for consistency. Section 1.6.2.6 now reads as follows: "IR Site 8 is adjacent to AOCs 9 and 11 and is known as the pesticide storage area (Building 114). The site was operated as the weed and pest control center for the base by the PWC. Historical operations at Building 114 included pesticide storage and mixing, paint stripping, public works maintenance and storage, sandblasting, carpentry, equipment cleaning, and painting. A washdown area (WD-114) and an oil-water separator (OWS 114) were also associated with Building 114. The primary source of contamination on-site was likely the disposal of wastes in sinks and floor drains that flowed through leaking sewer lines. The RI Report for IR Site 8 (TtEMI 2004) identified Aroclor 1260, arsenic, B(a)P, and lead as the primary COCs in soil, and benzene and TCE as the primary COCs in groundwater. Concentrations of benzene and TCE in groundwater had decreased to below

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Specific Comment 6 (continued).	**Response to Specific Comment 6 (continued).** MCLs as of 2003 and the RI concluded that there appeared to be no continuing source. However, groundwater sampling conducted in June 2006 under the basewide groundwater monitoring program reported a benzene concentration of 16 µg/L at location M08-01 (ITSI 2006). This concentration exceeds the MCL (1.0 µg/L) and is comparable to the maximum concentration (20 µg/L) reported at this location in 1994. "The boundaries of IR Site 8 and CAA-8 are nearly coincident. Historical operations and sampling at CAA-8 are discussed in Section 1.6.3.5." Section 1.6.3.5 (CAA-8) has been revised as follows to reflect the presence of the WD-114 and OWS-114 (consistent with Section 1.6.2.6) and also to provide additional information about the effective transfer of the investigation of CAA-8 from the TPH Program to the CERCLA program. "CAA-8 occupies approximately the same area as IR Site 8; it is adjacent to the southern boundary of AOC 9 and the western boundary of AOC 11. CAA-8 was identified as a corrective action site under the TPH Program because of its proximity to fuel line CAA-B. However, no investigations were conducted at this site under the TPH Program; it was recommended for transfer to CERCLA in 2003 (TtEMI 2003a). Soil and groundwater were sampled for TPH-associated constituents (TPH fractions, BTEX, and lead) at various locations at IR Site 8 during the RI for OU-1. The RI Report for OU-1 reported that lead in soil was recommended for further action under CERCLA; groundwater was not considered significantly impacted by TPH, and it was determined that CAA-8 would not be further addressed under the TPH Program (TtEMI 2004).

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Specific Comment 7. **Section 1.6.2.11 – IR Site 28.** Verify that elevated levels of arsenic approximately 200 to more than 400 micrograms per liter (µg/L) in groundwater at IR Site 28 are not bounded to the south.	**Response to Specific Comment 7.** Page 1-21, Section 1.6.2.11, next to last sentence has been revised as follows: "However, metals concentrations in groundwater, primarily arsenic at concentrations of 250 to 470 µg/L in upgradient well 28MW04, have not been bounded at the southern margin of IR Site 28. Groundwater data from well MBG-1, which is located approximately 500 feet upgradient of IR Site 28 and within IR Site 35, indicates arsenic concentrations below background levels."
Specific Comment 8. **Attachment A AOC 1, Section 5.3 – Contaminant Migration.** Clarify that values estimated for retardation are approximate because they depend on a number of site-specific subsurface parameters that can change appreciably from location-to-location. At many sites, these site-specific parameters have not been measured. The absence of detectable naphthalene in the two other locations sampled at AOC 1 (about 70 feet north and east) may be related to differences in groundwater flow directions and/or migration through preferential flow pathways.	**Response to Specific Comment 8.** The following text has been added to the end of the second bullet in Section 5.3. "..., however, the absence of naphthalene in the downgradient samples may also be due to a slightly different groundwater flow direction or migration through a preferential pathway. It should be noted that the calculated retardation factor of 138 for naphthalene is approximate because it was based on average values for bulk mass density and porosity for samples collected in silty sands across IR Site 35. No soil samples collected at AOC 1 were analyzed for these properties and they can vary appreciably from location to location."

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Specific Comment 9. **Attachment B AOC 2, Section 1.1 – Background.** The boundary and size of AOC 2 changed between the final RI work plan for IR Site 35 and the draft RI/FS report without rationale or discussion. These changes in site boundary dimensions and size should be addressed.	**Response to Specific Comment 9.** Attachment B, AOC 2, Section 1.1, new text added as follows: "The boundary of AOC 2 was revised and the area was reduced from approximately 2.9 to 1.1 acres between issuance of the final IR Site 35 RI Work Plan (BEI 2006) and preparation of the RI Report. As discussed in response to agency comments on the Work Plan (included in Appendix F of the Work Plan, Response to DTSC GSU Specific Comment 5), the initial AOC 2 boundaries were defined to include locations of elevated PAH concentrations and the location of RCRA unit NAS GAP 28A. Because of uncertainty concerning the location of the RCRA unit, the initial AOC 2 boundary included the northern portion of EBS Parcel 61A. Subsequently, the location of the RCRA unit was identified near Building 562 in the southern portion of EBS Parcel 61A. With incorporation of soil sampling location 32EDC-5-34, located in the northern portion of EBS Parcel 61A, into the PAH Areas (Attachment W), the AOC 2 boundary was reduced to include only areas requiring additional sampling and the location of NAS GAP 28A."
Specific Comment 10. **Attachment E AOC 5, Section 1.4.2 – Polynuclear Aromatic Hydrocarbon Removal Action.** The RI/FS states that soil in the locations where samples were collected from three borings (K12, L11, and L12) was still in place after the Time-Critical Removal Action, and that these samples were analyzed for PAHs. However, Figure 1-1 shows that samples from soil boring L11 were analyzed for metals only. Appendix B indicates that these samples were only analyzed for arsenic. This discrepancy should be corrected.	**Response to Specific Comment 10.** The following was added to the end of Section 1.4.2 in Attachment E: "Soil at locations K12 and L12 was not removed during the TCRA (Figure 1-1). Samples from K12 and L12 were analyzed for PAHs at depths between 0 and 2 feet bgs, and B(a)P equivalent concentrations were below the PSC. Soil at sample location L11 was removed during the TCRA (Figure 1-1). The TCRA excavation at AOC 5 was filled with imported backfill and topsoil, which were

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SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 10 (continued).	**Response to Specific Comment 10 (continued).** sampled and analyzed for arsenic. The results of the topsoil and backfill sampling are included in Table 4-3 for sampling location L-11." The station IDs for the four fill samples for station ID L-11 in Table 4-3 have been revised to indicate that the two samples from the upper 6 inches represent two topsoil samples and the two deeper samples represent two backfill samples.
Specific Comment 11. **Attachment F AOC 6, Section 6.2 – Risk Characterization.** This section (and the following two sections) state that 15 soil samples from AOC 6 were analyzed for PCBs. However, according to Table 4-1, only 12 soil samples were analyzed for PCBs. The Navy should reconcile and correct this information.	**Response to Specific Comment 11.** Section 6.2 and the following two sections (Sections 6.3 and 6.4) have been corrected to indicate that PCBs were identified in 3 of 12 samples. This has also been corrected in Section 6.3.4 of the main RI/FS text and in Appendix J. It should be noted that a Tier 1 evaluation was performed for AOC 6, in which the maximum reported Aroclor 1260 result was used; therefore, this error did not affect the results of the risk assessment.
Specific Comment 12. **Attachment K AOC 11/EBS Parcels 78-79, Section 6.2.1.** It is unclear what is considered to be metals background values for the purposes of the risk evaluation. On Table 6-2, which summarizes the human-health risk assessment results, risks associated with arsenic in groundwater are not listed under the "without background" columns even though arsenic was found at concentrations above the 95th percentile background value. The Navy should clarify or reconcile this discrepancy.	**Response to Specific Comment 12.** The table is correct and a footnote has been added to cadmium in soil and arsenic, iron, and manganese in groundwater to state (as stated at the bottom of page K6-1) that additional statistical evaluations presented in Appendix H indicate that these metals are present at concentrations below Alameda Point pink background.

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Comments from DTSC, D. Lofstrom, 11/21/2006

MINOR AND/OR EDITING COMMENTS	
SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 13. **Attachment R AOC 23, Section 4.2.1 – Volatile Organic Compounds.** The RI/FS states that current sampling of well 398-MW1 as part of the RI did not confirm the presence of VOCs above PSC values in this well. However, the data provided on Table 4-10b indicate that the sample obtained from this well during the RI exceeded the PSC value for 1,2-DCA. This discrepancy should be corrected. a. The units provided for TCE concentrations in the last bullet on page R4-8 should be corrected to indicate µg/L, not mg/L. b. Contrary to the statement of the last sentence of the first full paragraph in this section, the lateral extent of vinyl chloride is not defined north of the southern exceedence.	**Response to Specific Comment 13.** The last sentence of the fifth bullet on page R4-8 has been deleted. Current sampling of 398-MW1 as part of the RI identified the presence of 1,2-DCA at a concentration above the PSC. See also Response to U.S. EPA Errata Comment 15.
Specific Comment 14. **Attachment P AOC 20, Section 7.1 – Summary.** The concentration listed as the maximum contaminant level for arsenic is actually the maximum concentration that was detected in groundwater at this AOC. The Navy should correct this information.	**Response to Specific Comment 14.** The first sentence of the third paragraph of Section 7.1 of Attachment P has been revised as follows: "Arsenic was reported in one groundwater sample collected during the RI at a concentration of 26.9 µg/L, which is above the PSC (federal MCL of 10 µg/L)."
Specific Comment 15. **Attachment R AOC 23, Section 4.2.1 – Volatile Organic Compounds.** The Navy should indicate that the two exceedences of 1,2-DCA may be related to releases of chlorinated hydrocarbons at Building 398.	**Response to Specific Comment 15.** Attachment R, AOC 23, Section 4.2.1, second paragraph, first sentence has been revised as follows: "The two exceedances of 1,2-DCA were in the northeastern corner of EBS Parcel 126. These concentrations are likely associated with the VOCs reported in groundwater at Building 398 (located in CAA-3A in IR Site 21). During the 2001 data gap investigation at CAAs (TtEMI 2001b), VOCs (1,1-DCA; 1,2-DCA; PCE; and TCE) were reported in groundwater at Building 398

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MINOR AND/OR EDITING COMMENTS	
SPECIFIC COMMENTS	**RESPONSE TO SPECIFIC COMMENTS**
Specific Comment 15 (continued).	**Response to Specific Comment 15 (continued).** (adjacent to AOC 23). All VOCs were reported at concentrations below their respective PSCs. During the data gap investigation, PCE and TCE were reported at concentrations below their PSCs in a groundwater sample collected from monitoring well 398-MW1, which is located on the west side of Building 398 and within AOC 23, EBS Parcel 126. The EBS documented storage of approximately 5,000 gallons of halogenated and nonhalogenated solvents in Building 398 (IT 2001a)."

Note:
* These responses identify changes to the subject document text, tables, and/or figures. The specific wording that appears in the document may differ slightly from that presented in these responses to comments. The edited version of the document was reviewed by Bechtel Environmental, Inc., to ensure that there are no substantive differences that would warrant further Navy and/or agency review and concurrence.

COMMENTS FROM RWQCB

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Comments from RWQCB, E. Simon, 11/3/2006

GENERAL COMMENTS	RESPONSE TO GENERAL COMMENTS
General Comment 1. **Preliminary Screening Criteria** - What rationale is used in selecting EPA PRGs over other screening levels? Why not use the more conservative between ESLs and PRGs?	**Response to General Comment 1.** Comparison criteria used in the RI Report were agreed upon by the Navy and agencies and included in the final RI Work Plan. Specifically, the comparison criteria were stated in the DQO tables included in the approved final RI Work Plan, dated March 2006 (Tables 1-2 through 1-4 of the Sampling and Analysis Plan, Attachment A to the final RI Work Plan). The Water Board provided input to the comparison criteria presented in the draft RI Work Plan, and its recommendation was incorporated into the final RI Work Plan. Specifically, the Water Board requested that TPH results be compared to ESLs. (Comment 1, comments dated November 8, 2005; comments and Navy responses to comments are included in Attachment F of the final RI Work Plan).
General Comment 2. **Background Metals Concentrations** - We concur with EPA and DTSC comments regarding interpretation of background levels at Alameda Point. Also, see specific comments # S7,S21, and S23. Furthermore, the background metal concentrations presented throughout the document are confusing. When metals are compared with background levels in most tables, it is unclear whether the background levels referenced are the 'Alameda Point' background levels or the elevated background levels as discussed in Section 4.3.	**Response to General Comment 2.** Background levels referenced throughout the report are the Alameda Point background levels (TtEMI 2001 and 2004); these levels are used for identifying metals present at concentrations above background for the nature-and-extent discussion in Section 4 and discussing total and incremental risk (results without metals below background) in the risk assessment in Section 6. No chemicals were excluded from the Tier 1 or baseline risk assessments based on a comparison to PSCs or background levels.
General Comment 3. **B(a)P Equivalents** - The Alameda Point B(a)P equivalent concentration screening level used throughout this document is 620 µg/kg. The only reference given to support the use of this screening level is (DON 2001a), which refers to Draft PAH Technical Meeting Minutes from 5/31/01. Please include discussion and/or other documentation on the regulatory agencies concurrence that this screening level is acceptable and appropriate.	**Response to General Comment 3.** The following text has been added after the first sentence of Section 3.5: "PSCs for IR Site 35 were agreed upon by the Navy and agencies and included in the final RI Work Plan (BEI 2006)." As discussed in the Response to General Comment 1, comparison criteria used in the RI Report were agreed upon by the Navy and agencies and included in

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GENERAL COMMENTS	RESPONSE TO GENERAL COMMENTS
General Comment 3 (continued).	**Response to General Comment 3 (continued).** the final RI Work Plan. These criteria include a B(a)P equivalent concentration of 620 µg/kg, as described in the May 31, 2001, meeting minutes. These meeting minutes are also included as an attachment to DTSC's letter to the Navy dated July 13, 2006, that summarizes a regulatory meeting on May 22, 2006 regarding the use of 620 µg/kg as a screening level for B(a)P relative to IR Site 25 at Alameda Point (the Water Board was copied on this letter). The first bullet for soil on page 3-8 in Section 3.5 has been changed to reference Cal/EPA 2006 as well as DON 2001a. Reference added: California Environmental Protection Agency Department of Toxic Substances Control. 2006. Letter from Dot Lofstrom, OMF, to Thomas L. Macchiarella, DON, re: Regulatory Meeting Regarding Polynuclear Aromatic Hydrocarbons, Alameda Point, Alameda California. July 13.

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 1. **Page ES-2, Exec Summary** **Remedial Investigation** - This paragraph mentions that only 14 samples for the Site 35 RI were analyzed for hexavalent chromium. Please include rationale for limiting hexavalent chromium analyses to these samples.	**Response to Specific Comment 1.** The paragraph under "Remedial Investigation" on page ES-2 of the executive summary has been revised to note that 13 samples (9 soil and 4 groundwater) were analyzed for hexavalent chromium. As discussed in the final RI Work Plan for IR Site 35 (BEI 2006), previous samples collected at AOC 17 had reported concentrations of chromium in groundwater above the PSC. For this reason, the RI included analysis for hexavalent chromium in addition to analysis for total chromium at AOC 17 for both soil and groundwater samples. This rationale has been added to Table 3-4 of the RI/FS Report. No other study areas within IR Site 35 warranted hexavalent chromium analysis.
Specific Comment 2. **Page ES-3, Exec Summary** **Third paragraph** - If the groundwater at AOCs 5, 24, and 25 can sustain a yield of 200 gallons per day (and have TDS <3000 mg/L), the Water Board will consider it a potential drinking water source under State Board Resolution 88-63.	**Response to Specific Comment 2.** The Navy concurs that the groundwater beneath AOCs 5, 24, and 25 will be considered a potential drinking water source under State Water Board Resolution 88-63 if it can sustain a yield of 200 gallons a day and have TDS less than 3,000 mg/L.
Specific Comment 3. **Page ES-4, Exec Summary** **Nature and Extent of Contamination - second paragraph** - Regardless of the conditions present that may or may not have contributed to higher metals concentration due to dissolution, elevated metals concentrations above PSCs/ESLs need to be addressed, as they indicate potential risk to human and aquatic receptors. Also, what rationale was used for taking some samples unfiltered and other samples filtered? Were EPA approved methods used in sample collection and analysis? Furthermore, no discussion was given that	**Response to Specific Comment 3.** The presence of concentrations above PSCs or ESLs (which are screening guidelines) does not necessarily indicate a concern for human health. All metals (except required human nutrients) were included in the HHRA, which presents a full evaluation of potential for adverse human health effects. Additionally, per the final RI Work Plan, maximum concentrations of metals in groundwater at sites adjacent to or near surface-water bodies were compared to aquatic screening criteria to evaluate the potential for impact to aquatic receptors.

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 3 (continued). may indicate reason/cause of anaerobic conditions or if these anaerobic conditions may or may not have resulted from Navy activities on the site.	**Response to Specific Comment 3 (continued).** All RI samples were collected and analyzed in accordance with the final RI Work Plan, which included approved U.S. EPA methods for sample analysis and field filtering for dissolved metals analyses. This information is summarized in the draft RI/FS Report: analysis methods are listed in Section 3; and sampling methods are summarized in Section 3 and detailed in Appendix C. Metals samples collected during many previous investigations were not filtered. The following sentence has been added to the eighth bullet in the Executive Summary under Nature and Extent to clarify this point: "In groundwater, metals above background are likely due to dissolution of naturally occurring metals in soil as a result of reducing conditions and likely from suspended matter in unfiltered samples at AOCs 17 and 25." Two new subsections have been added to Section 4 to support the discussion of anaerobic conditions. These sections include: Section 4.3.2.1 Evidence of Reducing Conditions and 4.3.2.2 Potential Causes of Reducing Conditions.
Specific Comment 4. **Page ES-9, Exec Summary** **Ecological Risk Assessment** - Please mention where supporting data for statements made in this section may be found in this report.	**Response to Specific Comment 4.** The discussion of the ecological risk assessment in the Executive Summary has been revised to read: "As agreed upon by the Navy and regulatory agencies and documented in the final RI Work Plan for IR Site 35, an ecological assessment of terrestrial receptors was not conducted because of the lack of suitable habitat and the absence of threatened, endangered, or special-status species at IR Site 35. Ecological habitats and natural resources at IR Site 35 are discussed in Section 2.8 of the main RI/FS Report. However, groundwater results for study areas adjacent to or near surface water bodies were compared to criteria for protection of aquatic receptors (Section 4 of the main RI/FS Report and

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 4 (continued).	**Response to Specific Comment 4 (continued).** applicable attachments). Based on these comparisons and analyses, it is unlikely that chemicals in groundwater with concentrations above aquatic ecological PSCs would reach surface water."
Specific Comment 5. **Page ES-11, Exec Summary** **Top of page** - Provide rationale for why other metals, benzene, and TPH do not have remediation goals developed for them, even though high concentrations were detected above background and screening levels. Why is the RG for B(a)P above the PSC of 620 µg/kg?	**Response to Specific Comment 5.** Preliminary remediation goals (PRGs) were developed for COCs carried forward to the FS for AOCs 1, 3, 10, 12, and 23 and for residual PAHs in Transfer Parcel EDC-5, and were based on results from the human-health risk assessment (RI/FS Report Section 6) and conclusions from the RI (RI/FS Report Section 7). PRGs were not developed for all concentrations that were detected above background and screening levels. Petroleum hydrocarbon impacts are not addressed in this RI/FS, because they are addressed separately under the TPH Program. This has been clarified in the Executive Summary by revising the text at the top of page ES-11 with the following: "Remedial action objectives were developed for COCs carried forward to the FS at AOCs 1, 3, 10, 12, 23 and for residual PAHs in Transfer Parcel EDC-5 as follows: • PRGs for soil – heptachlor at AOC 3: 110 µg/kg – lead at AOCs 10 and 12: 184 mg/kg – PAHs in PAH Areas: 1,000 µg/kg B(a)P equivalent • PRGs for groundwater – naphthalene at AOC 1: 100 µg/L – vinyl chloride at AOC 23: 0.5 µg/L

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 5 (continued).	**Response to Specific Comment 5 (continued).** The Navy and the regulatory agencies have been actively discussing appropriate PRGs and exposure depth intervals for PAHs in soil at IR Site 35, as stated in Section 8.4.3.1. The PRG for PAHs in soil at Transfer Parcel EDC-5 is 1,000 µg/kg B(a)P equivalent; this is the same PRG that was used for previous TCRA activities within Transfer Parcel EDC-5 (which includes IR Site 35). Additionally, this is consistent with the After Action Report (meeting minutes) summarizing discussions at the PAH technical meeting held on May 31, 2001. These meeting minutes are also included as an attachment to DTSC's letter to the Navy dated July 13, 2006, that summarizes a regulatory meeting on May 22, 2006, regarding PAHs relative to IR Site 25 at Alameda Point (Cal/EPA 2006)." As stated in Section 8.4.3, PRGs for IR Site 35 have been identified for the RI/FS Report only. Final PRGs will be determined when the remedy is selected, in accordance with Section 300.430(e)(2)(i) of the NCP. Reference added: California Environmental Protection Agency Department of Toxic Substances Control. 2006. Letter from Dot Lofstrom, OMF, to Thomas L. Macchiarella, DON, re: Regulatory Meeting Regarding Polynuclear Aromatic Hydrocarbons, Alameda Point, Alameda California. July 13.
Specific Comment 6. **Exec Summary** **Table ES-1** - There are numerous AOCs that seem to exhibit unacceptable cancer or HI risks (even without consideration of metals) that have 'No Further Action' recommendations, with typical argument that concentrations are 'naturally occurring' or 'dissolution' is occurring. Regardless, unacceptable risks are identified throughout this report, indicating some	**Response to Specific Comment 6.** Risk management decisions consider information in addition to the presence of cancer risk above 10^{-6} and a noncancer HI above 1. Per NCP Section 300.430, preliminary remediation goals for carcinogens are set at a 10^{-6} excess cancer risk as a point of departure, but may be revised to a different risk level within the acceptable risk range (10^{-6} to 10^{-4}), based on the consideration of appropriate factors, including but not limited to, exposure factors, uncertainty, and technical limitations.

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Specific Comment 6 (continued). action or use restriction may be required to protect human and aquatic receptors. Elevated risk associated with various contaminants seems to warrant further consideration for remedial action.	**Response to Specific Comment 6 (continued).** At Alameda Point, the Navy and regulators have agreed on acceptable risk ranges between 10^{-6} to 10^{-4} when consideration of site-specific factors support risk above 10^{-6}. For IR Site 35, NFA recommendations were made for study areas with an incremental cancer risk within the risk management range and a noncancer HI less than 1 without including metals at ambient concentrations, and (for some study areas) with consideration of other site-specific and toxicological factors. Text supporting the basis for risk management recommendations has been added as an introductory paragraph in Section 7 (RI Conclusions and Recommendations) of the main RI/FS Report. In addition, information of this nature already exists in bullets in the conclusions column in Table ES-1.
Specific Comment 7. **Page 1-11, Section 1.5.5** **Background Metals Evaluation** - This paragraph mentions that only 3 soil borings for the Alameda Point Background evaluation were located in the rather extensive site 35 boundaries. Was this sufficient to evaluate? Furthermore, for these three borings, were elevated metals concentrations reported that are consistent with Navy's position that a "higher background" exists at site 35? Please include information from these three samples for comparison purposes. Furthermore, is there statistically enough local data to justify claim that a higher background exists at Site 35 than other Alameda Point sites?	**Response to Specific Comment 7.** The three borings designated as background are part of the Alameda Point pink background data set compiled by PRC in 1997 that was approved by U.S. EPA. This data set has been used to establish background metals concentrations for all IR sites within the pink area. The 95th percentile in the Alameda Point pink background, used to identify the presence of metals at concentrations above background, is based on all pink background sampling locations, including the three locations in IR Site 35. Elevated metals concentrations reported from one of the three boring locations in IR Site 35 support the presence of higher background concentrations at IR Site 35. Soil boring MBG-1, located in AOC 4, is part of the pink background data set and contained elevated concentrations of aluminum, chromium, iron, magnesium, and vanadium. In any statistical population, approximately 4 percent of the samples will have concentrations above the 95th percentile. The data set for IR Site 35 is much

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Specific Comment 7 (continued).	**Response to Specific Comment 7 (continued).** larger than the pink background data set, so the presence of more samples with concentrations above the 95th percentile is expected. In addition, there is evidence that some common rock-forming metals such as iron and manganese are present at ambient concentrations that are higher than those in the Alameda Point pink background data set. The draft final RI/FS Report provides additional evidence in Section 4.3.1 to support this finding.
Specific Comment 8. **Page 1-13, Section 1.5.9** **OU5 addendum Sampling** - The Alameda Point B(a)P equivalent concentration screening level used throughout this document is 620 µg/kg. The only reference given to support the use of this screening level is (DON 2001a), which refers to Draft PAH Technical Meeting Minutes from 5/31/01. Please include discussion and/or other documentation on the regulatory agencies concurrence that this screening level is acceptable and appropriate.	**Response to Specific Comment 8.** The DON 2001a reference on page 1-13 in Section 1.5.9 has been changed to DON 2001a, Cal/EPA 2006. See also Response to General Comment 3.
Specific Comment 9. **Page 1-28, Section 1.6.4.3** **First Sentence** - Clean Water Act was passed in 1972, not 1974.	**Response to Specific Comment 9.** The first sentence of Section 1.6.4.3 has been revised to note that the Clean Water Act was passed in 1972.
Specific Comment 10. **Page 2-11, Section 2.7** **Second Paragraph** - California EPA does not use the same Federal EPA terminology that defines groundwater as Class I, II, or III. Please include a reference to State Board Resolution 88-63 when discussing California guidelines to define groundwater beneficial uses.	**Response to Specific Comment 10.** Please see Response to Specific Comment 11.

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 11. **Page 2-12, Section 2.7** **Top Paragraph** - While the groundwater in the central region of Alameda Point may not be currently used as a drinking water source, it is considered a potential drinking water source per State Board Resolution 88-63. CERCLA cleanup decisions need to be protective of present and future beneficial uses, including use as a drinking water source. Please revise all sections of this report to reflect that the groundwater in the central region of Alameda Point, east of Saratoga street, is considered by the Water Board to be a potential drinking water source, unless the groundwater meets the exception criteria specified in State Board Resolution 88-63.	**Response to Specific Comment 11.** Text in Section 2.7 has been revised to clarify this issue. The first eight paragraphs and the bulleted list of Section 2.7 were replaced with the following text (this insert is identical to the one in Response to U.S. EPA General Comment 1): "Groundwater beneath Alameda Point (including IR Site 35) is not currently used for drinking water, irrigation, or industrial supply. Drinking water is supplied to Alameda Point by the EBMUD. The U.S. EPA and California State Water Resources Control Board (SWRCB) have developed classification categories for groundwater to describe potential use. "U.S. EPA classifies groundwater in one of three categories (Class I, II, or III) based on ecological importance, replaceability, and vulnerability considerations. Class I groundwater is irreplaceable groundwater that is currently used by a substantial population, or groundwater that supports a vital habitat. Groundwater that is currently being used or that might be used as a source of drinking water in the future is considered to be Class II. Groundwater that cannot be used for drinking water due to insufficient quality (e.g., high salinity or widespread, naturally occurring contamination) or quantity is considered to be Class III. U.S. EPA guidelines define Class III groundwater as groundwater with TDS concentrations above 10,000 milligrams per liter (mg/L) and a yield of less than 150 gallons per day (U.S. EPA 1986). Class III groundwater can also be classified on the basis of economic or technological treatability tests as well as on quality or quantity (only one set of criteria is needed, not both). "The California SWRCB Source of Drinking Water Policy Resolution (Res.) 88-63 (SWRCB 1988) defines sources of drinking water and states exemption

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 11 (continued).	**Response to Specific Comment 11 (continued).** criteria as groundwater with TDS concentrations above 3,000 mg/L and with a sustainable yield of less than 200 gallons per day. "Beneficial groundwater use at Alameda Point was evaluated in the final Determination of the Beneficial Uses of Groundwater Report, prepared in 2000 (TtEMI 2000a). No Class I groundwater was identified at Alameda Point. Most of the FWBZ at Alameda Point was considered to be Class II groundwater and a potential, although unlikely, source of drinking water. The SWBZ at Alameda Point was considered a Class III aquifer because TDS concentrations exceed 10,000 mg/L. Additionally, shallow groundwater near shorelines at Alameda Point typically contained TDS at concentrations greater than 10,000 mg/L. "IR Site 35 is within the central and southeastern regions of Alameda Point and based on the beneficial use report, groundwater in the FWBZ is considered Class II groundwater. However, the beneficial use evaluation also states that for purposes of CERCLA cleanup decisions, FWBZ groundwater in the central region of Alameda Point, where the majority of the IR Site 35 study areas are located, is unlikely to be used as a potential drinking water source, when considering the following factors (TtEMI 2000a): • safe yield and maximum pumping rates that are inadequate to support common uses of water as well as multiple domestic users • existing saltwater intrusion at the base of the FWBZ that would be accelerated by groundwater extraction • absence of supply wells currently within or downgradient of contaminated groundwater • state and county limitations that exist on well construction because of a thin, vulnerable aquifer

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 11 (continued).	**Response to Specific Comment 11 (continued).** "Additionally, the BCT has concurred with cleanup levels above MCLs in some areas of the central region of Alameda Point on the condition that any contaminated groundwater beneath IR sites (IR Sites 5, 6, 7, 8, 10, 12, and 25 are specifically mentioned in the beneficial use report) is remediated to levels such that the threats posed by such exposures as inhalation (groundwater vapors into buildings), dermal contact, and those associated with irrigation use are eliminated, and any significant ongoing degradation of the groundwater from contaminant migration is prevented. "The SWRCB currently classifies groundwater beneath Alameda Point as potentially suitable for municipal or domestic supply. However, in a letter dated July 21, 2003, the Navy received concurrence from the SWRCB that groundwater in the FWBZ and SWBZ west of Saratoga Street at Alameda Point meets the exemption criteria in the SWRCB Res. 88-63 (SWRCB 1988) and California Regional Water Quality Control Board Res. 89-39 (RWQCB 2003). Hence, groundwater west of Saratoga Street is not considered a potential drinking water source for purposes of CERCLA cleanup decisions. AOCs 1, 2, 18, 20, and 21; EBS Parcel 205; AST 039; and portions of AOCs 3 and 17 are located west of Saratoga Street. "Two study areas at IR Site 35, AOC 25 and the southern portion of AOC 23 (i.e., EBS Parcels 125 and 126), are located in the southeastern groundwater region of Alameda Point, as identified in the beneficial use report (TtEMI 2000a). The southeastern region is considered a potential drinking water source (Class II groundwater) for CERCLA cleanup decisions, with off-base wells located within 1 mile of Alameda Point. "While it is considered unlikely that groundwater beneath IR Site 35 would be used as a drinking water source, inland groundwater east of Saratoga Street

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 11 (continued).	**Response to Specific Comment 11 (continued).** (currently Class II groundwater) may be considered a potential drinking water source for CERCLA decision-making purposes unless saltwater intrusion and/or low yield make development of a sustainable water supply infeasible. TDS data and observations of groundwater yield (described in the following paragraphs) suggest that some inland areas within IR Site 35 east of Saratoga Street may meet Class III criteria; however, groundwater in inland areas east of Saratoga Street is assumed for the purposes of this RI/FS Report to exhibit Class II characteristics and qualify as a potential drinking water source for CERCLA decision-making purposes. This is discussed in Section 8.3.2.2, as it pertains to groundwater ARARs."
Specific Comment 12. **Page 2-12, Section 2.7** **Second paragraph** – Please clarify when the regulators agreed that groundwater below sites 5, 6, 7, 8, 10, 12, and 25 is unlikely to be a potential drinking water source? I have no record of the Water Board providing formal exemption for these sites?	**Response to Specific Comment 12.** This information is stated in the final Determination of the Beneficial Uses of Groundwater Report prepared for Alameda Point in 2000 and in Navy responses dated July 13, 2000, to U.S. EPA comments on the final draft version of this report. In a letter dated January 3, 2000, to the Navy, U.S. EPA clarified the conditions under which the groundwater underlying the central region (specifically mentioning these sites) would be an unlikely, though possible, source of drinking water. In this letter, U.S. EPA states that it considers groundwater beneath the central region of Alameda Point as a Class II aquifer. It further states that the NCP preamble allows site-specific factors to be acknowledged in order to determine whether all or part of the aquifer should be considered a potential drinking water source for making CERCLA cleanup decisions. The Water Board participated in BCT discussions and in the regulatory review process to finalize this document.

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 13. **Page 2-12, Section 2.7** **4th Paragraph** –The text mentions that the Water Board proposed (proposed changes to Basin Plan 4/10/00) to de-designate the MUN designation for shallow bay-front groundwater in the fill layer. As this de-designation process was not completed and is inactive, this information is no longer pertinent? Please delete this paragraph.	**Response to Specific Comment 13.** The paragraph has been deleted.
Specific Comment 14. **Page 2-13, Section 2.7** **Third Paragraph** – Please be cautious when reporting average TDS data across sites, especially when the range between max and min is great, when few data are available, or when portions of the site have groundwater wells that may be tidally influenced. Please include the range of TDS values when discussing average TDS values, and mention if any wells associated with average TDS values may be tidally influenced.	**Response to Specific Comment 14.** The comment has been acknowledged and information has been added to the text to provide ranges of TDS values. A discussion of continuous water-level studies that assesses tidal influence is in Section 2.4, Surface Water Drainage and Tides, presented in the main RI/FS report. This section presents the results of three continuous water-level studies performed at IR Sites 26, 27, and 28. Results of the studies are variable due to changes in site lithology and physical, manmade barriers; however, the studies conclude that shoreline monitoring wells (located within 30 feet of the coast) had up to 2.9 feet of tidal influence. Tidal influence in wells located 200 feet from the shoreline decreased significantly, to approximately 0.04 feet. With the exception of the northern portion of AOC 4, and possibly EBS Parcel 205 and the southernmost portion of AOC 23, IR Site 35 is expected to experience minimal tidal influence. Page 2-14, Section 2.7, four paragraphs have been revised as follows: "Several trends are noted when the average TDS concentrations are viewed spatially by study area across the site. Because of the wide ranges of TDS detected across individual AOCs, averages are used to outline the general trends of TDS

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Specific Comment 14 (continued).	**Response to Specific Comment 14 (continued).** concentrations at IR Site 35. Ranges and averages for TDS values are presented in Table 2-3. Higher average concentrations of TDS (i.e., above 8,000 mg/L; range of approximately 3,000 to 18,000 mg/L) exist at AOCs 2 and 5 in the northern portion of the site near Oakland Inner Harbor. Higher average concentrations (i.e., above 6,000 mg/L; range of approximately 400 to 20,000 mg/L) also exist in the southeastern portion of the site at AOC 25 and near ASTs 173A, 173B, and 173C. AOC 23 covers a relatively large area and its many wells show a wide range of TDS concentrations. Moderate average TDS concentrations (i.e., average between 1,000 and 5,000 mg/L; range of approximately 400 to 22,000 mg/L) exist in AOC 23 and in the central and western portions of the site, including AOCs 1, 9, 11, 17, and 24; ASTs 152 and 392; OWS 017; and UST(R)-11. The lowest average TDS concentrations (i.e., below 1,000 mg/L; range of approximately 200 to 1,000 mg/L) typically exist in the southwestern portion of the site in the vicinity of AOCs 18, 20, and 21; EBS Parcel 205; and AST 039. AST 016, located in the central portion of the site, also had low TDS concentrations."
Specific Comment 15. **Page 2-14, Section 2.7** **Second Paragraph** - Regardless of arguments presented in this paragraph, the groundwater below most of Site 35 does not meet the criteria specified in State Board Resolution 88-63 that would allow for exemption of drinking water consideration. Please revise.	**Response to Specific Comment 15.** The following sentence has been added to the end of the last paragraph in Section 2.7 for clarification: "However, as discussed above, groundwater in inland areas east of Saratoga Street is assumed for the purposes of the RI/FS Report to exhibit Class II characteristics with sufficient yield to qualify as a potential drinking water source for CERCLA decision-making purposes."

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 16. **Page 3-8, Section 3.5** **First Bullet under 'Soil':** This is the first, and only, mention of which constituents are included in the B(a)P equivalent concentration screening level. Please include this information when the concept is first discussed in the text.	**Response to Specific Comment 16.** The first bullet on page ES-4 has been modified to refer to DON 2001a and Cal/EPA 2006 and to list the eight PAHs classified as carcinogenic. The second sentence in the last bullet in Section 1.4.4 has been revised to read as follows: "PAH Areas were identified as those areas with PAHs at residual benzo(a)pyrene (B[a]P) equivalent concentrations above the Alameda Point screening level of 620 micrograms per kilogram (µg/kg) (DON 2001a, Cal/EPA 2006) for eight PAHs classified as carcinogenic: benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, B(a)P, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and naphthalene. PAH Areas also include those areas with TPH concentrations above environmental screening level (ESLs) (RWQCB 2005)."
Specific Comment 17. **Page 4-2, Section 4.1.2** **First Paragraph** - How significant are the "positive interferences" associated with EPA method 8015-M? Are they significant? Regardless, was this data still used in the report? Please elaborate.	**Response to Specific Comment 17.** Positive interferences associated with U.S. EPA Method 8015M are described in a Water Board memorandum dated February 16, 1999; these interferences can result in substantially higher reported TPH concentrations than are actually present. This memorandum describes sample preparation methods that can help reduce these biases, such as silica gel cleanup. Silica gel cleanup was performed by the laboratory for all RI samples. Samples analyzed for TPH in previous investigations were not subject to silica gel cleanup; results of these samples may overstate actual TPH concentrations. Nevertheless, the RI uses all TPH data collected during the RI and previous investigations.
Specific Comment 18. **Page 4-2, Section 4.1.2** **Total Petroleum Hydrocarbons** - Please explain how AOCs with TPH levels exceeding PSCs will be addressed in/transferred to the TPH program. Discuss if any of the areas with exceedances are within Corrective Action	**Response to Specific Comment 18.** TPH levels have been compared to ESLs. If there are exceedances, the basewide TPH strategy will be applied (DON 2001a). Soil and/or groundwater samples with reported TPH concentrations above PSCs were collected within CAAs at AOC 21, AOC 23, and EBS Parcel 205. Additionally, TPH concentrations in soil

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Specific Comment 18 (continued). Areas. Briefly discuss how areas with TPH issues that are not in current CAAs will be addressed in the TPH program. Also discuss in section 4.2.2 and any other applicable section.	**Response to Specific Comment 18 (continued).** and groundwater in the northern portion of AOC 25 are in close proximity to CAA-3C, TPH concentrations in soil in the eastern portion of AOC 23 are near CAA-3A, and TPH concentrations in groundwater at AOC 20 are near CAA-B. The text in Section 4.1.2 describing TPH concentrations in soil at AOCs 21 and 25, and Section 4.2.2 describing TPH concentrations in groundwater at AOCs 20 and 21 and EBS Parcel 205, already describe samples relative to CAAs. Text in Section 4 of the main RI/FS Report and Attachment R has been revised to mention result locations relative to CAAs for the other study areas. Section 7 describes recommendations related to TPH for each applicable study area; recommendations regarding TPH have been clarified in the main RI/FS Report and the attachment for AOC 17. The following text has been added to the end of the paragraph discussing AOC 23 in Section 4.1.2: "Two samples with reported TPH concentrations above PSCs (071-0002 collected at 3 to 3.5 feet bgs and 071M-004M collected at 7.5 to 8.5 feet bgs) are within CAA-B. Soil associated with these samples was likely removed during subsequent fuel pipeline closure activities for CAA-B. No visual signs of hydrocarbon impacts were observed in the pipeline backfill during RI drilling of boring A023SB05, located adjacent to previous boring 071M-004M." The following text has been added to the end of the paragraph discussing AOC 23 in Section 4.2.2: "Two samples with reported TPH concentrations above PSCs (071M-011 and 071M-013) are within CAA-B."

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 18 (continued).	**Response to Specific Comment 18 (continued).** The second paragraph of Section 4.4.1 has been revised as follows: "Significant exceedances of TPH in soil at AOCs 21 and 23 and ASTs 173A, 173B, and 173C are referred to the TPH Program for review. Locations at AOCs 21 and 23 that are within CAA-B should be assessed under the TPH Program with CAA-B. Additionally, TPH exceedances in the eastern portion of AOC 23 should be assessed under the TPH Program with adjacent CAA-3A, and those in the northern portion of AOC 25 should be assessed under the TPH Program with adjacent CAA-3C. Other exceedances at AOC 17, the southern portion of AOC 25, EBS Parcels 78 and 79, and UST(R)-11 are not considered significant due to their low concentrations, the apparent weathered condition of the TPH, the use of older and less accurate analytical methods, and/or insignificant impact to groundwater." The second paragraph on page 4-27 of Section 4.4.2 has been revised as follows: "TPH was reported at concentrations above PSCs in groundwater at AOCs 20, 21, and 23, EBS Parcel 205, and ASTs 173A, 173B, and 173C, which are referred to the TPH Program for review. Locations at AOCs 20, 21, and 23, and EBS Parcel 205 that are near or within CAA-B should be assessed under the TPH Program with CAA-B. Additionally, TPH exceedances in the northern portion of AOC 25 should be assessed under the TPH Program with CAA-3C. Other exceedances at AOC 24, the southern portion of AOC 25, and SWMUs AST 152 and UST(R)-11 are not considered significant due to their low concentrations, limited extent in groundwater."

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Specific Comment 18 (continued).	**Response to Specific Comment 18 (continued).** The first bullet in Section 7.2.8 of the main report and Section 7.2 of Attachment K (AOC 11/EBS Parcels 78 and 79) has been revised as follows: "Diesel-range TPH in soil above the PSC appears to be limited in extent laterally and is defined vertically. Additionally, it is not providing a significant, if any, source of soluble constituents to groundwater." In Section 4.1.4 of Attachment R (AOC 23), the following text has been added to the end of the first bullet under motor oil–range TPH: "This sample is located within CAA-B. Soil associated with this sample was likely removed during subsequent fuel pipeline closure activities for CAA-B." In Section 4.1.4 of Attachment R, the following text has been added to the end of the first bullet under gasoline-range TPH: "Sample 071M-004M is located within CAA-B. Soil associated with this sample was likely removed during subsequent fuel pipeline closure activities for CAA-B." In Section 4.2.4 of Attachment R, the following text has been added to the end of the first bullet under motor oil–range TPH: "These samples are located within CAA-B." New reference: DON 2001. Letter regarding Preliminary Remediation Criteria and Closure Strategy for Petroleum-Contaminated Sites at Alameda Point, Alameda, CA. May 16.

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SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 19. **Page 4-6, Section 4.1.5** **Second Paragraph** - The PSC for lead (23,000 mg/kg) is significantly higher than the ESLs for lead (150 - 750 mg/kg). Please include rationale for using PRGs instead of ESLs when some ESLs are more protective.	**Response to Specific Comment 19.** Please see Response to General Comment 1 for the rationale for using PRGs instead of ESLs. The PSCs for metals are shown on Table 4-7, Metals in Soil Exceeding Preliminary Screening Criteria. The PSC for iron is 23,000 mg/kg and the PSC for lead is 150 mg/kg.
Specific Comment 20. **Page 4-9, Section 4.2.1** **Top of page** - Information presented here seems to suggests that the extent of naphthalene in groundwater may be limited in the down-gradient direction while the full extent is not fully defined, due to lack of up-gradient information. Please include some justification for why the naphthalene plume was not fully characterized.	**Response to Specific Comment 20.** As noted in the final Work Plan for IR Site 35, three groundwater samples were collected from the study area at the locations of the former OWSs. Prior to the RI sampling, naphthalene had not been identified in groundwater at AOC 1; therefore, the RI sampling program was not designed to fully define naphthalene in groundwater. AOC 1 is one of the study areas carried forward to the FS. For alternatives other than no action, the FS includes an investigation phase to fully define the extent of naphthalene in groundwater in the design phase, prior to implementation of the remedial action.
Specific Comment 21. **Page 4-11, Section 4.2.5** **First Paragraph** - We question whether sufficient data has been collected for the statistical justification deciding that high metal concentrations are "naturally occurring", and concur with DTSC and EPA comments regarding metals above background levels. See comment for Section 4.3 below.	**Response to Specific Comment 21.** Sufficient data are available to statistically justify the conclusion that the high metals concentrations at IR Site 35 are naturally occurring. The IR Site 35 metals data set is several times larger than the Alameda Point pink background data set. As discussed in a DTSC policy (DTSC 1997), data from a single site can be used to evaluate the likelihood that the concentrations represent a release or ambient conditions. As agreed upon during the conference call between the Navy and agencies held December 6, 2006, the draft final RI/FS Report has been revised to include additional statistical analyses for iron, manganese, vanadium, and arsenic on a sitewide basis. The discussion of metals present at ambient concentrations focuses

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Specific Comment 21 (continued).	**Response to Specific Comment 21 (continued).** on the correlation analysis, which shows that metals that typically occur together in natural rock (e.g., aluminum, arsenic, cobalt, copper, iron, and manganese) are significantly correlated in IR Site 35 soil. Metal outliers that may not be naturally occurring are discussed for individual study areas in Section 4.3.3.
Specific Comment 22. **Page 4-13, Section 4.2.5** **Top paragraph** - Discuss rationale for developing assumption that the observed Nickel is above background levels if Nickel was not included in the background assessment?	**Response to Specific Comment 22.** The former Section 4.2.5, does not present an assumption that observed nickel in groundwater is above background levels. It states that nickel was present in an EBS groundwater sample collected at AOC 17 at a concentration above the PSC. It also states that there is no background concentration for nickel. This sentence has been revised in new Section 4.3.3.8 to state that there is no background concentration for nickel in groundwater. There is, however, an Alameda Point background concentration for nickel in soil (Table 3-10). Review of the data indicates that it is likely that the EBS groundwater samples were not filtered and contained some soil particles, as the concentrations reported in the EBS groundwater samples were not confirmed by the results of the RI sample for dissolved metals (Table 4-4 of Attachment N).
Specific Comment 23. **Section 4.3** **General** - The Navy's arguments for why they consider high metal concentrations found throughout Site 35 to be naturally occurring, as detailed in Section 4.3, seems limiting and ignores numerous significantly elevated concentrations of metals found throughout the site. With many of the "background" levels already far exceeding ESL/PRCs, to propose to accept even "higher background" levels site Site 35 in this report seems inappropriate,	**Response to Specific Comment 23.** As noted in the Response to Specific Comment 21, iron and manganese are the predominant metals with concentrations above background in soil and groundwater and with noncancer hazard values above the target level of 1. The presence of several concentrations above the 95th percentile in the Alameda Point pink background data set distributed randomly (vertically and horizontally) across the site also supports that these metals are present at ambient concentrations. New Figure 4-6, Concentrations of Arsenic, Iron, Manganese, and Vanadium in Soil Above

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Specific Comment 23 (continued). especially considering the potential risks associated with unrestricted use on areas with metals at the upper limit of the "background" levels.	**Response to Specific Comment 23 (continued).** Background, and revised text has been included in Section 4.3.1, Sitewide Metals in Soil, of the draft final RI/FS Report to support that the majority of concentrations of iron and manganese are present at ambient concentrations and not the result of Navy activities. The following has been added to the end of Section 3.5 for clarification: "The presence of metals at concentrations above ESLs and PRGs does not necessarily indicate a health concern. ESLs and PRGs are screening levels. The results of the HHRA along with other factors are used to make risk management decisions. "According to Navy policy (NFEC 1998, 2002a), the Navy does not conduct remedial actions on sites to address the presence of metals at concentrations below background. This concept is supported by U.S. EPA (2002a)." The following new references have been added to Section 12: Naval Facilities Engineering Command. 1998. Procedural Guidance for Statically Analyzing Environmental Background Data. September. _____. 2002. Guidance for Environmental Background Analysis, Volume 1: Soil. April. United States Environmental Protection Agency. 2002a. Memorandum – Role of Background in the CERCLA Cleanup Program, OSWER 9285.6-07P. May.
Specific Comment 24. **Page 4-14, Section 4.3.1** **Third Paragraph, First Sentence** - This sentence references (PRC 1997), however, there is no entry in the References section for PRC 1997. Please correct the reference in the text or the References section.	**Response to Specific Comment 24.** The following reference has been added to Section 12: PRC Environmental Management, Inc. 1997. Samples for Use as Background, Naval Air Station Alameda, Alameda, California. Consultant's Report to the United States Department of the Navy. CLEAN Contract Number N62474-88-D-5086, Contract Task Order 0316. February 7.

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Specific Comment 25. **Page 4-15, Section 4.3.1** **Last bullet item ("for most metals...")** - Widespread distribution could result from activities that could have sprayed pollutants, or emitted them gaseously or via fine dust particles.	**Response to Specific Comment 25.** It is correct that this mechanism could result in widespread distribution. However, it is unlikely that the distribution would have covered the extent of IR Site 35 to depths of 4 feet bgs and greater.
Specific Comment 26. **Page 4-21 thru 4-24, Section 4.3.2.2** **For each metal summary** - It would also be useful to include the number of samples that were above ESLs/PSCs. This is important information and should not be left out.	**Response to Specific Comment 26.** The number of samples above the ESLs/PSCs was included in Table 4-1 in each attachment. This information has also been added, as needed, to the appropriate portion of Section 4 in the main text.
Specific Comment 27. **Page 4-27, Section 4.4.2** **Last paragraph** - Even considering supporting text, the argument that all the metals detected throughout site 35, except for some Lead at a couple sites, are "naturally occurring" is tenuous. Furthermore, the high levels detected suggest significant risk is associated with most uses of this site. Some discussion about how future beneficial uses will be protected, and the risks to human and aquatic receptors is warranted.	**Response to Specific Comment 27.** The general comment that all metals are naturally occurring has been deleted. See the Response to Specific Comment 23 for a discussion of additional evidence for ambient levels of metals that has been presented in Section 4.3 of the draft final RI/FS Report. The presence of concentrations above PSCs does not suggest that there is a significant risk. As explained in Response to Specific Comment 6, the results of the risk assessment are considered along with other factors to determine if action is needed to protect human health or aquatic receptors. Per the final RI Work Plan, groundwater concentrations at sites adjacent to or near surface-water bodies were compared to criteria for protection of aquatic receptors. Results of these comparisons are summarized in Table 4-11 of the draft RI/FS Report. Metals and TPH were the only chemicals reported above aquatic ecological PSCs. TPH concentrations above surface water TPH ESLs in one sample at AOC 20 and one sample in the southern portion of AOC 23 were referred to the TPH Program for review, per the basewide TPH strategy (DON 2001).

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Specific Comment 27 (continued).	**Response to Specific Comment 27 (continued).** At AOC 4, mercury was reported in one of three samples at a concentration slightly above the laboratory detection limit of 0.1 µg/L from a well approximately 400 feet from the shoreline. Soil results from the well boring did not indicate a mercury source (concentrations are below the Alameda Point 95th percentile), and it is considered unlikely that such an extremely low level of mercury (an estimated concentration of 0.14 µg/L) would migrate 400 feet in groundwater and result in a surface water concentration above the PSC. Zinc was reported at a concentration above the aquatic ecological PSC in only one of three samples collected from the same well at AOC 4. Soil results from the well boring also did not indicate a zinc source (concentrations are below the Alameda Point 95th percentile), and the groundwater concentrations were not consistently above the aquatic ecological PSC. Arsenic was reported at concentrations above the surface water PSC for human consumption of fish in a total of seven samples from AOCs 2, 4, 20, 23, and EBS Parcel 205; these concentrations were below the Alameda Point background 95th percentile. Vinyl chloride was reported at a concentration slightly above the surface water PSC for human consumption of fish from one soil sample in the southern portion of AOC 23, but it is considered unlikely that this slight exceedance (2.7 µg/L compared to the PSC of 2.4 µg/L) would migrate 150 feet in groundwater and result in a surface water concentration above the PSC.

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Specific Comment 28. **Page 4-27, Section 4.4.2** **Top paragraph** - MTBE is an important exception to the statement that "Generally, petroleum hydrocarbons that are most mobile in the environment are also readily degraded". Because this section discusses the environmental fate of petroleum hydrocarbons in general, please include a sentence describing the environmental fate characteristics of MTBE.	**Response to Specific Comment 28.** MTBE was not included in the discussion of environmental fate because it was not identified as a contaminant at IR Site 35. It was reported in only 4 of 170 samples at concentrations from 0.24 J to 0.31 J µg/L, which are well below the MCL of 13 µg/L.
Specific Comment 29. **Sections 6.3 & 6.4** **General** - Please also provide the risk including metals in all the AOC subsections to 6.3 and 6.4	**Response to Specific Comment 29.** The following information has been incorporated into subsections in Sections 6.3 and 6.4: Section 6.3.1: For AOC 2, total cancer risks and noncancer hazards including metals below background are as follows: • Exposure Group 1: 2×10^{-3} and 7, respectively • Exposure Group 2: 2×10^{-4} and 3, respectively • Exposure Group 3: 2×10^{-3} and 4, respectively Section 6.3.2: For AOC 4, total cancer risks and noncancer hazards including metals below background are as follows: • Exposure Group 1: 2×10^{-3} and 5, respectively • Exposure Group 2: 9×10^{-5} and 2, respectively • Exposure Group 3: 2×10^{-3} and 3, respectively Section 6.3.3: For AOC 5, total cancer risks and noncancer hazards including metals below background are as follows: • Exposure Group 1: 5×10^{-3} and 12, respectively

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Specific Comment 29 (continued).	**Response to Specific Comment 29 (continued).** • Exposure Group 2: 1×10^{-4} and 6, respectively • Exposure Group 3: 4×10^{-3} and 6, respectively Section 6.3.4: *No additional text is needed.* Section 6.3.5: For AOC 7, total cancer risk including metals below background is 9×10^{-5} for Exposure Group 2. The hazard index was not calculated. Section 6.3.6: *No additional text is needed.* Section 6.3.7: For AOC 9, total cancer risk and noncancer hazard index including metals below background are 9×10^{-5} and less than 1, respectively, for Exposure Group 2. Section 6.3.8: For AOC 13, total cancer risk and noncancer hazard index including metals below background is 1×10^{-4} and less than 1, respectively, for Exposure Group 2. Section 6.3.9: For AOC 17, total cancer risks and noncancer hazards including metals below background are as follows: • Exposure Group 1: 2×10^{-3} and 16, respectively • Exposure Group 2: 7×10^{-5} and 3, respectively • Exposure Group 3: 2×10^{-3} and 13, respectively Section 6.3.10: For AOC 18, total cancer risks and noncancer hazards including metals below background are as follows: • Exposure Group 1: 8×10^{-5} and 1, respectively • Exposure Group 2: 4×10^{-5} and less than 1, respectively • Exposure Group 3: 4×10^{-5} and less than 1, respectively

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Specific Comment 29 (continued).	**Response to Specific Comment 29 (continued).** Section 6.3.11: For AOC 20, total cancer risks and noncancer hazards including metals below background are as follows: • Exposure Group 1: 4×10^{-3} and 2, respectively • Exposure Group 2: 4×10^{-5} and 1, respectively • Exposure Group 3: 4×10^{-3} and less than 1, respectively Section 6.3.12: For AOC 21, total cancer risks and noncancer hazards are as follows: • Exposure Group 1: 1×10^{-6} and less than 1, respectively • Exposure Group 2: 2×10^{-8} and less than 1, respectively • Exposure Group 3: 1×10^{-6} and less than 1, respectively Section 6.3.13: For AOC 24, total cancer risks and noncancer hazards including metals below background are as follows: • Exposure Group 1: 9×10^{-4} and 11, respectively • Exposure Group 2: 2×10^{-4} and 4, respectively • Exposure Group 3: 7×10^{-4} and 7, respectively Section 6.3.14: For AOC 25, total cancer risks and noncancer hazards including metals below background are as follows: • Exposure Group 1: 3×10^{-3} and 35, respectively • Exposure Group 2: 2×10^{-4} and 6, respectively • Exposure Group 3: 3×10^{-3} and 29, respectively Section 6.4.1: Soil samples were not analyzed for metals, in accordance with the Work Plan (BEI 2006).

Comments from RWQCB, E. Simon, 11/3/2006

SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 29 (continued).	**Response to Specific Comment 29 (continued).** Section 6.4.2: *No additional text is needed.* Section 6.4.3: For AOC 11/EBS Parcels 78-79, the U.S. EPA and Cal/EPA total cancer risks including metals below background are as follows: • Exposure Group 1: 3×10^{-3} and 8×10^{-3}, respectively • Exposure Group 2: 2×10^{-5} and 8×10^{-5}, respectively • Exposure Group 3: 3×10^{-3} and 8×10^{-3}, respectively The noncancer hazard values including metals below background are as follows: • Exposure Group 1: 233 • Exposure Group 2: 2 • Exposure Group 3: 231 Section 6.4.4: For AOC 23, the U.S. EPA and Cal/EPA total cancer risks including metals below background are as follows: • Exposure Group 1: 2×10^{-2} and 3×10^{-2}, respectively • Exposure Group 2: 3×10^{-5} and 2×10^{-4}, respectively • Exposure Group 3: 2×10^{-2} and 3×10^{-2}, respectively The noncancer hazard values including metals below background are as follows: • Exposure Group 1: 408 • Exposure Group 2: 3 • Exposure Group 3: 405 Section 6.4.5: For EBS Parcel 205, the U.S. EPA and Cal/EPA total cancer risks including metals below background are as follows: • Exposure Group 1: 4×10^{-4} and 2×10^{-3}, respectively

Comments from RWQCB, E. Simon, 11/3/2006

SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 29 (continued).	**Response to Specific Comment 29 (continued).** • Exposure Group 2: 4×10^{-5} and 1×10^{-4}, respectively • Exposure Group 3: 3×10^{-4} and 2×10^{-3}, respectively The noncancer hazard values including metals below background are as follows: • Exposure Group 1: 6 • Exposure Group 2: at or less than 1 • Exposure Group 3: 4
Specific Comment 30. **Figure 4-5** Why are only metals above PSCs and "background" presented for groundwater? What "background" is referenced here? The Alameda Background, or the elevated "background" as discussed in Section 4.3?	**Response to Specific Comment 30.** Discussions of metals above Alameda Point pink soil and groundwater background data sets have been added to the Executive Summary and Section 4 of the main RI/FS Report. The "background" referenced on Figure 4-5 is the Alameda Point background 95th percentile for the pink soil and groundwater data set. This has been clarified on Figure 4-5. Metals above PSCs and background presented on Figure 4-5 were used in assessing the nature and extent of metals contamination at IR Site 35 and to calculate the risk without metals below background. There is also a calculation of the total risk for the human-health risk evaluations that includes all chemicals (except metals considered essential nutrients) reported above detection limits in any sample including metals at concentrations below background. PSCs were not used to eliminate chemicals from the risk assessment. An "elevated" background concentration was not developed for IR Site 35 in the RI/FS Report. Section 4.3 describes why metals (most notably, iron and manganese) concentrations above the Alameda Point background data set are believed to represent naturally occurring concentrations rather than Navy releases.

RESPONSE TO COMMENTS* ON
DRAFT REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT, IR SITE 35,
AREAS OF CONCERN IN TRANSFER PARCEL EDC-5
ALAMEDA POINT, ALAMEDA, CALIFORNIA
DATED JULY 2006
CTO-0077

Comments from RWQCB, E. Simon, 11/3/2006

SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 30 (continued).	**Response to Specific Comment 30 (continued).** Section 4.3 has been revised. See Response to Specific Comments 21 and 23 about revisions to provide additional evidence that several metals are present at ambient concentrations and do not represent releases from Navy activities.
Specific Comment 31. **Figures 11-4 & 11-5** Why is B(a)P equivalent concentration of 1,000 µg/kg used instead of 620ug/kg? Also on Page ES-10.	**Response to Specific Comment 31.** Please refer to Response to Specific Comment 5. Figures 11-4 and 11-5 support FS alternatives for residual PAHs in soil. The PRG for PAHs identified in Section 8 is 1,000 µg/kg B(a)P equivalent.
Specific Comment 32. **Figure 11-9** Seems like more samples should be taken to more fully characterize the VC plume. How can the plume be defined and injection points be situated with so few previous sampling locations. Only one sampling location was reported for the site south of Building 66, none further downgradient.	**Response to Specific Comment 32.** As stated in Section 11.6, except for the no action alternative, the two active groundwater remedial alternatives considered for AOC 23 would include an initial groundwater investigation to refine the extent of vinyl chloride in groundwater. The initial investigation would include the collection of grab groundwater samples from 20 proposed soil borings. Analytical results reported for these samples would then be used to refine the configurations of the vinyl chloride plumes and to determine the final locations of the proposed new monitoring wells in AOC 23. Figure 11-9 shows only 19 of the 20 proposed/illustrative boring locations. This figure was revised by adding another downgradient location south of Building 66 near the northern end of Building 113. The number and locations of sampling points for AOC 23 should be considered preliminary and subject to refinement based upon a review of available information during the remedial design stage. Additional sampling is currently planned for adjacent IR Site 21. This includes groundwater sampling as part of a post-RI data gap sampling effort. Data collected as part of this sampling effort could be used in the remedial design stage for AOC 23.

RESPONSE TO COMMENTS* ON
DRAFT REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT, IR SITE 35,
AREAS OF CONCERN IN TRANSFER PARCEL EDC-5
ALAMEDA POINT, ALAMEDA, CALIFORNIA
DATED JULY 2006
CTO-0077

Comments from RWQCB, E. Simon, 11/3/2006

SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 32 (continued).	**Response to Specific Comment 32 (continued).** Groundwater sampling data from the proposed new boring locations and wells, along with the results of the samples already collected during previous investigations, are believed to be sufficient to refine the extent of the vinyl chloride plumes and to conduct an FS. No change has been made to the number of proposed borings at this time. During the remedial design phase, a review of information available at that time would be performed.
Specific Comment 33. **Table 3-6** The PRGs for Benz(a)anthracene through Benzo(a)pyrene range from 62 to 6,200 µg/kg, where as the B(a)P equivalent concentration screening criteria mentioned throughout the text is 620 µg/kg. Presenting this information without further explanation is confusing.	**Response to Specific Comment 33.** Table 3-6 has been changed to replace the federal and California-modified PRGs for the eight carcinogenic PAHs, benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, B(a)P, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, naphthalene, with footnote "c". This footnote "c" has been revised to read, "The Alameda Point benzo(a)pyrene equivalent concentration screening level of 620 µg/kg is used for the eight PAHs classified as carcinogenic, instead of an individual PRG for each PAH."
Specific Comment 34. **Table 4-10** **Metals in GW Exceeding PSCs -** There is no indication of the number of samples tested or the number of samples above PSCs at each study area. Is the concentration presented the maximum detected at the site, or something else? Please include more specifics here. Also, it would be helpful to include a table showing metals above background levels as well.	**Response to Specific Comment 34.** The number of samples analyzed for each chemical and the number of samples above the PSC at each study area are included in Table 4-2 of the attachments to the main report, for study areas where groundwater samples were collected. Table 4-17 lists the total number of groundwater samples analyzed for each metal at IR Site 35, the maximum reported concentration of each metal, the number of reported concentrations above the Alameda Point 95th percentile, and the study area and sampling location where the maximum reported concentration was collected.

RESPONSE TO COMMENTS* ON
DRAFT REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT, IR SITE 35,
AREAS OF CONCERN IN TRANSFER PARCEL EDC-5
ALAMEDA POINT, ALAMEDA, CALIFORNIA
DATED JULY 2006
CTO-0077

Comments from RWQCB, E. Simon, 11/3/2006

SPECIFIC COMMENTS	RESPONSE TO SPECIFIC COMMENTS
Specific Comment 34 (continued).	**Response to Specific Comment 34 (continued).** Table 4-11 includes a list of all reported metals concentrations above the PSCs and the location and depth where the samples were collected. Only the metals with a concentration above the PSC are included in Table 4-11. Other metals reported in the groundwater samples are included in the tables in Section 4 of the attachment for each study area. However, text has been added to Section 4.3 of the draft final RI/FS Report that discusses the number of samples with concentrations of metals in soil and groundwater that are above background.
Specific Comment 35. **Table K-2-2** **Page 1 and 2 -** The Water Board considers SWRCB Resolutions 68-16 and 92-49 ARARs. Please clearly present this information in this table.	**Response to Specific Comment 35.** The following sentence has been added at the end of the second paragraph under the heading State Water Resources Control Board Res. 92-49 and 68-16 and in the comments to Table K2-2: "The RWQCB considers Res. 92-49 and 68-16 to be ARARs."

Note:
* These responses identify changes to the subject document text, tables, and/or figures. The specific wording that appears in the document may differ slightly from that presented in these responses to comments. The edited version of the document was reviewed by Bechtel Environmental, Inc., to ensure that there are no substantive differences that would warrant further Navy and/or agency review and concurrence.

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APPENDIX N

MEMORANDUM OF AGREEMENT BETWEEN THE UNITED STATES DEPARTMENT OF THE NAVY AND THE CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

Memorandum of Agreement Between
The United States Department of the Navy and
The California Department of Toxic Substances Control

Use of Model "Covenant to Restrict Use of Property" at Installations Being Closed and Transferred by the United States Department of the Navy

1. Background

   a. The purpose of this Memorandum of Agreement (MOA) is to formalize the use of two model environmental restriction covenants (attached) that have been drafted during negotiations between representatives of the United States Department of the Navy (DON) and the California Department of Toxic Substances Control (DTSC).

   b. Under CERCLA Sec. 104, as delegated to DON by E.O. 12580, and implemented pursuant to the National Contingency Plan (NCP – 40 CFR Sec. 300 et seq.) and 10 USC Sec. 2701, et seq., the cleanup of hazardous substances, pollutants and contaminants is required to be at a level that protects human health and the environment. As a result, this protection can be achieved at certain sites by the imposition of "institutional controls" (i.e., ICs – legal mechanisms to protect human health and the environment by restricting access or exposure to the contaminants in question) with or without underlying "engineering controls" (i.e., ECs – engineered mechanisms such as a cap on a landfill, designed to physically insure access or exposure to the contaminants in question is prevented). Collectively these ICs and ECs are called "land use controls" (LUCs).

   c. In the case of property being closed and transferred by DON to a nonfederal entity, it is necessary to insure that these LUCs stay in place and are honored by all future owners and occupants of the property in question, for as long as contamination is present at levels that do not permit unrestricted use. One key way such LUCs can be maintained is by DON's retention of sufficient legal title and interest to insure continuing enforcement of the terms of the LUCs. This retention would entail burdening such conveyances of title with deed covenants insuring that the deed transferring such property contain a formal restriction – a restrictive covenant – on the use of the property that will "run with the land," and is enforceable against the "servient estate" (i.e., all future owners of the land) and is retained by the United States, as represented by DON, acting as holder of the "dominant estate." In addition, DON can convey a separate and similar restrictive covenant to DTSC as provided in

Section 2 below.

d. In the State of California, such a restriction on the use of land, to protect human health and the environment is recognized by Section 1471 of the California Civil Code. This statute characterizes such a restrictive covenant as an "environmental restriction" and requires such words to be placed in the title of the document creating such an interest. DON has agreed to include such restrictive language in the deeds it executes where it imposes LUCs as a remedy under applicable law.

e. Similar to CERCLA, State environmental protection laws recognize the availability of using LUCs as remedies to protect human health and the environment. Currently, DTSC's authority under Chapter 6.5 and 6.8 of Division 20 of the California Health and Safety Code, provides statutory avenues to impose LUCs at a cleanup site to insure that the LUCs are honored by future owners. Chapter 6.5 is generally used when the cleanup site in question is one subject to the State's authorities under the hazardous waste facilities law, and Chapter 6.8 is generally used when the cleanup site in question is one subject to the State's equivalent to the federal CERCLA program.

f. In the case of property being closed and transferred to a nonfederal entity by DON where a cleanup remedy has used LUCs as a remedy as described above, DON and DTSC have a mutual interest in insuring that the "environmental restriction" imposed on the land is enforced for however long the protection of public health and the environment requires such restrictions.

g. As a result, DON and DTSC agree that it is in both parties' and the public's interests, that DTSC be in a position to enforce the "environmental restrictions" that the DON will be imposing on these transferring parcels of property. To this end, in addition to retaining the power to enforce protective covenants, DON agrees to convey a separate power to enforce such restrictive covenants to DTSC equivalent to DON's power to enforce any "environmental restrictions" burdening the transferring property by entering into a "Covenant to Restrict Use of Property." Under both Chapter 6.5 and Chapter 6.8, DTSC has the authority to monitor and enforce such "environmental restrictions" conveyed to it by the owner of property on which such an "environmental restriction" has been found necessary. Therefore, in consideration of DON's conveying such an interest, DTSC may implement as appropriate the various statutory authorities it possesses under Chapter 6.5 and Chapter 6.8 (as applicable) to insure these "environmental restrictions" are honored by all future owners and occupants.

2. Terms of Understanding:

a. DON and DTSC agree that in all future property transfers to a nonfederal agency, where DON is acting on behalf of the United States as the transferring or disposing agent, the applicable model "Covenant to Restrict Use of Property" attached to this MOU will be used throughout California when the proposed remedy involves imposing an IC (except those "early transfers" where 1) the transferee will perform the cleanup, and 2) the cleanup includes an IC in the remedy, and 3) has executed an order or enforceable agreement with DTSC or has entered into a Sec. 25222.1 agreement with DTSC, that calls for the transferee entering into a "Covenant to Restrict Use of Property" directly with DTSC).

b. DON and DTSC have entered into a number of Federal Facility Agreements and Federal Site Remediation Agreements for DON property. These Agreements generally call for coordination of the DON's satisfaction of its corrective action obligations under the Resource Conservation and Recovery Act (RCRA) and Health and Safety Code section 25200.10 with its responsibilities under CERCLA section 120(l), EO 12580, the Defense Environmental Restoration Program and the NCP. The Agreements recognize that the DON may satisfy some or all of its corrective action obligations through CERCLA response actions. Where such corrective action at hazardous waste management units is being satisfied through CERCLA, Attachment A shall be used. Attachment B is the model which will be used for hazardous waste management facilities not addressed in Federal Site Remediation or Federal Facility Agreements.

c. When issuing Proposed Plans for public comment, DON will attach a copy of this MOU and the appropriate model "Covenant to Restrict Use of Property" so as to assure the public that the specific LUC being proposed will be enforced, in part, by DON's retained power to enforce the deed covenants and conveyance of the power to enforce protective deed covenants to DTSC contemporaneously with the execution of the deed transferring DON's interests to the new owner.

d. In using these models to draft the appropriate "Covenant to Restrict Use of Property," DON's and DTSC's personnel will work collaboratively to develop the specific information applicable to the given site called for by Articles I (Statement of Facts) and IV (Restrictions) of the attached models. A final "Covenant to Restrict Use of Property" that is ready for signature for a given site, will be prepared in time to allow it to be

executed contemporaneously with the execution of the deed transferring DON's non-retained interests in the property to the new owner. In the case of "early transfers" where DON is performing the cleanup after the transfer, and is imposing an LUC at the time of the "early transfer" in support of its ongoing cleanup activities, the Parties recognize that the contents of Articles I and IV of the model covenants for such sites will likely not be as detailed as that suggested in the attached models. The degree of detail contained within the model covenant will be the information available as to the cleanup site, although the covenants must be adequate to protect human health and the environment to allow an early transfer. The form of remedy and any additional associated IC will be more fully developed once the remedy is selected and implemented.

e. The Parties recognize that given the need to tailor the terms of the "environmental restriction" to the remedy that is finally selected after seeking public comment on the Proposed Plan, the terms of the final "Covenant to Restrict Use of Property" may vary greatly from the draft proposal. The Parties recognize that the public should be given specific notice of this fact in the Proposed Plan.

f. The Parties recognize that remedies proposed by the DON will be submitted to DTSC for concurrence. However, there may be unresolved disagreements at some cleanup sites concerning the remedy being proposed by DON including, in particular, the scope and nature of the LUCs, and the terms of any underlying, proposed "Covenant to Restrict Use of Property." In such situations the Parties will use their best efforts to resolve all disputes informally. If the Parties are ultimately unable to resolve the issue in dispute, DON and DTSC reserve any rights they might have to take any action available under applicable state or federal law.

g. Either Party may terminate its involvement in this Agreement by giving thirty (30) days written notice to the other Party. Upon receipt of notice and the expiration of thirty days termination shall occur by operation of law.

Signed: _____ 10 MARCH 2000

F.R. Ruehe
Rear Admiral
United States Navy
Commander Navy Region Southwest

Date

Signed: Edwin F. Lowry 3/10/00

Edwin F. Lowry
Director
Department of Toxic Substances Control

Date

Attachment A: Model Site Mitigation Program "Environmental Restriction Covenant and Agreement"

Attachment B: Model Hazardous Waste Management Program/State Regulated Unit "Environmental Restriction Covenant and Agreement"

Approved as to form:

Date: 9 March 00 By: Mary Kay Lamyer

Approved as to form:

Date: March 16, 2000 By: Mark W. Thomas

MODEL SITE MITIGATION PROGRAM

DEED RESTRICTION

RECORDING REQUESTED BY: **[Covenantor's Name]** **[Street Address]** **[City]**, California **[Zip Code]** WHEN RECORDED, MAIL TO: Department of Toxic Substances Control Region ___ **[Street Address]** **[City]**, California **[Zip Code]** Attention: **[Name of Branch Chief]**, Chief **[Branch Designation]**	

SPACE ABOVE THIS LINE RESERVED FOR RECORDER'S USE

COVENANT TO RESTRICT USE OF PROPERTY

ENVIRONMENTAL RESTRICTION

(Re: *[Insert parcel number(s) and name of site property to be restricted.]*)

This Covenant and Agreement ("Covenant") is made by and between the United States of America acting by and through the Department of the Navy ("DON") (the "Covenantor"), the current owner of property situated in *[city]*, County of [ ], State of California, described in Exhibit "A", attached hereto and incorporated herein by this reference (the "Property"), and the State of California acting by and through the Department of Toxic Substances Control (the "Department"). Pursuant to Civil Code section 1471(c), Health and Safety Code Sections 25222.1 and 25355.5 the

Department has determined that this Covenant is reasonably necessary to protect present or future human health or safety or the environment as a result of the presence on the land of hazardous materials as defined in Health and Safety Code ("H&SC") section 25260. In addition, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 104 (42 USC Section 9604), as delegated to the Covenantor by E.O. 12580, ratified by Congress in 10 USC Sec. 2701, et seq., and implemented by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP – 40 CFR Part 300) and implementing guidances and policies, the Covenantor has also determined that this Covenant is reasonably necessary to protect present or future human health or safety or the environment as the result of the presence on the land of hazardous substances, pollutants and contaminants as defined in CERCLA Section 101 (42 USC Section 9601).

The Covenantor and the Department, collectively referred to as the "Parties", therefore intend that the use of the Property be restricted as set forth in this Covenant, in order to protect human health, safety and the environment.

The Covenantor retains sufficient legal title and interest in the subject property to insure continuing enforcement of the protective covenants and agreements contained within this Covenant to Restrict the Use of Property. Further in any subsequent transfers or conveyance of title to nonfederal entities the DON shall burden the property with additional deed covenants that insure that any subsequent deed or transfer contains the protective covenants and right of access and power to conduct monitoring of wastes retained on site. Those covenants and agreements shall be enforceable against the servient estate in that those protective covenants shall run with the land to

all successors and assigns.

ARTICLE I

STATEMENT OF FACTS

1.01 The Property, totaling approximately [acres] [square yards] is more particularly described and depicted in Exhibit "A", attached hereto and incorporated herein by this reference. ***[Exhibit "A" must include the legal description of the property used by the county recorder. This must include the particular description of the boundaries of the area to be subject to a particular use restriction. If the property does not already have a legal description (it generally will not if it is a portion of a larger piece of property) a survey will be required.]*** The Property is located in the area now generally bounded by ***[include narrative description of the area; this will typically be street names: e.g., Main Street on the north, Maple Street on the east, etc.]*** County of [ ], State of California.

1.02 ***[Use this paragraph if imposing additional restrictions on a portion of the Property, for example on a capped portion, or if for any other reason it is necessary to precisely identify any portion of the property, such as an area with groundwater monitoring wells. The purpose of this paragraph is to give the precise location of such areas where use restrictions generally will apply. Renumber following paragraphs accordingly.]*** A limited portion of the Property is more particularly described in Exhibit "B" which is attached and incorporated by this reference ("Capped Property") as defined below ***[or "(other identified) Property"]. [Exhibit B must include a legal description of the exact area(s) being restricted***

and any necessary diagram(s). This will generally require a legal survey and engineering drawing for the Cap or other area to be further restricted.] The [Capped *(or other description)*] Property is located in the area now generally bounded by [ ]. ***[Include language that generally describes the Capped or other identified Property.]*** The [Capped *(or other identified)* Property is also more specifically described as encompassing [ ] County Assessor's Parcel No.(s) [ ].

1.03 ***[Briefly describe the remedial measures implemented at the Property, including, if applicable, installation of a cap and construction and ongoing operation and maintenance of a groundwater treatment system, in order to identify the remaining contaminants and physical remedial measures on the Property that necessitate this deed restriction. This paragraph should also briefly discuss the regulatory context for the DON facility. Reference should be made to any applicable Federal Facility Agreement (FFA) or Federal Facility Site Remediation Agreement(FFSRA) and any corrective action obligations under RCRA or Chapter 6.5 of Division 20 of the Health and Safety Code covered by the FFA or FFSRA. This paragraph should refer to, and give the approval date for, the RAP, ROD, RAW or other decision document that selected the remedial measures at the Property and required this Covenant.]***

SAMPLE [For a facility which has an FFA or FFSRA and hazardous waste management units]: The DON and the Department entered into a Federal Facility Agreement (FFA) on [date]. Pursuant to that FFA, the DON may satisfy some or all of its corrective action obligations under the Resource Conservation and Recovery Act

(RCRA)(42 USC 6901 et seq)or Califomia Health and Safety Code sectin 25200.10 through CERCLA response actions. ***{Proceed to additional SAMPLES as appropriate.]***

SAMPLE [For a property with remaining contamination, but no cap, O&M, or other ongoing response activities]: The Property is [a portion of a site] being remediated pursuant to a Record of Decision (ROD) pursuant to the Defense Environmental Restoration Program (DERP), 10 U.S.C. section 2701 et seq, and CERCLA; and a Remedial Action Plan (RAP) pursuant to Chapter 6.8 of Division 20 of the H&SC, under the oversight of the Department. The ROD/RAP provides that a deed restriction be required as part of the site remediation, because lead, which is a hazardous substance, as defined in H&SC section 25316, and a hazardous material as defined in H&SC section 25260 remains at depths of 10 feet or more below the surface of the Property. The DON circulated the ROD/RAP, for public review and comment. The ROD/RAP was approved by the DON and concurred in by the Department on [date], pursuant to which the Property was excavated to a depth of 10 feet, graded, then backfilled with clean soil.

SAMPLE [For a property with ongoing operation and maintenance of a monitoring or treatment system and/or cap. The exact provisions of this paragraph will vary depending upon the facts of the particular site or facility. The paragraph below is illustrative of the kind of information that should be included. Note specifically there is reference to a signed Operation and Maintenance Agreement.]: [Covenantor] ***[or party responsible for the activity, if different from***

Covenantor] is remediating the Property under the supervision and authority of the Department. The Property is [a portion of a site] being remediated pursuant to a Record of Decision (ROD) pursuant to the Defense Environmental Restoration Program (DERP), 10 U.S.C. section 2701 et seq; and a Remedial Action Plan (RAP) pursuant to Chapter 6.8 of Division 20 of the H&SC. Because hazardous substances, as defined in H&SC section 25316, which are also hazardous materials as defined in H&SC section 25260, including volatile organic compounds, total petroleum hydrocarbons, chlorinated benzenes and polychlorinated biphenyls, remain in the soil and groundwater in and under portions of the Property, the Remedial Action Plan provides that a deed restriction be required as part of the site remediation. The DON circulated the ROD/RAP for public review and comment. The ROD/RAP were approved by the DON and concurred in by Department on [*date*]. Remediation includes installing and maintaining a synthetic membrane cover ("Cap") over the Capped Property. The Cap consists of a low permeability synthetic membrane and other associated layers, as more particularly described in the engineering drawing attached as Exhibit "B" hereto. The response action also includes the installation and operation of: (1) a passive gas collection system on the Capped Property which removes volatile organic compounds migrating upward from under the Cap, (2) a vapor extraction system, which remediates certain volatile organic compound-impacted soils, and (3) groundwater monitoring wells ("Monitoring Wells"). The location of the gas collection system, vapor extraction system, and Monitoring Wells are shown on Exhibit "B". ***[This exhibit will have been identified in paragraph 1.02.]*** The operation and maintenance of the Cap, gas collection system, vapor extraction system, and Monitoring Wells is pursuant to an Operation and

Maintenance Manual incorporated into the Operation and Maintenance Agreement between [Covenantor] ***[or name of other entity]*** and the Department dated [ ]. ***[If an O&M Agreement has not been signed, the approval date for the O&M Manual or Plan should be referenced.]***

1.04 ***[This paragraph should set out specific information about the risk assessment findings relevant to the contaminants of concern remaining at the property, essentially the basis for the restrictions imposed by this covenant. The Restrictions in Paragraphs 4.01, and any requirement for Soil Management Activity and any Prohibited Activity must be linked to the contaminants and risk assessment as discussed in this paragraph. The following paragraph is given for purposes of illustration. Each site will have different facts; those should be developed in a manner similar to the sample paragraph given here. Land use must be consistent with the approved RAW, RAP or ROD and the health risk assessment.]***

SAMPLE: As detailed in the Final Health Risk Assessment ***[or other appropriate document]*** as proposed by the Covenantor and approved by the Department on [***date***], all or a portion of the surface and subsurface soils within 10 feet of the surface of the Property contain hazardous substances, as defined in H&SC section 25316, which include the following metal contaminants of concern in the ranges set forth below: arsenic (0.3 to 38.1 parts per million ("ppm"), beryllium (2.6 ppm), copper (4.6 to 756 ppm, and nickel (7.3-105 ppm). In addition, there are low pH soils. Based on the Final Risk Assessment the Department and the Covenantor have

concluded that use of the Property as a residence, hospital, school for persons under the age of 21 or day care center would entail an unacceptable cancer risk to the users or occupants of such property operated or occupied. The Department and the Covenantor have further concluded that the Property, as remediated, and operated or occupied subject to the restrictions of this Covenant, does not present an unacceptable threat to human safety or the environment, if limited to ***[as applicable:*** commercial and industrial, parks, open space,**[*or other appropriate*]]** use.

SAMPLE: [Note: Groundwater restrictions in Paragraph 3.04 must be based on a discussion of what contaminants are found in groundwater at the site, and what the drinking water standards are.]

Groundwater at the Property is found 15 to 20 feet below ground surface. Contaminants in the groundwater include benzene (50- 123 ppm), chromium (75- 213 ppm) and TCE (350-780 ppm). California drinking water standards are benzene at 0.08 ppm, chromium at 30 ppm and TCE at 5 ppm. The Department and the Covenantor concludes that the groundwater presents an unacceptable threat to human health and safety absent an environmental restriction to eliminate exposure to such levels of groundwater.

ARTICLE II

DEFINITIONS

2.01 Department. "Department" means the State of California by and through the Department of Toxic Substances Control and includes its successor agencies, if

any.

2.02 Owner. "Owner" shall include the Covenantor's successors in interest, and their successors in interest, including heirs and assigns, during his or her ownership of all or any portion of the Property.

2.03 Occupant. "Occupant" means Owners and any person or entity entitled by ownership, leasehold, or other legal relationship to the right to occupy any portion of the Property.

2.04 Covenantor. "Covenantor" shall mean the United States acting through the Department of the Navy (DON).

ARTICLE III

GENERAL PROVISIONS

3.01 Restrictions to Run with the Land. This Covenant sets forth protective provisions, covenants, restrictions, and conditions (collectively referred to as "Restrictions"), subject to which the Property and every portion thereof shall be improved, held, used, occupied, leased, sold, hypothecated, encumbered, and/or conveyed. These Restrictions are consistent with the separate restrictions placed in the deed by and in favor of the Covenantor, conveying the Property from the Convenantor to its successor in interest described above. Each and every Restriction: (a) runs with the land in perpetuity pursuant to H&SC sections 25222.1 25355.5(a)(1)(C) and Civil Code section 1471; (b) inures to the benefit of and passes with each and every portion of the Property; (c) shall apply to and bind all subsequent Occupants of the Property; (d) is for the benefit of, and is enforceable by the Department; and (e) is imposed upon the entire Property unless expressly stated as applicable only to a specific portion thereof.

3.02 Binding upon Owners/Occupants. Pursuant to H&SC sections 25222.1, 25355.5(a)(1)(C), this Covenant binds all Owners of the Property, their heirs, successors, and assignees, and the agents, employees, and lessees of the owners,

heirs, successors, and assignees. Pursuant to Civil Code section 1471(b), all successive owners of the Property are expressly bound hereby for the benefit of the Department.

3.03 Written Notice of Hazardous Substance Release. The Owner shall, prior to the sale, lease, or rental of the Property, give written notice to the subsequent transferee that a release of hazardous substances has come to be located on or beneath the Property, pursuant to Health and Safety Code section 25359.7. Such written notice shall include a copy of this Covenant. *[This last sentence is optional, to be used at sites where it is important that buyers and tenants be specifically aware of the ongoing remediation and their obligations.]*

3.04 Incorporation into Deeds and Leases. The Restrictions set forth herein shall be incorporated by reference in each and all deeds and leases for any portion of the Property.

3.05 Conveyance of Property. The Owner shall provide notice to the Department not later than thirty (30) days after any conveyance of any ownership interest in the Property (excluding mortgages, liens, and other non-possessory encumbrances). The Department shall not, by reason of this Covenant alone, have authority to approve, disapprove, or otherwise affect a conveyance, except as otherwise provided by law, by administrative order, or by a specific provision of this Covenant.

ARTICLE IV

RESTRICTIONS

[The following examples are intended to be illustrative. Not all of them will be

applicable. The restrictions for a particular property should have a direct relationship to what the Health Risk Assessment said was appropriate for use at the site. The restrictions must also protect the integrity and physical accessibility of, and legal rights of access to, any ongoing remediation facilities at the site.]

4.01 Prohibited Uses. The Property shall not be used for any of the following purposes: ***[Note: These prohibitions must be based on the appropriate decision documents as set forth in Paragraphs 1.03 and 1.04]***

[Sample provisions:]

(a) A residence, including any mobile home or factory built housing, constructed or installed for use as residential human habitation.

(b) A hospital for humans.

(c) A public or private school for persons under 21 years of age.

(d) A day care center for children.

4.02. Soil Management ***[Note: The basis for the soil restrictions must be in Paragraphs 1.03 and 1.04]***

[Sample provisions]

(a) No activities that will disturb the soil [at or below [ ] feet below grade] (e.g., excavation, grading, removal, trenching, filling, earth movement or mining) shall be allowed on the Property without a Soil Management Plan and a Health and Safety Plan approved by the Department.

(b) Any contaminated soils brought to the surface by grading, excavation, trenching or backfilling shall be managed in accordance with all applicable provisions of

state and federal law.

(c) The Owner shall provide the Department written notice at least fourteen (14) days prior to any building, filling, grading, mining or excavating in the Property [more than [ ] feet below the soil surface] [which will remove more than [ ] cubic yards of soil].

4.03 Prohibited Activities. ***[This paragraph will not be applicable to all sites. If not used, renumber accordingly. If there are groundwater restrictions, the basis must be in Paragraphs 1.03 and 1.04]*** The following activities shall not be conducted at the Property:

[Sample provisions]

(a) Raising of food (agricultural products intended for human consumption or use, including but not limited to food, cattle, fibers, including cotton).

(b) Drilling for [drinking irrigation] water, oil, or gas [without prior written approval by the Department].

[or] (b) Extraction of groundwater for purposes other than site remediation or construction dewatering.

[The following paragraphs are samples of restrictions that may be applicable when there is a cap, vapor and/or gas collection system, and/or groundwater monitoring system.]

4.04 Non-Interference with Cap [and Vapor Extraction System (VES)] and [Groundwater Capture System (GCS)].

[Sample provisions:]

(a) Activities that may disturb the Cap (e.g. excavation, grading, removal, trenching, filling, earth movement, or mining) shall not be permitted on or within _____ feet of the Capped Property without prior review and approval by the Department. ***[Similar restrictions may be appropriate for other ongoing remediation systems.]***

(b) All uses and development of the Capped Property shall preserve the integrity [***(if appropriate:)*** **and physical accessibility]** of the Cap. ***[Extend to other systems as appropriate.]***

(c) The Cap shall not be altered without written approval by the Department.

(d) The Owner shall notify the Department of each of the following: (i) the type, cause, location and date of any damage to the Cap and (ii) the type and date of repair of such damage. Notification to the Department shall be made as provided below within ten (10) working days of both the discovery of any such disturbance and the completion of any repairs. Timely and accurate notification by any Owner or Occupant shall satisfy this requirement on behalf of all other Owners and Occupants. ***[Extend to other systems as appropriate.]***

4.05 Access for Department. The Department shall have reasonable right of entry and access to the Property for inspection, monitoring, and other activities consistent with the purposes of this Covenant as deemed necessary by the Department in order to protect the public health or safety, or the environment.

ARTICLE V

ENFORCEMENT

5.01 Enforcement. Failure of the Owner or Occupant to comply with any of the

Restrictions specifically applicable to include grounds for the Department to require that the Owner modify or remove any improvements ("Improvements" herein shall mean all buildings, roads, driveways, and paved parking areas), constructed or placed upon any portion of the Property in violation of the Restrictions. Violation of this Covenant by the Owner or Occupant may result in the imposition of civil and/or criminal remedies including nuisance or abatement against the Owner or Occupant as provided by law. The State of California shall have all remedies as provided at in California Civil Code Section 815.7 as that enactment may be from time to time amended.

ARTICLE VI

VARIANCE AND TERMINATION

6.01 Variance. The Owner, or with the Owner's consent, any Occupant, may apply to the Department for a written variance from the provisions of this Covenant. Such application shall be made in accordance with H&SC section 25233. The Department will grant the variance only after finding that such a variance would be protective of human, health, safety and the environment.

6.02 Termination. The Owner, or with the Owner's consent, any Occupant, may apply to the Department for a termination of the Restrictions or other terms of this Covenant as they apply to all or any portion of the Property. Such application shall be made in accordance with H&SC section 25234. No termination or other terms of this Covenant shall extinguish or modify the retained interest held by the United States.

ARTICLE VII

MISCELLANEOUS

7.01 No Dedication Intended. Nothing set forth in this Covenant shall be

construed to be a gift or dedication, or offer of a gift or dedication, of the Property, or any portion thereof to the general public or anyone else for any purpose whatsoever.

7.02 Recordation. The Covenantor shall record this Covenant, with all referenced Exhibits, in the County of [name of county] within ten (10) days of the Covenantor's receipt of a fully executed original.

7.03 Notices. Whenever any person gives or serves any Notice ("Notice" as used herein includes any demand or other communication with respect to this Covenant), each such Notice shall be in writing and shall be deemed effective: (1) when delivered, if personally delivered to the person being served or to an officer of a corporate party being served, or (2) three (3) business days after deposit in the mail, if mailed by United States mail, postage paid, certified, return receipt requested:

To Owner: *[include name and address of Owner and name of person to receive service]*

To Department: *[title and address of Regional Branch Chief.]*

Any party may change its address or the individual to whose attention a Notice is to be sent by giving written Notice in compliance with this paragraph.

7.04 Partial Invalidity. If any portion of the Restrictions or other term set forth herein is determined by a court of competent jurisdiction to be invalid for any reason, the surviving portions of this Covenant shall remain in full force and effect as if such portion found invalid had not been included herein.

7.05 Statutory References. All statutory references include successor provisions.

IN WITNESS WHEREOF, the Parties execute this Covenant.

Covenantor: ***[name of Covenantor]***

By: _____

Title: ***[signatory's name and title]***

Date: _____

Department of Toxic Substances Control

By: _____

Title: ***[signatory's name and title]***

Date: _____

Approved as to form:

Date: _____ By: _____

Approved as to form:

Date: _____ By: _____

STATE OF CALIFORNIA)
)
COUNTY OF _____)

On this _____ day of _____, in the year _____,

before me _____, personally appeared

_____,

personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is /are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Signature _____

MODEL HAZARDOUS WASTE MANAGEMENT PROGRAM

DEED RESTRICTION

RECORDING REQUESTED BY: **[Covenantor's Name]** **[Street Address]** **[City]**, California **[Zip Code]** WHEN RECORDED, MAIL TO: Department of Toxic Substances Control Region ___ **[Street Address]** **[City]**, California **[Zip Code]** Attention: **[Name of Branch Chief]**, Chief **[Branch Designation]**	

SPACE ABOVE THIS LINE RESERVED FOR RECORDER'S USE

COVENANT TO RESTRICT USE OF PROPERTY

ENVIRONMENTAL RESTRICTION

(Re: *[Insert parcel number(s) and name of site property to be restricted.]*)

This Covenant and Agreement ("Covenant") is made by and between the United States of America acting by and through the Department of Navy or "DON" (the "Covenantor"), the current owner of certain property situated in *[city]*, County of _____, State of California, described in Exhibit "A", attached hereto and incorporated herein by this reference (the "Property"), and the State of California acting by and through the Department of Toxic Substances Control (the "Department"). Pursuant to Civil Code section 1471(c), the Department has determined that this Covenant is reasonably necessary to protect present or future human health or safety or the environment as a

result of the presence on the land of hazardous materials as defined in Health and Safety Code ("H&SC") section 25260. In addition, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 104 (42 USC Section 9604), as delegated to the Covenantor by E.O. 12580, ratified by Congress in 10 USC Sec. 2701, et seq., and implemented by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP – 40 CFR Part 300) and implementing guidances and policies, the Covenantor (DON) has also determined that this Covenant is reasonably necessary to protect present or future human health and safety and the environment as the result of the presence on the land of hazardous substances, pollutants and contaminants as defined in CERCLA Section 101 (42 USC Section 9601).

The Covenantor and the Department, collectively referred to as the "Parties", therefore intend that the use of the Property be restricted as set forth in this Covenant, in order to protect human health, safety and the environment.

The Covenantor retains sufficient legal title and interest in the subject property to insure continuing enforcement of the protective covenants and agreements contained within this Covenant to Restrict the Use of Property. Further in any subsequent transfers or conveyance of title to nonfederal entities the DON shall burden the property with additional deed covenants that insure that any subsequent deed or transfer contains the protective covenants and right of access and power to conduct monitoring interest contained herein and of wastes retained on site. Those covenants and agreements shall be enforceable against the servient estate in that those protective covenants shall run with the land to all successors and assigns.

ARTICLE I

STATEMENT OF FACTS

1.01 The Property, totaling approximately [acres] [--- square yards] is more particularly described and depicted in Exhibit "A", attached hereto and incorporated herein by this reference. *[Exhibit "A" must include the legal description of the property used by the county recorder. This must include the particular description of the boundaries of the area to be subject to a specific use restriction. A survey may be required].* The Property is located in the area now generally bounded by *[include narrative description of the area; this will typically be street names: e.g. Main Street on the north, Maple Street on the east, etc.]* County of [ ], State of California.

1.02 *[Use this paragraph if imposing additional restrictions on a portion of the Property, for example on a capped portion, or if for any other reason it is necessary to precisely identify any portion of the property, such as an area with groundwater monitoring wells. The purpose of this paragraph is to give the precise location of such areas where use restrictions will apply. Renumber following paragraphs accordingly]* A limited portion of the Property is more particularly described in Exhibit "B" which is attached and incorporated by this reference ("Capped Property" or "*[other identified]* Property"). *[Exhibit B must include a legal description of the exact area(s) being restricted and any necessary diagram(s). This will generally require a legal survey and engineering drawing for the Cap or other area to be further restricted.].* The [Capped or {other identified}] Property is located in the area now generally bounded by _____. *[include language that generally describes the Capped or other identified Property]* The

[Capped or {other identified}] Property is also more specifically described as encompassing xxxx County Assessor's Parcel numbers ---.

1.03 *[Briefly describe the regulatory oversight of the facility by the Department and the CERCLA decisions including any applicable Federal Facility Agreement (FFA) or Federal Facility site Remediation Agreement (FFSRA) and implementing activities of the Covenantor, the remedial activities that have occurred at the Property, including, if applicable, installation of a cap and construction and ongoing operation and maintenance of a groundwater treatment system. This paragraph should refer to the Closure Report or other decision document such as a ROD which approved the remedial activities at the Property and required this Covenant. The paragraph needs to identify the contaminants and physical remedial measures on the Property which necessitate this deed restriction.]*

Since [*date*] the Department [*or*, the Department's predecessor in interest (California Department of Health Services)] authorized this [treatment], [storage], [disposal] facility ("Facility") pursuant to an [interim status document] [permit]. Under this authorization the Site was a hazardous waste facility, regulated by the Department, subject to the requirements of the California Hazardous Waste Control Law ("HWCL"), at Health and Safety Code ("H&S Code") section 25100 et seq., and the federal Resource Conservation and Recovery Act ("RCRA"), at 42 U.S.C. section 6901 et seq. Pursuant to the closure requirements of the HWCL, including H&S Code section 25246 and post-closure notices provisions of Title 22 California Code of Regulations [section 66265.119(b) for interim status hazardous waste facilities] [*or* 66264.119(b) for permitted hazardous waste facilities]] [*or, if restrictions required for permit:* corrective

action requirements of the HWCL, including H&S Code Section 25200.10] the Department is requiring this Covenant as part of the [facility closure] [corrective action] [permitting] of the facility. The Department circulated a [Closure Plan] [Remedial Measures Study] [*other appropriate document*], which contained a Final Health Risk Assessment [and/or Remedial Goals document], together with a draft [Environmental Impact Report] [Negative Declaration] pursuant to the California Environmental Quality Act, Public Resources Code section 21000 et seq for public review and comment from [*date*] to [*date*]. Because hazardous wastes, which are also hazardous materials as defined in Health and Safety Code sections 25117 and 25260, including [list hazardous wastes] remain in the [soil] and [groundwater] at the Property, the [Closure Plan] [Remedial Measures Study] provided that a deed restriction would be required as part of the facility remediation. The Department approved the [Closure Plan] [Remedial Measures Study] [*other appropriate document*] together with the [*environmental document*] on [*date*].

Pursuant to these documents, the Property was [*describe remedial actions taken which relate to what is left on the property. This description must include installation of any physical remedial measures. The description must identify what contaminants remain on the Property.*]

SAMPLE: Hazardous wastes, which are also hazardous materials as defined in H&S Code sections 25117 and 25260, and are CERCLA hazardous substances, pollutants or contaminant, including xxxx and yyyy, remain in the soil and groundwater at the Property. Remediation includes installing and maintaining a synthetic membrane cover ("Cap") over the Capped Property. The Cap consists of a low permeability

synthetic membrane and other associated layers over the hazardous wastes and materials, as more particularly described in the engineering drawing attached as Exhibit "B" hereto. The Remedial Measure also includes the installation and operation of: (1) a passive gas collection system ("GCS") on the Capped Property which removes miscellaneous gas/vapors migrating upward from under the Cap, (2) a vapor extraction system ("VES"), which remediates certain volatile organic compound-impacted soils, and (3) groundwater monitoring wells ("Monitoring Wells"). The location of the GCS, VES and Monitoring Wells are shown on the map attached as exhibit "--". The operation and maintenance ("O&M") of the Cap, GCS, VES, and Monitoring Wells is pursuant to an O&M Manual incorporated into the O&M Agreement between [Covenantor] *[or name of other entity]* and the Department dated September 20, 1995. *[If an O&M Agreement has not been signed, the approval date for the O&M Manual or Plan should be referenced]*

1.04 *[This paragraph should set out specific information about the risk assessment findings relevant to the contaminants of concern remaining at the property, essentially the basis for the restrictions imposed by this covenant. The Restrictions in Paragraphs 4.01, and any requirement for Soil Management Activity and any Prohibited Activity must be linked to the contaminants and risk assessment as discussed in this paragraph. The following paragraph is given for purposes of illustration. Each site will have different facts; those should be developed in a manner similar to the sample paragraph given here. You must consult with the assigned toxicologist about what are the appropriate land uses.]*

SAMPLE: As detailed in the Final Health Risk Assessment *[or other appropriate*

document] as proposed by the Covenantor and approved by the Department on *[date]*, all or a portion of the surface and subsurface soils within 10 feet of the surface of the Property contain hazardous wastes and hazardous materials, as defined in H&S Code section 25117 and 25260, which include one or more of the following metal contaminants of concern in the ranges set forth below: arsenic (0.3 to 38.1 parts per million ("ppm"), beryllium (2.6 ppm), copper (4.6 to 756 ppm, and nickel (7.3-105 ppm). In addition, there are low pH soils. Based on the Final Risk Assessment the Department and the Covenantor have concluded that use of the Property as a residence, hospital, school for persons under the age of 21 or day care center would entail an unacceptable cancer risk to the users or occupants of such property. The Department and the Covenantor have further concluded that the Property, as remediated, and operated or occupied subject to the restrictions of this Covenant, does not present an unacceptable threat to human safety or the environment, if limited to *[as applicable:* commercial and industrial use, parks, open space, [or other appropriate] use*]*.

SAMPLE [Note: Groundwater restrictions in Paragraph 3.04 must be based on a discussion of what contaminants are found in groundwater at the site, and what drinking water standards are.]: Groundwater at the Property is first found at 15 to 20 feet below ground surface. Contaminants in the groundwater include benzene (50- 123 ppm), chromium (75- 213 ppm) and TCE (350-780 ppm). California drinking water standards are benzene at .08 ppm, chromium at 30 ppm and TCE at 5 ppm. The Department and the Covenantor concludes that the groundwater presents an unacceptable threat to human health and safety absent an environmental restriction to eliminate exposure to such levels of groundwater.

ARTICLE II

DEFINITIONS

2.01 Department. "Department" shall mean the State of California by and through the California Department of Toxic Substances Control and shall include its successor agencies, if any.

2.02 Owner. "Owner" shall include the Covenantor's successor's in interest, and their successors in interest, including heirs and assigns, during his or her ownership of all of any portion of the Property.

2.03 Occupant. "Occupant" shall mean Owners and any person or entity entitled by ownership, leasehold, or other legal relationship to the right to occupy any portion of the Property.

2.04 Covenantor. "Covenantor" shall mean the United States acting through the Department of the Navy (DON).

ARTICLE III

GENERAL PROVISIONS

3.01 Restrictions to Run With the Land. This Covenant sets forth protective provisions, covenants, restrictions, and conditions (collectively referred to as "Restrictions"), upon and subject to which the [Property] [Capped Property] [Restricted Property] and every portion thereof shall be improved, held, used, occupied, leased, sold, hypothecated, encumbered, and/or conveyed. These Restrictions are consistent with the separate restrictions placed in the deed by and in favor of the Covenantor, conveying the Property from the Covenantor to its successor in interest described above. Each and every one of the Restrictions: (a) shall run with the land in perpetuity pursuant to H&SC sections 25202.5, and 25202.6, and Civil Code section 1471; (b) shall inure to the benefit of and pass with each and every portion of the Property; (c) shall apply to and bind all subsequent Occupants of the Property; (d) are for the benefit of, and shall be enforceable by the State of California; and (e) are imposed upon the entire Property unless expressly stated as applicable only to a specific portion thereof.

3.02 Binding Upon Owners/Occupants. Pursuant to Health and Safety Code section 25202.5(b), this Covenant shall be binding upon all of owners of the land, their heirs, successors, and assignees, and the agents, employees, and lessees of the owners, heirs, successors, and assignees. Pursuant to Civil Code section 1471(b), all successive owners of the Property are expressly bound hereby for the benefit of the covenantee(s) herein.

3.03 Written Notice of Hazardous Substance Release. The Owner shall, prior to the sale, lease, or rental of the Property, give written notice to the subsequent

transferee that a release of hazardous substances has come to be located on or beneath the Property, pursuant to Health and Safety Code section 25359.7. Such written notice shall include a copy of this Covenant. *[This last sentence is optional, to be used at sites where it is important that buyers and tenants be specifically aware of the ongoing remediation and their obligations]*

3.04 Incorporation into Deeds and Leases. The Restrictions set forth herein shall be incorporated by reference in each and all deeds and leases for any portion of the Property.

3.05 Conveyance of Property Covenantor agrees that the Owner shall provide notice to the Department not later than thirty (30) days after any conveyance of any ownership interest in the Property (excluding mortgages, liens, and other non-possessory encumbrances). The Department shall not, by reason of this Covenant alone, have authority to approve, disapprove, or otherwise affect such conveyance. *[This paragraph is optional, to be used, for example, at sites with groundwater treatment systems that will require access by the Department and by the entity responsible for O&M.]*

ARTICLE IV

RESTRICTIONS

[The following examples are intended to be illustrative. Not all of them will be applicable. The restrictions for a particular property should have a direct relationship to what the Health Risk Assessment said was ok/appropriate for use at the site. The toxicologist must be involved with drafting the Restrictions. The restrictions must also protect the integrity of, and access to, any ongoing remediation facilities at the site.]

4.01 Prohibited Uses. The Property shall not be used for any of the following purposes: *[Note: These prohibitions must be based on the facts and Health Risk Assessment as set forth in Paragraph 1.04]*

[sample provisions]

(a) A residence, including any mobile home or factory built housing, constructed or installed for use as residential human habitation.

(b) A hospital for humans.

(c) A public or private school for persons under 21 years of age.

(d) A day care center for children.

4.02 Soil Management *[Note: The basis for the soil restrictions must be in Paragraph 1.04]*

[sample provisions]

(a) No activities which will disturb the soil *[*at or below xxx feet below grade*]* (e.g., excavation, grading, removal, trenching, filling, earth movement or mining) shall be permitted on the Property without a Soil Management Plan and a Health and Safety Plan submitted to the Department for review and approval.

(b) Any contaminated soils brought to the surface by grading, excavation, trenching or backfilling shall be managed in accordance with all applicable provisions of state and federal law.

(c) The Owner will provide the Department written notice at least fourteen (14) days prior to any building, filling, grading, mining or excavating in the Property [more than feet below the soil surface] [which will remove more than cubic yards of soil].

4.03 Prohibited Activities. *[This paragraph will not be applicable to all sites. If*

not used, renumber accordingly. If there are groundwater restrictions, the basis must be in Paragraph 1.04] The following activities shall not be conducted at the Property: *[sample provisions]*

(a) No raising of agricultural products intended for human consumption or use, including but not limited to food,cattle, fibers including, cotton) shall be permitted on the property.

(b) No drilling for *[*drinking/IRRIGATION *]* water, oil, or gas shall be permitted on the Property *[*without prior written approval by the Department*]. [or]* (b) No groundwater shall be extracted on the Property for purposes other than site remediation or construction dewatering. *[The following paragraphs are samples of restrictions that may be applicable when there is a cap, vapor and/ or gas collection system, and/or groundwater monitoring system.]*

4.04 Non-Interference with Cap [and VES] and [GCS].

[sample provisions]

(a) No activities which will disturb the Cap (e.g. excavation, grading, removal, trenching, filling, earth movement, or mining) shall be permitted on or within _____feet of the Capped Property without prior review and approval by the Department. *[Similar restrictions may be appropriate for other ongoing remediation systems.]*

(b) All uses and development of the Capped Property shall preserve the integrity of the Cap. *[Extend to other systems as appropriate.]*

(c) Any proposed alteration of the Cap shall require written approval by the Department.

(d) The Owner shall notify the Department of each of the following: (i) The

type, cause, location and date of any disturbance to the Cap which could affect the ability of the Cap to contain subsurface hazardous wastes or hazardous materials in the Capped Property, and (ii) the type and date of repair of such disturbance. Notification to the Department shall be made as provided below within ten (10) working days of both the discovery of any such disturbance(s) and the completion of any repairs. Timely and accurate notification by any Owner or Occupant shall satisfy this requirement on behalf of all other Owners. *[Extend to other systems as appropriate.]*

4.05 Access for Department. The Department shall have reasonable right of entry and access to the Property for inspection, monitoring, and other activities consistent with the purposes of this Covenant as deemed necessary by the Department in order to protect the public health and safety and the environment.

ARTICLE V

ENFORCEMENT

5.01 Enforcement. Failure of the Owner or Occupant to comply with any of the Restrictions specifically applicable to it shall be grounds for the Department, by reason of this Covenant, to require that the Owner modify or remove any improvements ("Improvements" herein shall include all buildings, roads, driveways, and paved parking areas, constructed or placed upon any portion of the Property constructed in violation of the Restrictions). Violation of this Covenant by the Owner or Occupant may result in the imposition of civil and/or criminal remedies including nuisance or abatement against the Owner or Occupant as provided by law. The State of California shall have all remedies as provided in California Civil Code, Section 815.7, as that enactment may

be from time to time amended.

ARTICLE VI

MODIFICATION AND TERMINATION

6.01 Modification. Any Owner or, with the Owner's written consent, any Occupant of the Property or any portion thereof may apply to the Department for a written modification from the provisions of this Covenant. Such application shall be made in accordance with H&S Code section 25202.6. The Department will grant the modification only after finding that such a modification would be protective of human health, safety and the environment.

6.02 Termination. Any Owner, and/or, with the Owner's written consent, any Occupant of the Property, or any portion thereof, may apply to the Department for a termination of the Restrictions or other terms of this Covenant as they apply to all or any portion of the Property. Such application shall be made in accordance with H&S Code section 25202.6. The Department will grant the termination only after finding that such a termination would be protective of human health, safety and the environment. No termination of the Restrictions or other terms of this Covenant shall extinguish or modify the retained interest held by the United States.

ARTICLE VII

MISCELLANEOUS

7.01 No Dedication Intended. Nothing set forth in this Covenant shall be construed to be a gift or dedication, or offer of a gift or dedication, of the Property, or any portion thereof to the general public or anyone else for any purpose whatsoever.

7.02 Recordation In accordance with HSC Section 25235, the Department will record this Covenant, with all referenced Exhibits, in the County of [name of county] within ten (10) days of the Department's receipt of a fully executed original.

7.03 Notices. Whenever any person gives or serves any notice ("Notice" as used herein includes any demand or other communication with respect to this Covenant), each such Notice shall be in writing and shall be deemed effective: (1) when delivered, if personally delivered to the person being served or to an officer of a corporate party being served, or (2) three (3) business days after deposit in the mail, if mailed by United States mail, postage paid, certified, return receipt requested:

To Owner: *[include name and address of Owner and name of person to receive service]*

To Department: *[include name, address, and appropriate name of Department person to be served]*

Any party may change its address or the individual to whose attention a notice is to be sent by giving written notice in compliance with this paragraph.

7.04 Partial Invalidity. If any portion of the Restrictions or other term set forth herein is determined by a court of competent jurisdiction to be invalid for any reason, the surviving portions of this Covenant shall remain in full force and effect as if such portion found invalid had not been included herein.

7.05 Statutory References. All statutory references include successor provisions.

IN WITNESS WHEREOF, the Parties execute this Covenant.

"Covenantor"

Date:_____ By:_____

"Department"

Date:_____ By:_____

Approved as to form:

Date: _____ By: _____

Approved as to form:

Date: _____ By: _____

STATE OF CALIFORNIA)
)
COUNTY OF _____)

On this _____ day of _____, in the year _____,

before me _____, personally appeared

_____,

personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is /are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Signature _____

APPENDIX O

PRINCIPLES AND PROCEDURES FOR SPECIFYING, MONITORING, AND ENFORCEMENT OF LAND-USE CONTROLS AND OTHER POST-ROD ACTIONS

PRINCIPLES AND PROCEDURES FOR SPECIFYING, MONITORING AND ENFORCEMENT OF LAND USE CONTROLS AND OTHER POST-ROD ACTIONS

PREAMBLE

Since the Department of Defense (DoD) /Environmental Protection Agency (EPA) Model Interagency Agreement (IAG)/Federal Facility Agreement (FFA) was developed in 1988, EPA and Navy have gained considerable knowledge and understanding about post-Records of Decisions (ROD) activities, especially Land Use Controls (LUCs). Thinking, policies, regulations and procedures concerning LUCs have evolved considerably since DoD and EPA developed the 1988 FFA model language. New statutes and regulations related to LUCs are being considered in many states. Accordingly, EPA and the Department of the Navy (DON) believe that a set of Principles will assist Navy field commands and EPA Regions to better implement our respective Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) responsibilities. The Principles described below do not replace or substitute for any existing CERCLA statutory or regulatory requirement. Rather they provide a mutually agreeable framework to provide a more efficient process to implement LUCs at National Priority List (NPL) installations.

These Principles will guide the EPA and DON personnel involved in these decisions. They are written in full knowledge that state regulatory and trustee organizations have independent responsibilities and authorities. EPA and the DON recognize the importance of the state role in helping to ensure a cleanup is protective of human health and the environment. Headquarters EPA and DoD will jointly develop a communications plan to ensure we include the states in this important issue.

These Principles support the President's Management Agenda by focusing on improving environmental results. The Principles encourage continued innovation and improvement in CERCLA implementation. EPA and the Components should continue to propose and pilot initiatives at Component installations or at other properties for which they are responsible. This includes proposing variations in, or alternatives such as performance-based practices to, the approach described in this document.

PRINCIPLES

- At sites where remedial action is determined necessary to protect human health and the environment, the actions must be documented in accordance with CERCLA and its implementing regulation, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

- At sites where contaminants are left in place at levels that do not allow for unrestricted use, LUCs are used to ensure that the contaminants do not pose an unacceptable risk to human health or the environment. LUCs consist of engineering controls and/or institutional controls.

- The EPA and DON desire to ensure that LUCs are specified, implemented, monitored, reported on, and enforced in an efficient, cost-effective manner that ensures long-term protectiveness. In addition, in accordance with CERCLA and the NCP, if an equally protective but more cost-effective remedy is identified, DON may propose, and EPA will consider, using the more cost-effective remedy.

- The EPA acknowledges the DON's role and responsibilities as the Federal Lead Agent for response actions. This role includes selecting remedies with EPA at NPL sites and funding response actions.

- The DON acknowledges EPA's role and responsibilities for regulatory oversight and enforcement at NPL sites. This role includes ultimate ability to select the remedy at NPL sites if EPA disagrees with DON's proposed remedy and dispute resolution fails.

- Federal Facilities Agreements (FFAs) are CERCLA 120 agreements used by DON and EPA to describe in detail the roles and relationships among DON, EPA and often the state. They form the foundation for these relationships regarding DON's response actions at NPL sites. FFAs also contain installation specific details and procedures for planning, budgeting, and dispute resolution. DON and EPA desire FFAs to be as standardized as possible and relatively static (i.e., the FFA should not need to be changed for a given installation).

- Primary Documents developed under the FFA are relatively dynamic and document important plans and actions. In that sense, they are action-oriented. For example, a Site Management Plan is revised yearly via collaboration among DON and EPA remedial project managers and is an important tool for planning response actions and demonstrating commitment to the public. Likewise, a LUC Remedial Design (RD) or Remedial Action Work Plan (RAWP) describes those actions that are needed to ensure viability of both long-term engineered and institutional control remedies.

- Records of Decision should document the remedy selection process and remedy decision in accordance with CERCLA and the NCP, as well as applicable and

appropriate guidance, regulations, standards, criteria, and policy. With regard to LUCs, the ROD should describe the LUC objectives; explain why and for what purpose the LUCs are necessary, where they will be necessary, and the entities responsible for implementing, monitoring, reporting on and enforcing the LUCs. The ROD will refer to the RD or RAWP for implementation actions.

- Where situations arise (such as new cleanup standards; new or additional contamination is discovered on a site, etc.) that require additional response actions that go beyond the actions and objectives described in a ROD, and any related ROD Amendment or Explanation of Significant Difference (ESD), the additional actions required and their remedial objectives will be further documented in an ESD or ROD Amendment, as appropriate. There may also arise situations after a remedy has been completed that require removal actions to protect human health and the environment, such as the newly discovered contamination posing an imminent risk to human health. In such circumstances, documentation as required in the removal process should be created.

- Given the above, EPA and DON agree that the most efficient framework for specifying, implementing, monitoring, reporting on and enforcing LUCs is:
  - a standard FFA for NPL sites,
  - a clear, concise RoD with LUC objectives, and
  - a RD or RAWP with LUC implementation actions.

Note: These documents are described more fully below.

- EPA and DON will move expeditiously to finalize all outstanding FFAs using a standard FFA template as a guide to minimize the development/writing process.

Note: A "standard FFA" means the Agreement presently being used between EPA and DoD using the DoD-EPA model language, plus site-specific statements of fact, plus the additional primary document shown in Attachment (1).

- EPA and DoD will initiate a task force with appropriate headquarters and field representatives from EPA and the military services. The task force will make recommendations as to how to ensure that the same documentation can be used to memorialize both remedial action completion and deletion, as well as to determine the process whereby DoD and EPA will document the completion of the remedial actions required by the ROD in a single primary document. The task force will examine ways to reduce document size, review time, and revisions. The task force will recommend changes to guidance and policy that will help reduce document

size or streamline the process in order to manage costs. The task force may also include other stakeholders.

After reviewing the task force recommendations EPA and DoD will determine how to ensure that the same documentation can be used to memorialize both remedial action completion and deletion, as well as to determine the process whereby DoD and EPA will document the completion of the remedial actions required by the ROD in a single primary document. In addition, EPA and DoD will streamline the remedial process and better manage costs. While the efforts of the Task Force are meant to complement the Principles described above, its work is separate from the Principles and must not impede their implementation. The work of the Task Force also must not impede completion or closeout of individual sites or operable units.

GENERAL PROCEDURES

1. Federal Facility Agreement

- The LUC implementation and operation/maintenance actions will be included in the RD or RAWP which are already primary documents deliverable under standard FFAs. In addition, the same documentation as determined by the task force and approved by the Parties to memorialize both the remedial action completion and deletion will be provided as a primary document for new FFAs. For existing FFAs without such a primary document, this document will be provided as an attachment to the RD or RAWP with the same enforceability as a primary document.

Note: Model FFA language will need to be supplemented to reflect these Principles and Procedures. Attachment (1) contains necessary modifications to FFA language.

2. Record of Decision

- It is EPA's and DON's intent that Records of Decision (RoDs) continue to be consistent with CERCLA and the National Contingency Plan. Relative to land use controls and institutional controls, the ROD shall:
  - Describe the risk(s) necessitating the remedy including LUCs;
  - Document risk exposure assumptions and reasonably anticipated land uses;
  - Generally describe the LUC, the logic for its selection and any related deed restrictions/notifications;
  - State the *LUC performance objectives*. (See attachment (2) for examples of

LUC performance objectives);
- List the parties responsible for implementing, monitoring, reporting on, and enforcement of the LUC;
- Provide a description of the area/property covered by the LUC (should include a map);
- Provide the expected duration of the LUCs; and
- Refer to the RD or RAWP for LUC *implementation actions,* since these details may need to be adjusted periodically based on site conditions and other factors. (See attachment (2) for examples of LUC implementation actions).

- The ROD at transferring properties will need to be crafted based on the responsibilities of the new owner and state-specific laws and regulations regarding LUCs. At transferring properties, compliance with the LUC performance objectives may involve actions by the subsequent owners in accordance with deed restrictions, however, ultimate responsibility for assuring that the objectives are met remains with DON as the party responsible under CERCLA for the remedy. DON and regulators will consult to determine appropriate enforcement actions should there be a failure of a LUC objective at a transferred property.

3. LUC Remedial Design (RD) or Remedial Action Work Plan (RAWP)

- The RD or RAWP will be provided as a primary document in accordance with the FFA.
- The RD or RAWP will describe short and long-term implementation actions and responsibilities for the actions in order to ensure long-term viability of the remedy which may include both LUCs (e.g., institutional controls) and an engineered portion (e.g., landfill caps, treatment systems) of the remedy. The term "implementation actions" includes all actions to implement, operate, maintain, and enforce the remedy. Depending on the LUC and site conditions, these actions can include:
- Conducting CERCLA five-year remedy reviews for the engineered remedies and/or LUCs.
- Conducting periodic monitoring or visual inspections of LUCs; frequency to be determined by site-specific conditions.
- Reporting inspection results.
- Notifying regulators prior to any changes in the risk, remedy or land use including any LUC failures with proposed corrective action.
- Including a map of the site where LUCs are to be implemented.

For active bases,

- Developing internal-DON policies and procedures with respect to LUC monitoring, reporting, and enforcement in order to institutionalize LUC management and to ensure base personnel are aware of restrictions and precautions that should be taken; Consulting with EPA at least 14 days prior to making any changes to these policies and procedures to ensure that any substantive changes maintain a remedy that is protective of human health and the environment.
- Developing a comprehensive list of LUCs with associated boundaries and expected durations.
- Notifying regulators of planned property conveyance, including federal-to-federal transfers. "Property conveyance" includes conveying leaseholds, easements and other partial interests in real property.
- Obtaining regulator concurrence before modifying or terminating land use control objectives or implementation actions.

For closing bases/excess property:

- Notifying regulators of planned property conveyance, including federal-to-federal transfers.
- Consulting with EPA on the appropriate wording for land use restrictions and providing a copy of the wording from the executed deed.
- Defining responsibilities of the DON, the new property owner and state/local government agencies with respect to LUC implementation, monitoring, reporting, and enforcement.
- Providing a comprehensive list of LUCs with associated boundaries and expected durations.
- Obtaining regulator concurrence before modifying or terminating land use control objectives or implementation actions.

Note: The mix of responsibilities among DON, the new property owner, and other government agencies depends on state and federal laws and regulations that are applied in the state. Implementation actions at closing bases may include elements characteristic of both active and closing bases, depending on the timing of transfer.

- Should there be a failure to complete LUC implementation actions at an active base, the EPA Region shall notify the installation and seek immediate action. Should there be a failure to complete LUC actions after such notification to the base, EPA may notify the Deputy Assistant Secretary of the Navy (Environment) who will ensure that LUC actions are taken.

- Should there be a failure to complete implementation actions that are the responsibility of a subsequent owner or third party at a transferred property, EPA and DON will consult on the appropriate enforcement action. Should there be a failure to complete implementation actions that are the remaining responsibility of DON at a transferred property, the EPA Region will notify the cognizant Navy Engineering Field Division. If necessary, EPA may notify the Deputy Assistant Secretary of the Navy (Environment) who will ensure that corrective action is taken.

  Note: The RD or RAWP should contain no more or no less implementation actions than needed to ensure the viability of the remedy. There is a delicate balance required. EPA and DON both desire to ensure protectiveness while minimizing process and documents. The parties agree to work diligently to define the appropriate implementation actions for each LUC. EPA and DON believe the key elements can be easily developed between RPMs in a matter of a few hours. Based on detailed discussions and the examples shown in Attachment (2), EPA and DON expect that the LUC portion of the RDs or RAWPs to be in the range of 2-6 pages. If combined with a sampling plan, there may be additional pages needed to list the analyses, sampling locations and frequencies.

4. LUC Data

- The DON will ensure that all LUCs at its installations are included in the Service LUC database.

Attachments:
1. Incorporating Land Use Control (LUC) Objectives and Implementing Actions into Federal Facilities Agreements (FFAs)
2. Examples of LUC objectives and LUC Implementation Actions

Attachment 1

INCORPORATING LAND USE CONTROL (LUC) OBJECTIVES AND IMPLEMENTATION ACTIONS INTO FEDERAL FACILITIES AGREEMENTS (FFAs)

FFA Model Template Additions/Changes

1. Definitions Section:

Add: "Land use controls" shall mean any restriction or administrative action, including engineering and institutional controls, arising from the need to reduce risk to human health and the environment.

2. Primary Documents:

Add: A document memorializing remedial action completion.

Note: EPA and DoD believe it is important that a primary document: (1) document the completion of remedy-in-place and/or site close-out and (2) receive concurrence from EPA. The task force discussed above will make recommendations on the scope and content of the document, and DoD and EPA will determine this document after reviewing the task force recommendations. In the meantime, EPA and DON shall enter into FFAs which include a primary document memorializing remedy completion. The document shall not duplicate information in the Administrative Record or previously provided to EPA. Previously provided information shall be referenced and itemized. New information/data (e.g., sampling data) may be needed to demonstrate that the Remedial Action Objectives have been met. The report shall also include any as-built drawings for remedies if different from the remedial design. EPA and DoD do not envision this to be a lengthy document, but shall contain only the information needed to justify the remedy completion. EPA and DoD believe the document should discuss how the remedial objectives in the ROD have been met. It should not be used to expand the scope of requirements beyond the remedial actions required in the original ROD or any subsequent amendment or explanation of significant difference. Instead, if new requirements are needed for a protective remedy, these will be documented in an Explanation of Significant Difference or ROD Amendment, as appropriate, prior to reaching the milestone. The EPA and DoD will determine the precise nature of this document after reviewing the task force's recommendations.

Change: Eliminate the sub-bullets (subsidiary documents) under remedial action work plan for document streamlining purposes.

ttachment 2

EXAMPLES OF LUC OBJECTIVES AND LUC IMPLEMENTATION ACTIONS

(Note: Actions are to be tailored to site-specific conditions.
This is neither a mandatory nor a complete list)

LUC OBJECTIVES (contained in ROD)

- Ensure no construction on, excavation of, or breaching of the landfill cap.
- Ensure no residential use or residential development of the property.
- Ensure no withdrawal and/or use of groundwater.
- Ensure no excavation of soils without a use permit and special handling procedures.

LUC IMPLEMENTATION ACTIONS (contained in the RD or RAWP)

- Conduct a CERCLA five-year remedy review of the LUC and provide to EPA for review.
- Conduct annual inspections of the LUC and report results (active or BRAC – responsible party to be defined).
- Record the LUC in the base master plan. (active)
- Produce a survey plat of the LUC by a state registered land surveyor. (active or BRAC).
- File the survey plat with the local government/Circuit Court for purposes of public notification (active or BRAC)
- Place a survey plat in CERCLA administrative record, and send copies to EPA and state. (active or BRAC).
- Develop and implement a base procedure that requires excavation to be approved by the Public Works Officer or equivalent official. (active)
- Develop and implement a base procedure that requires changes in land use to be approved by the Public Works Officer or equivalent official. (active)
- Notify the regulatory agencies 45 days in advance of any Base proposals for a major land use change at a site inconsistent with the use restrictions and exposure assumptions described in the RoD, any anticipated action that may disrupt the effectiveness of the land use controls, any action that might alter or negate the need for the land use controls, or any anticipated transfer of the property subject to the land use controls.
- Obtain regulator concurrence before modifying or terminating land use control objectives or implementation actions.
- Maintain a comprehensive list of LUCs with associated boundaries and expected durations.

Note: These examples are consistent with draft EPA guidance: "Describing Institutional Controls in Remedy Decision Documents at Active Federal Facilities".

ATTACHMENT A

AREA OF CONCERN 1

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT ATTACHMENT A, AREA OF CONCERN 1 IR SITE 35, TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

Prepared by:

BECHTEL ENVIRONMENTAL, INC.
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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 1. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station Alameda), Alameda, California (Figure 1-1).

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

AOC 1 is an approximately 0.5-acre area near the northwestern boundary of Transfer Parcel Economic Development Conveyance (EDC)-5 and in the south-central portion of Environmental Baseline Survey (EBS) Parcel 43 (Figure 1-1). A small portion of Building 3 is located in the eastern portion of AOC 1. The remainder of AOC 1 consists of a landscaped area in the south and two paved areas: a rear kitchen area in the eastern portion and a loading dock area in the western portion of the AOC.

1.2 HISTORICAL USE

EBS Parcel 43 (and specifically Building 3) was historically used for housing and barracks. Chemical storage in these residential buildings was minimal, and only minor stains were observed indoors during the EBS (IT 2001a). Two grease pits, identified as Oil/Water Separator (OWS) 063A and OWS 063C in the Solid Waste Management Unit (SWMU) Report (SulTech 2005a), were present outdoors in the rear kitchen area portion of Building 3 (Figure 1-1). During a June 2005 site visit by Bechtel Environmental, Inc. (BEI), the locations of these OWSs were identified by identical fenced areas; each OWS was covered by a metal plate measuring approximately 5 by 7 feet (Photographs 1-1 and 1-2). According to the SWMU Report, the larger OWS (OWS 063C) measures 16 by 4 by 10 feet deep, and the smaller OWS (OWS 063A) measures 12 by 4.5 by 10 feet deep. The grease pits were connected to part of the sanitary sewer system but were not known to have received any hazardous materials. During the EBS, grease and oil stains, possibly from cooking activities, were observed outdoors near OWS 063C.

A third OWS, identified as OWS 063B, was located in the loading dock area of AOC 1. OWS 063B measured 8.5 by 2 by 5 feet deep and was used to manage runoff from this area (SulTech 2005a) (Figure 1-1, Photograph 1-3). The materials collected in this OWS are unknown. All three OWSs were observed in 2002 to be inactive. Additionally, paint stains were identified on outdoor concrete (in an unspecified location) during the EBS (IT 2001a). No evidence of OWS 063B was found during the June 2005 site visit by BEI; the assumed former location is shown in Photograph 1-3.

Photograph 1-1
OWS-063A, View to East

Photograph 1-2
OWS-063C, View to East

Photograph 1-3
Assumed Former Location of OWS-063B, View to East

1.3 PRELIMINARY SCREENING CRITERIA

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this AOC are the following:

- Soil
  - residential preliminary remediation goals (U.S. EPA 2004b), except polynuclear aromatic hydrocarbons (PAHs) classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (DON 2001a)
  - environmental screening levels (ESLs) for total petroleum hydrocarbons (TPH) – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)
- Groundwater
  - maximum contaminant levels and advisory level for lead (U.S. EPA 2002, DHS 2006)
  - ESLs for TPH (current or potential source of drinking water) (RWQCB 2005)

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being

assessed. For example, groundwater concentrations from all study areas were compared to maximum contaminant levels, whether or not the groundwater was considered a potential drinking water source in that area. Groundwater concentrations in areas near surface water bodies were also compared to surface water PSCs even though surface water criteria are not applicable to groundwater. Chemicals of potential concern (COPCs) identified in the health risk evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs.

1.4 PREVIOUS INVESTIGATIONS

During three previous investigations, soil and/or groundwater samples were collected at AOC 1, and results are summarized below. Locations sampled in AOC 1 are shown on Figure 1-1. Analytical results for soil samples collected within AOC 1 are provided in Appendix B.

1.4.1 Environmental Baseline Survey

During the EBS, two surface soil samples (043-0001 and 043-0001M) were collected near OWS 063C from the most heavily stained area and analyzed for TPH (IT 2001a). TPH constituents reported in soil were below PSCs.

1.4.2 2002 Polynuclear Aromatic Hydrocarbon Study

One soil boring (32EDC-5-2) was advanced in AOC 1 during the 2002 PAH study (BEI 2005a). Samples were collected from four depth intervals between 0 and 8 feet below ground surface (bgs) and analyzed for PAHs. PAH concentrations reported in the samples were below the PSC.

1.4.3 Solid Waste Management Unit Report

The three OWSs near Building 3 were included in the 2005 SWMU Report (SulTech 2005a). Because no hazardous materials are known to have been received by the two OWSs (063A and 063C) used as grease pits, no further action was recommended. However, further action was recommended for the former location of OWS 063B because the materials that were in this OWS are unknown and no sampling has been conducted at this location.

1.5 ADJACENT SITES

IR Site 26, located less than 125 feet west of AOC 1, is known as the Western Hangar Zone. Activities previously conducted at IR Site 26 include aircraft parking, maneuvering, washdown, fueling, and maintenance, as well as support activities including paint spraying, mixing, storage, and use of solvents, adhesives, detergents, alcohol, and sealers. Fuel pipelines and ten aboveground storage tanks were historically located on the site.

Discussions presented here are limited to chemicals of concern in the northern portion of IR Site 26 near Building 20 because this area is the contaminated portion of IR Site 26

that is adjacent to IR Site 35. During the RI for IR Site 26 (BEI 2003), chlorinated volatile organic compounds (VOCs), benzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and naphthalene were reported in groundwater near the southeastern corner of Building 20. However, concentrations of chlorinated VOCs generally decrease to below detection limits within the boundaries of IR Site 26, and the VOC plume does not extend to AOC 1 (BEI 2003).

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Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, geology, and potential groundwater beneficial use at AOC 1.

AOC 1 is located west of Saratoga Street. Topography at AOC 1 is relatively flat. The average ground elevation is 9 feet above mean sea level (MSL), based on elevation data from the three borings (A01SB01 through A01SB03) advanced during the RI. Average groundwater depth in the three borings was approximately 3 feet bgs. Groundwater depth was measured in temporary casings prior to groundwater sample collection. Total dissolved solids (TDS) concentrations analyzed in groundwater samples from the borings ranged from 444 to 2,490 milligrams per liter (mg/L), and the average TDS concentration was 1,800 mg/L. The groundwater monitoring well nearest to AOC 1 is M05-01, located approximately 500 feet south of AOC 1. A review of groundwater depths in this well over time (August 1991 through March 2005) shows depth to water from approximately 6 to 8 feet bgs. The deepest historical groundwater measured in this well is approximately 4 feet above MSL. This value, if subtracted from the ground elevation at AOC 1, would suggest groundwater in the vicinity of this AOC may have been as deep as 5 feet bgs.

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is northeast at AOC 1. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Tidal influence at AOC 1, located approximately 1,600 feet from Oakland Inner Harbor, would be expected to be negligible, based on tidal studies performed at other nearby Alameda Point sites. Results of tidal studies at nearby sites (see Section 2 of the main RI/FS Report) indicated a minimal effect on groundwater elevations in the fill material at the inland well, located approximately 200 feet from Oakland Inner Harbor.

Soil encountered in the three RI borings consisted of poorly graded sand and poorly graded sand with silt to total boring depth (12 feet bgs). Road base was encountered to about 1 to 2 feet bgs in borings A01SB02 and A01SB01, respectively. Fill material was encountered in the three borings to approximately 5 to 8 feet bgs, below which bay sediments were encountered. Fine-grained bay sediment (Young Bay Mud) was not encountered in the borings; however, the IR Site 26 RI (BEI 2003) identified the Young Bay Mud between approximately 7.5 to 19 feet bgs. The Young Bay Mud is estimated to be approximately 12 to 13 feet bgs at AOC 1, as shown on Figure 2-9 of the main RI/FS Report. RI boring logs are presented in Appendix D. As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust is not likely to be located beneath AOC 1; it was not encountered in borings advanced to 12 feet bgs during the RI.

Based on the location of AOC 1 west of Saratoga Street, groundwater at AOC 1 would not be considered a drinking water source. In a letter dated July 21, 2003, the Navy received concurrence from the San Francisco Bay Regional Water Quality Control Board (Water Board) that groundwater west of Saratoga Street meets exemption criteria for the municipal and domestic water supply designation in the California State Water Resources Control Board (SWRCB) source of drinking water policy Resolution (Res.) 88-63 (SWRCB 1988) and California Regional Water Quality Control Board Res. 89-39 (RWQCB 2003).

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Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for AOC 1. The RI was conducted in accordance with the sitewide data quality objectives (DQOs) for evaluation of OWSs presented in Table 3-2 of the main RI/FS Report.

3.1 APPROACH

AOC 1 is located entirely within the boundaries of EBS Parcel 43, which was historically used for housing and barracks. Previous investigations did not identify TPH or PAHs in soil at concentrations above screening criteria near Building 3; however, soil samples were not collected immediately adjacent to the three OWSs (063A, 063B, and 063C), two of which were used as grease pits for the kitchen, and groundwater was not assessed.

Regulatory agencies requested that soil and groundwater sampling be performed at each OWS in AOC 1 to assess whether soil and groundwater have been impacted by possible releases of contaminants.

3.2 SCOPE

Soil and grab groundwater samples were collected during the 2005 RI sampling from one boring adjacent to each of the three OWSs. Since the depths of the OWSs are known, the deepest samples targeted the bottom of each OWS. Soil and groundwater samples collected during the RI were analyzed for VOCs and TPH-fuel fingerprint. Groundwater samples were also analyzed for TDS. Table 3-1 includes a summary of samples collected during the RI and previous investigations. Figure 1-1 shows sampling locations from all investigations.

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Section 4
NATURE AND EXTENT OF CONTAMINATION

This section presents the analytical results from previous investigations and from the RI along with the spatial distributions of the analytes with concentrations above PSCs identified at AOC 1. Soil and groundwater samples were collected at five locations during the EBS (IT 2001a), the 2002 PAH study (BEI 2005a), and the RI (Table 3-1 and Figure 1-1). Statistical summaries of soil and groundwater results are presented in Tables 4-1 and 4-2, and soil and groundwater analytical results are summarized in Tables 4-3 and 4-4. Complete analytical results for historical and RI samples from AOC 1 are included in Appendices B and G, respectively.

4.1 SOIL SAMPLING RESULTS

Analytical soil sampling results are summarized below for each class of chemicals investigated at AOC 1 (Figure 1-1).

4.1.1 Volatile Organic Compounds

Carbon disulfide was reported in soil from boring A01SB01, and cis-1,2-dichloroethene was reported in soil from borings A01SB01 and A01SB02. Naphthalene was reported in a soil sample collected below the groundwater table (10.5 to 12 feet bgs) at boring A01SB03. Reported VOC concentrations were below PSCs.

4.1.2 Polynuclear Aromatic Hydrocarbons

Sixteen PAHs were reported in soil from boring 32EDC-5-2. B(a)P equivalent concentrations were below the PSC.

4.1.3 Total Petroleum Hydrocarbons

Diesel-range TPH, motor oil–range TPH, and jet propellant grade 5–range TPH were reported in soil from borings 043-0001 and A01SB02. TPH was not reported above laboratory detection limits in soil samples from borings A01SB01 or A01SB03, indicating TPH in soil is limited to the eastern portion of the AOC. Reported TPH concentrations were below PSCs.

4.2 GROUNDWATER SAMPLING RESULTS

Groundwater samples were not collected at AOC 1 during previous investigations. Analytical results for samples collected during the 2005 RI sampling are presented for each class of chemicals investigated at AOC 1 (Figure 4-1).

4.2.1 Volatile Organic Compounds

Ten VOCs were reported in groundwater samples from AOC 1. Carbon disulfide was reported in groundwater from borings A01SB01 and A01SB02. Carbon disulfide, ethylbenzene, isopropylbenzene, m-,p-xylene, o-xylene, p-isopropyltoluene, toluene, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene were reported in groundwater from

boring A01SB03. Except for carbon disulfide, the VOCs reported in groundwater are constituents of fuel.

Naphthalene was also reported in groundwater from A01SB03 at a concentration of 1,200 micrograms per liter (µg/L). Naphthalene was not reported in the groundwater sample from boring A01SB01, which is estimated to be downgradient of boring A01SB03, or in the groundwater sample from boring A01SB02. This suggests that the extent of naphthalene in groundwater at AOC 1 is limited.

Reported VOC concentrations were below PSCs. There is no PSC for naphthalene in groundwater.

4.2.2 Total Petroleum Hydrocarbons

TPH was not reported above detection limits in groundwater from borings A01SB01, A01SB02, or A01SB03.

Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for AOC 1. It discusses the conceptual site model, the physical and chemical changes that might occur to contaminants present at AOC 1, and the mechanisms that could potentially transfer the contaminants from the study area. The conceptual site model facilitates understanding of the present AOC conditions by integrating AOC-specific physical characteristics with the nature and extent of contaminants in the physical system. Section 5.2 includes an evaluation of the mobility and persistence of compounds above PSCs not attributable to background and of risk drivers identified at AOC 1. Section 5.3 discusses potential migration pathways.

5.1 AOC 1 CONCEPTUAL SITE MODEL

AOC 1 is located west of Saratoga Street in the northwestern portion of Transfer Parcel EDC-5. Topography at AOC 1 is flat, and most of the study area is paved with asphalt and concrete. The remaining areas of AOC 1 are covered with grass or Building 43. The nearest surface water is Oakland Inner Harbor, approximately 1,600 feet north of AOC 1.

Based on a review of borings logs for AOC 1, the subsurface lithology at AOC 1 consists of generally homogeneous artificial fill material and bay sediments comprising poorly graded sand and poorly graded sand with silt. Shallow groundwater of the first water-bearing zone beneath AOC 1 occurs in the fill material. The underlying Young Bay Mud is expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. The western extent of the Marsh Crust is not likely to be present beneath AOC 1, and it was not encountered in RI borings. Groundwater flow direction is approximately northeast, and depth to water is approximately 3 feet bgs but may have historically been as deep as 5 feet bgs. Tidal influence is expected to be negligible at AOC 1 because of its distance from Oakland Inner Harbor. Groundwater at AOC 1 would not be a drinking water source based on the Water Board's finding that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation (RWQCB 2003).

Naphthalene was the primary chemical reported at AOC 1. Naphthalene was reported in groundwater and in a saturated soil sample (collected at 10.5 to 12 feet bgs) from one boring adjacent to OWS 063A. Because it was not reported in the shallower soil samples from this boring, naphthalene may have originated from a release from OWS 063A, which extends to depths below the water table. Other constituents common in fuels were also reported in groundwater at low concentrations at this location. Naphthalene was not reported in soil or groundwater samples from borings located adjacent to the other two OWSs.

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in the environment tends to remain in place. The tendency toward immobility and

persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Section 5 of the main RI/FS Report discusses the physical and chemical properties of contaminants and their chemical classes (e.g., VOCs) that affect their transport and persistence in the environment. This section summarizes the mobility and persistence of naphthalene, the primary chemical reported at AOC 1.

Although a PAH, naphthalene behaves more like a VOC in the environment. It can be transported in air because of its lower molecular weight and high vapor pressure. The Henry's law constant for naphthalene indicates that it will partition primarily in the vapor phase and is capable of movement in the vadose zone by molecular diffusion. Naphthalene can also adsorb to soil. This process is controlled by organic carbon partition coefficient (K_{oc}) and fraction organic carbon (f_{oc}). Table 5-1 shows the results of distribution calculations for the percentage of naphthalene sorbed to soil. Geotechnical samples were not collected from AOC 1; therefore, the average f_{oc} for the soil intervals containing poorly graded sand-silty sand was used.

In soil and groundwater, microorganisms have the ability to break down naphthalene (ATSDR 2005a), and biodegradation is the dominant fate process for naphthalene in aquatic systems. Half-lives reported for naphthalene range from 3 to 260 days in various water systems, with the fastest rates of biodegradation occurring in oil-polluted water and the slower rates in unpolluted waters. In general, biodegradation rates increase with naphthalene concentration (ATSDR 1995).

5.3 CONTAMINANT MIGRATION

The potential migration pathways considered for this AOC include atmospheric transport (e.g., airborne fugitive dust or vapors), transport by surface water runoff, and groundwater transport. Samples collected from surface soil did not have reported concentrations of analytes above PSCs. Additionally, most of the study area is paved and the remainder is covered with grass. Therefore, significant transport by airborne dust or by surface water runoff is unlikely. The two most likely migration pathways for contaminants at AOC 1 are discussed below.

- **Atmospheric Transport by Vapors.** Naphthalene can be transported into air by volatilizing from the soil and groundwater directly into air. With the exception of benzo(g,h,i)perylene, naphthalene is the least volatile of the VOCs identified as contaminants at IR Site 35. Currently, the pavement covering most of AOC 1 would lessen the effect of this transport mechanism.
- **Groundwater Transport.** Chemicals dissolved in groundwater move along with the bulk flow of groundwater by a process known as advection. There is also a tendency for a solute to spread out from the path it would be expected to follow based on the advective hydraulics of the flow system. Advection and dispersion are affected by the groundwater flow velocity, properties of the porous medium, and K_{oc} of the solute. Because of its relatively high (compared to other VOCs) K_{oc} value, migration of naphthalene is expected to be retarded compared to the movement of groundwater. Calculations described in Section 5 of the main RI/FS Report indicate that the velocity of naphthalene in the subsurface would be approximately 138 times slower than the velocity in

groundwater. This is supported by the fact that naphthalene was not reported in the groundwater sample estimated to be downgradient of OWS 063A; however, the absence of naphthalene in the downgradient samples may also be due to a slightly different groundwater flow direction or migration through a preferential pathway. It should be noted that the calculated retardation factor of 138 for naphthalene is approximate because it was based on average values for bulk mass density and porosity for samples collected in silty sands across IR Site 35. No soil samples collected at AOC 1 were analyzed for these properties, and they can vary appreciably from location to location.

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Section 6
HUMAN-HEALTH RISK ASSESSMENT

This section summarizes the baseline human-health risk assessment (HHRA) results for AOC 1. In the baseline HHRA, risk for a residential exposure scenario is assessed with the assumption that no remedial action would take place at the study area. Baseline risks were evaluated for reasonable maximum exposure (RME). This section also presents a qualitative uncertainty evaluation that identifies and characterizes the effects of uncertainties on the risk results.

The HHRA calculates total cumulative risk values and was conducted in accordance with guidelines published by the United States Environmental Protection Agency (U.S. EPA) in the Risk Assessment Guidance for Superfund Part A (U.S. EPA 1989), Part B (U.S. EPA 1991), and Part E (U.S. EPA 2004a) and supporting documents and guidelines published by the California Environmental Protection Agency (Cal/EPA) (1993, 1994, 1999, 2005). The approach used to calculate risk is described in Section 6 of the main RI/FS Report. HHRA information is provided in Appendix J.

Cancer risk and noncancer values for AOC 1 are shown in Table 6-1. Risk drivers for cancer and noncancer risk are presented in Table 6-2.

6.1 COPC IDENTIFICATION

Data selection and identification of COPCs are based on a compilation of all usable data for soil and groundwater. All chemicals reported in at least one sample collected during the RI and/or included in the historical data were included as HHRA COPCs. The HHRA included PAHs in soil.

The identification of HHRA COPCs in soil was based on the results from analyses of samples collected from 0 to 10 feet bgs or to groundwater if depth to groundwater is less than 10 feet bgs.

There are 17 COPCs in soil: nine VOCs and eight semivolatile organic compounds based on four samples for most COPCs.

There are ten COPCs in groundwater, all VOCs, based on three samples.

6.2 RISK CHARACTERIZATION

This section presents the results of the U.S. EPA and Cal/EPA cancer risk calculations and noncancer hazard values. For cancer risk, specific exposure pathways are discussed in the following sections. Results are presented in terms of exposure groups:

- **Exposure Group 1.** All soil and groundwater exposure pathways (includes residential use of groundwater)
- **Exposure Group 2.** Exposure pathways for soil and vapors from VOCs in groundwater (does not include residential use of groundwater)
- **Exposure Group 3.** Exposure pathways for residential use of groundwater

Two results are presented for each exposure group, the total risk and a second value that does not include risk associated with metals concentrations that are below Alameda Point background. For cancer risk, specific exposure pathways are also discussed.

6.2.1 Cancer Risk

The total U.S. EPA and Cal/EPA RME cancer risks at AOC 1 are 1×10^{-6} and 4×10^{-3}, respectively. Note that none of the VOCs in groundwater are considered carcinogens by U.S. EPA, so no U.S. EPA cancer risk is calculated for pathways associated only with groundwater. The total RME cancer risk rank-ordered by exposure pathway for U.S. EPA and Cal/EPA, respectively, are as follows:

- residential use of groundwater (no carcinogens and 4×10^{-3})
- direct contact with soil (1×10^{-6} and 2×10^{-6})
- inhalation of vapors in indoor air (no carcinogens and 5×10^{-5})
- ingestion of homegrown produce (1×10^{-7} and 2×10^{-7})
- inhalation of particulates and vapors in outdoor air (6×10^{-11} and 1×10^{-9})

Exposure pathways with cancer risks above the risk management range include residential use of groundwater (ingestion, inhalation, and dermal contact while showering). The primary Cal/EPA risk driver is associated with one groundwater sample with a reported naphthalene concentration of 1,200 µg/L.

6.2.2 Noncancer Hazard

The noncancer hazard index (HI) value at AOC 1 is 29 with residential use of groundwater and 2 without residential use of groundwater. All values above 1 are due to naphthalene in groundwater.

6.3 UNCERTAINTY ANALYSIS

The number of soil samples (four) and the number of groundwater samples (three) are considered adequate for this half-acre study area. Soil samples collected at AOC 1 were not analyzed for metals, in accordance with the Work Plan (BEI 2006). The sample results, with the exception of the detection of naphthalene, are consistent with this study area, which has no history of chemical use. The concentrations in indoor air are based on the maximum concentration of naphthalene in groundwater and soil parameters that result in the highest amount of vapor migration from all site-specific soil data.

6.4 CONCLUSIONS

The U.S. EPA cancer risk for Exposure Group 1 is 1×10^{-6}. The U.S. EPA cancer risk for Exposure Group 3 could not be calculated because none of the COPCs in this exposure group are classified as carcinogens. The Cal/EPA cancer risk is the same for Exposure Groups 1 and 3, at 4×10^{-3}. Cal/EPA cancer risk is due primarily to ingestion of naphthalene in groundwater and inhalation of naphthalene vapors in indoor air. The

noncancer HI is 29 for Exposure Group 1 and 27 for Exposure Group 3, due to naphthalene.

For reasonable future use exposure (Exposure Group 2), the U.S. EPA and Cal/EPA cancer risks are 1×10^{-6} and 5×10^{-5}, respectively. Cal/EPA cancer risk is due to naphthalene vapors from groundwater to indoor air. The HI is 2. Soil samples were not analyzed for metals, in accordance with the Work Plan (BEI 2006).

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Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at AOC 1, including the nature and extent of contamination and results of the baseline HHRA. RI results form the basis of responses to the DQO decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendations presented below.

7.1 SUMMARY

Previous investigations at AOC 1 did not report TPH or PAHs in soil at concentrations above screening criteria near Building 3; however, soil samples were not collected immediately adjacent to the three OWSs, two of which were used as grease pits for the kitchen, and groundwater was not assessed.

The primary chemical reported at AOC 1 is naphthalene in groundwater; there is no groundwater PSC for this compound. Other reported analyte concentrations in soil and groundwater at AOC 1 were below PSCs.

Naphthalene was reported at 1,200 µg/L in a groundwater sample from boring A01SB03 adjacent to OWS 63A. The naphthalene concentration in the saturated soil sample from this boring was below the soil PSC. The soil sample concentration likely reflects the naphthalene concentration reported in groundwater from this boring. While the extent of naphthalene in groundwater at AOC 1 has not been completely defined, results of two other groundwater samples suggest it is limited. Groundwater at AOC 1 would not be a drinking water source based on the Water Board's finding that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.

Results of the baseline HHRA show total cancer risks of 1×10^{-6} and 4×10^{-3} (greater than the risk management range) for U.S. EPA and Cal/EPA, respectively, and an HI of 29. Cancer risk is due to the presence of naphthalene. Without residential use of groundwater, the Cal/EPA cancer risk is 5×10^{-5} (within the risk management range) with an HI of 2. Without residential use of groundwater, the cancer risk and hazard value (within the risk management range) are due to the presence of naphthalene in indoor air.

7.2 AOC 1 CONCLUSIONS AND RECOMMENDATIONS

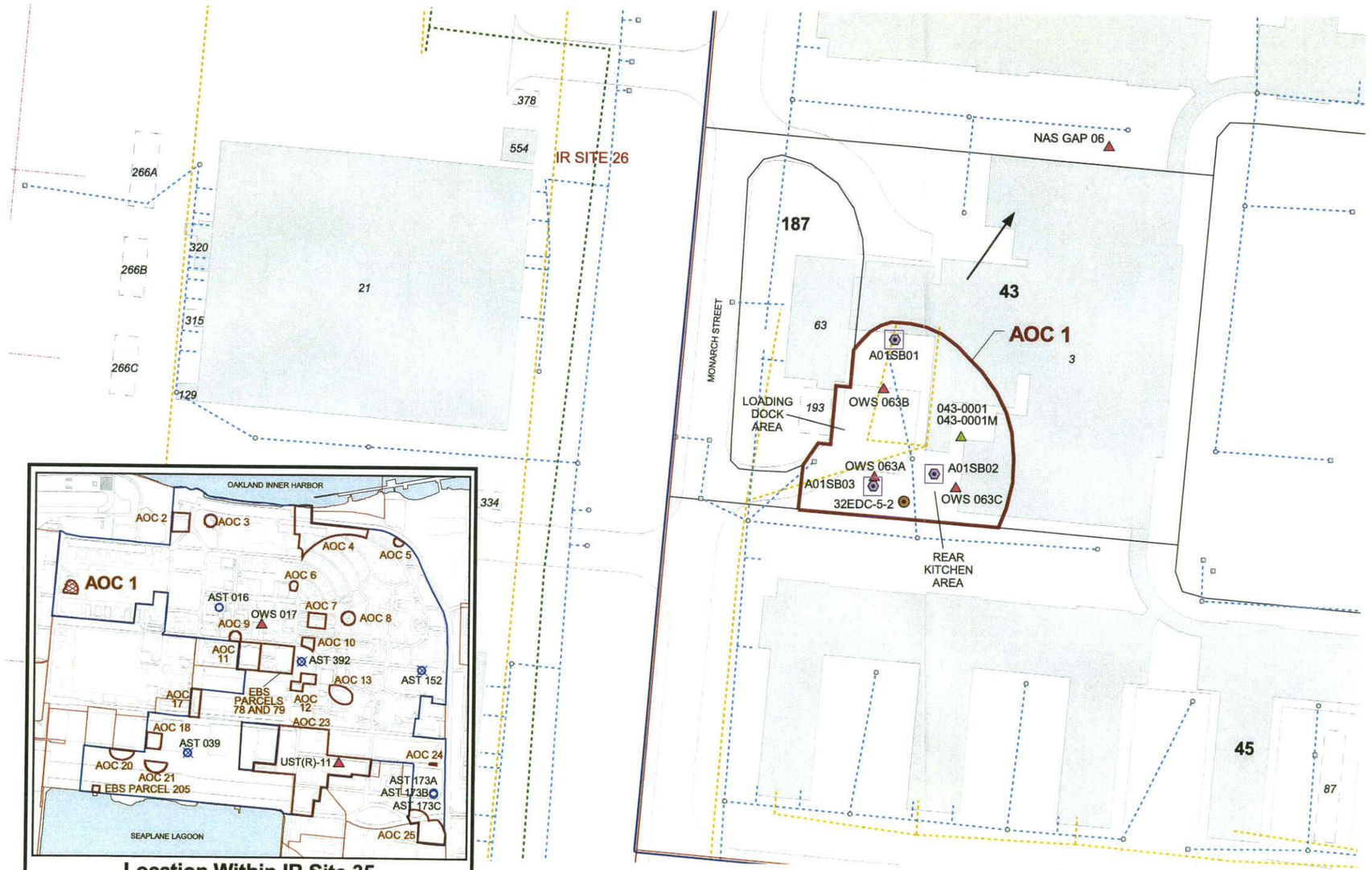
The RI was conducted using the seven-step DQO process (U.S. EPA 2000); DQOs were developed for AOC 1 in the Work Plan (BEI 2006). The RI has addressed these DQOs, as summarized in Table 7-1.

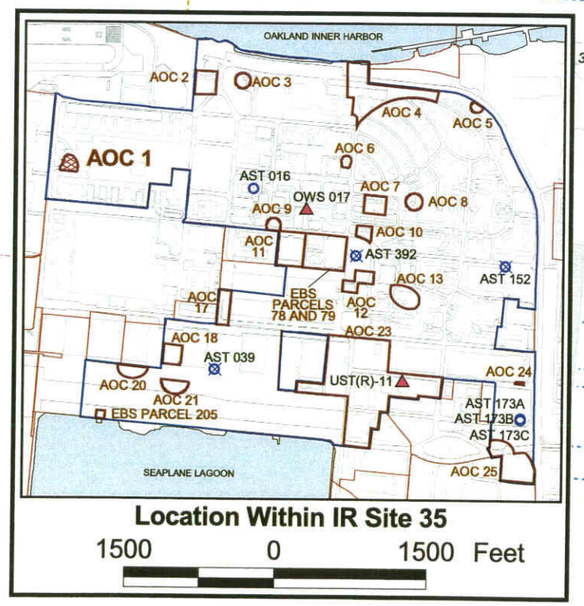
Data collected during previous investigations and the RI were sufficient to perform a baseline HHRA and support decisions on the necessity for remedial actions at AOC 1. The nature and extent of naphthalene in groundwater are not completely delineated, and risk due to naphthalene in groundwater is greater than the risk management range. However, because AOC 1 is located west of Saratoga Street, groundwater at the AOC meets the exemption criteria for SWRCB designation as a municipal and domestic water supply.

An FS is recommended for AOC 1 for the reasons listed below. Refinement of the lateral extent of naphthalene in groundwater is also recommended for inclusion in the FS alternatives.

- Naphthalene is an emergent chemical; the toxicity factor for naphthalene has recently been revised by Cal/EPA and is currently being revised by U.S. EPA.
- The cancer risk without residential groundwater use is driven by inhalation of naphthalene in indoor air. While the cancer risk is within the risk management range for a future resident, the Navy is recommending an FS for AOC 1 to be sensitive to possible public concerns about naphthalene while U.S. EPA revises its toxicity factor.

FIGURES





Location Within IR Site 35

1500 0 1500 Feet

LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- SWMU LOCATION (APPROXIMATE)
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

EBS SOIL SAMPLING LOCATION
- FUELS ANALYSIS ONLY

PAH STUDY SOIL SAMPLING LOCATION
- SVOCs ANALYSIS ONLY

RI SOIL SAMPLING LOCATION
- VOCs AND FUELS ANALYSES ONLY

RI GROUNDWATER SAMPLING LOCATION WITH STATION ID
- VOCs AND FUELS ANALYSES ONLY

N

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOCs – VOLATILE ORGANIC COMPOUNDS

100 0 100 Feet

RI/FS Report for IR Site 35

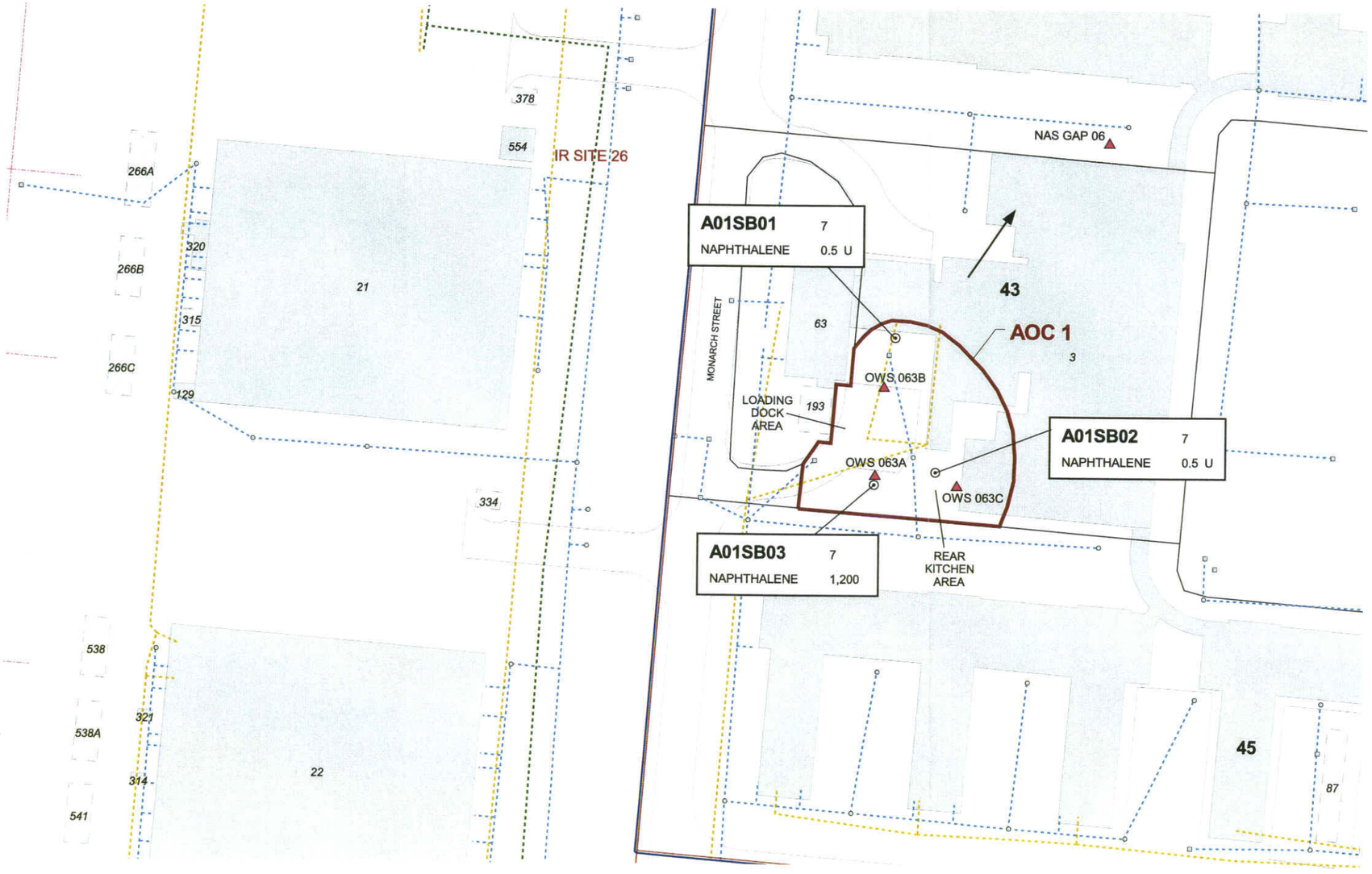
Figure 1-1

Study Area and Sampling Locations
Area of Concern 1

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/30/06
File No.: 077L14428
Job No.: 23818-077
Rev No.: C



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- SWMU LOCATION (APPROXIMATE)
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- RI GROUNDWATER SAMPLING LOCATION

N

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

A01SB02 7
NAPHTHALENE 0.5 U

ANALYTE — REVIEW QUALIFIER
CONCENTRATION in µg/L

NOTES:

DETECTED NAPHTHALENE CONCENTRATION DOES NOT HAVE PSC BUT IS SHOWN BECAUSE IT IS A RISK DRIVER

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
µg/L – MICROGRAMS PER LITER
OWS – OIL/WATER SEPARATOR
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
U – THE ANALYTE WAS NOT REPORTED ABOVE THE DETECTION LIMIT. THE ASSOCIATED NUMERICAL VALUE IS THE REPORTING LIMIT

RI/FS Report for IR Site 35

Figure 4-1

Groundwater Sampling Results for Naphthalene
Area of Concern 1

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/30/06
File No.: 077L14468
Job No.: 23818-077
Rev No.: C

TABLES

Table 3-1
Sample Analysis Summary, AOC 1

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE			
				VOCs	TPH	SVOCs	TDS
Soil							
043-001-001	043-0001[a]	EBS	0.5–1		X[b]		
043-001-001	043-0001M[a]	EBS	0.5–1		X[b]		
32EDC-5-2	C032C763	PAH Study	0–0.5			X	
32EDC-5-2	C032C764	PAH Study	0.5–2			X	
32EDC-5-2	C032C765	PAH Study	2–4			X	
32EDC-5-2	C032C766	PAH Study	4–8			X	
A01SB01	C077S001	Site 35 RI	1–2	X	X[c]		
A01SB01	C077S009	Site 35 RI	3–4	X	X[c]		
A01SB01	C077S002	Site 35 RI	7–8	X	X[c]		
A01SB02	C077S004	Site 35 RI	1–2	X	X[c]		
A01SB02	C077S005	Site 35 RI	3–4	X	X[c]		
A01SB02	C077S006	Site 35 RI	11–12	X	X[c]		
A01SB03	C077S007	Site 35 RI	1–2	X	X[c]		
A01SB03	C077S008	Site 35 RI	3–4	X	X[c]		
A01SB03	C077S010	Site 35 RI	10.5–12	X	X[c]		
Groundwater							
A01SB01	C077G001	Site 35 RI	7–12	X	X[c]		X
A01SB02	C077G002	Site 35 RI	7–12	X	X[c]		X
A01SB03	C077G003	Site 35 RI	7–12	X	X[c]		X

References:
EBS (IT 2001a)
PAH Study (BEI 2005a)

Notes:
[a] sample 043-0001 was analyzed by a fixed-base laboratory; sample 043-0001M was analyzed by a mobile or screening laboratory; samples 043-0001/-0001M were collected from the same location
[b] analyzed for gasoline-, diesel-, and motor oil–range TPH
[c] analyzed for diesel-, JP-5–, and motor oil–range TPH

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
EBS – environmental baseline survey
JP-5 – jet propellant grade 5
PAH – polynuclear aromatic hydrocarbon
RI – remedial investigation
SVOC – semivolatile organic compound
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 1

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	TPH ESL
Volatile Organic Compounds (µg/kg)									
carbon disulfide	9	1	11	0	2.2	2.2	2.2	360,000	—[c]
cis-1,2-dichloroethene	9	2	22	0	0.34	0.34	0.34	43,000	—
naphthalene	9	1	11	0	170	170	170	1,700 [d]	—
Fuels (µg/kg)									
diesel	11	3	27	0	2,200	5,500	8,800	—	100,000
JP-5	9	1	11	0	5,300	5,300	5,300	—	100,000
motor oil	11	3	27	0	11,000	25,000	40,000	—	500,000
Semivolatile Organic Compounds (µg/kg)									
acenaphthylene	4	1	25	No PSC	2.4	2.4	2.4	—	—
anthracene	4	1	25	0	3.9	3.9	3.9	22,000,000	—
benz(a)anthracene	4	2	50	0	2.5	15	27	620	—
benzo(b)fluoranthene	4	3	75	0	1.5	17	45	620	—
benzo(k)fluoranthene	4	2	50	0	3	25	46	380 [d]	—
benzo(g,h,i)perylene	4	3	75	No PSC	2.5	19	50	—	—
benzo(a)pyrene	4	2	50	0	4.4	25	46	62	—
chrysene	4	2	50	0	3.7	27	51	3,800 [d]	—
dibenz(a,h)anthracene	4	1	25	0	8.5	8.5	8.5	62	—
fluoranthene	4	3	75	0	2.8	21	54	2,300,000	—
fluorene	4	1	25	0	1.2	1.2	1.2	2,700,000	—
indeno(1,2,3-cd)pyrene	4	3	75	0	1.9	19	49	620	—
2-methylnaphthalene	4	1	25	No PSC	2.9	2.9	2.9	—	—
naphthalene	4	1	25	0	2.7	2.7	2.7	1,700 [d]	—
phenanthrene	4	3	75	No PSC	1.8	11	29	—	—
pyrene	4	3	75	0	4	23	58	2,300,000	—

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 1

Acronyms/Abbreviations:

AOC – area of concern
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
JP-5 – jet propellant grade 5
µg/kg – micrograms per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
TPH – total petroleum hydrocarbons

Table 4-2
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, AOC 1

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC	Minimum[a]	Average[a]	Maximum[a]	California MCL
Volatile Organic Compounds (µg/L)								
carbon disulfide	3	3	100	No PSC	0.25	0.93	2.1	—[b]
ethylbenzene	3	1	33	0	1.7	1.7	1.7	300
isopropylbenzene	3	1	33	No PSC	0.37	0.37	0.37	—
p-isopropyltoluene	3	1	33	No PSC	0.69	0.69	0.69	—
naphthalene	3	1	33	No PSC	1,200	1,200	1,200	—
toluene	3	1	33	0	0.79	0.79	0.79	150
1,2,4-trimethylbenzene	3	1	33	No PSC	7.1	7.1	7.1	—
1,3,5-trimethylbenzene	3	1	33	No PSC	2.3	2.3	2.3	—
xylenes, total	3	1	33	0	4.2	4.2	4.2	1,800
General Chemistry (µg/L)								
solids, total dissolved	3	3	100	No PSC	444,000	1,800,000	2,490,000	—

Notes:
[a] data review qualifiers are not included in this table
[b] dash indicates not applicable or not established

Acronyms/Abbreviations:
AOC – area of concern
µg/L – micrograms per liter
MCL – maximum contaminant level
PSC – preliminary screening criterion (MCL)

Table 4-3
Soil Sampling Results, AOC 1

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	043-001-001 043-0001 0.5 - 1 18-Jul-95	043-001-001 043-0001M 0.5 - 1 18-Jul-95	32EDC-5-2 C032C763 0 - 0.5 13-May-02	32EDC-5-2 C032C764 0.5 - 2 13-May-02	32EDC-5-2 C032C765 2 - 4 13-May-02	32EDC-5-2 C032C766 4 - 8 13-May-02	A01SB01 C077S001 1 - 2 14-Dec-05	A01SB01 C077S002 7 - 8 14-Dec-05	A01SB01 C077S009 3 - 4 14-Dec-05	A01SB02 C077S004 1 - 2 14-Dec-05	A01SB02 C077S005 3 - 4 14-Dec-05	A01SB02 C077S006 11 - 12 14-Dec-05	A01SB03 C077S007 1 - 2 14-Dec-05	A01SB03 C077S008 3 - 4 14-Dec-05	A01SB03 C077S010 10.5 - 12 14-Dec-05
VOCs																				
carbon disulfide	360,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	100 U	2.2 J	100 U	100 U	100 U	100 U	100 U	100 U	100 U
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	5 U	0.34 J	6 U	0.34 J	6 U	6 U	6 U	6 U	6 U
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	20 U	30 U	30 U	20 U	20 U	20 U	20 U	20 U	170
Petroleum Hydrocarbons																				
diesel	—	—	100,000	—	µg/kg	11,000 U	2,200	NA	NA	NA	NA	1,100 U	1,200 U	1,200 U	1,200 U	1,100 U	1,200 U	5,400	1,200 U	8,800
JP-5	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	1,100 U	1,200 U	1,200 U	1,200 U	1,100 U	1,200 U	1,100 U	1,200 U	5,300
motor oil	—	—	500,000	—	µg/kg	23,000 J	40,000	NA	NA	NA	NA	11,000 U	12,000 U	12,000 U	12,000 U	11,000 U	12,000 U	11,000	12,000 U	12,000 U
SVOCs																				
acenaphthylene	—	—	—	—	µg/kg	NA	NA	2.4 J	5.6 U	6.2 U	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	3.9 J	5.6 U	6.2 U	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	27	2.5 J	6.2 U	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	45	4 J	6.2 U	1.5 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	46	3 J	6.2 U	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	50	5.6 J	6.2 U	2.5 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	46	4.4 J	6.2 U	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	51	3.7 J	6.2 U	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	8.5	5.6 U	6.2 U	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	54	5 J	6.2 U	2.8 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	1.2 J	5.6 U	6.2 U	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	49	4.6 J	6.2 U	1.9 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	2.9 J	5.6 U	6.2 U	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	2.7 J	5.6 U	6.2 U	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg	NA	NA	29	2 J	6.2 U	1.8 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	58	6.7	6.2 U	4 J	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
- [a] feet below ground surface
- [b] dash indicates not applicable or not established
- [c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

Review Qualifiers:
- J – indicates an estimated value
- U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit

Acronyms/Abbreviations:
- AOC – area of concern
- B(a)P – benzo(a)pyrene
- Cal – California
- ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
- Fed – federal
- JP-5 – jet propellant grade 5
- µg/kg – micrograms per kilogram
- NA – not analyzed
- PAH – polynuclear aromatic hydrocarbon
- PRG – preliminary remediation goal
- PSC – preliminary screening criterion
- Res – residential
- SVOC – semivolatile organic compound
- TPH – total petroleum hydrocarbons
- VOC – volatile organic compound

Table 4-4
Groundwater Sampling Results, AOC 1

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	Groundwater TPH ESL	Background	Result Units	Station ID: A01SB01	A01SB02	A01SB03
						Sample: C077G001	C077G002	C077G003
						[a]Depth Interval: 7 - 12	7 - 12	7 - 12
						Collection Date: 14-Dec-05	14-Dec-05	14-Dec-05
VOCs								
carbon disulfide	—[b]	—	—	—	µg/L	0.25 J	0.45 J	2.1
ethylbenzene	700	300	—	—	µg/L	0.5 U	0.5 U	1.7
isopropylbenzene	—	—	—	—	µg/L	0.5 U	0.5 U	0.37 J
p-isopropyltoluene	—	—	—	—	µg/L	0.5 U	0.5 U	0.69
naphthalene	—	—	—	—	µg/L	0.5 U	0.5 U	1,200
toluene	1,000	150	—	—	µg/L	0.5 U	0.5 U	0.79
1,2,4-trimethylbenzene	—	—	—	—	µg/L	0.5 U	0.5 U	7.1
1,3,5-trimethylbenzene	—	—	—	—	µg/L	0.5 U	0.5 U	2.3
m-, p-xylene	—	—	—	—	µg/L	0.5 U	0.5 U	2.7
o-xylene	—	—	—	—	µg/L	0.5 U	0.5 U	1.5
Petroleum Hydrocarbons						ND	ND	ND
General Chemistry								
solids, total dissolved	—	—	—	—	µg/L	2,490,000	2,410,000	444,000

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit

Acronyms/Abbreviations:
AOC – area of concern
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/L – micrograms per liter
MCL – maximum contaminant level
ND – not detected
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 5-1
Estimates of Mobility and Persistence of Naphthalene, AOC 1

Analyte	K_{oc} (L/kg)	f_{oc}	Percent Sorbed[a]	Half-Life in Soil (years)[b]
naphthalene	2,000	0.0043	89.6	0.71

Notes:
[a] percent sorbed = $[K_{oc}f_{oc} / (1+K_{oc}f_{oc})] * 100$
[b] for microbially mediated degradation in soil (Howard et al. 1991)

Acronyms/Abbreviations:
AOC – area of concern
f_{oc} – fraction organic carbon; average value for poorly graded sand–silty sand at IR Site 35
IR – Installation Restoration (Program)
K_{oc} – organic carbon partition coefficient
L/kg – liters per kilogram

Table 6-1
HHRA Results by Exposure Group, AOC 1

Exposure Group	CANCER RISK		Hazard Index
	U.S. EPA	Cal/EPA	
1. All soil and groundwater exposure pathways			
Total*	1E-06	4E-03	29
Without metals below background	NM	NM	NM
2. Exposure pathways for soil and vapors from VOCs in groundwater			
Total*	1E-06	5E-05	2
Without metals below background	NM	NM	NM
Without metals below background and PAHs in soil	NC	5E-05	2
3. Exposure pathways for residential use of groundwater			
Total*	NC	4E-03	27
Without metals below background	NM	NM	NM

Note:
* includes all COPCs

Acronyms/Abbreviations:
AOC – area of concern
Cal/EPA – California Environmental Protection Agency
COPC – chemical of potential concern
HHRA – human-health risk assessment
NC – not calculated (no COPCs in this group)
NM – no metals data
PAH – polynuclear aromatic hydrocarbon
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Table 6-2
HHRA Results by Risk Driver, AOC 1

Study Area	Analyte Name	TOTAL			WITHOUT BACKGROUND		
		Hazard Quotient	U.S. EPA Cancer Risk	Cal/EPA Cancer Risk	Hazard Quotient	U.S. EPA Cancer Risk	Cal/EPA Cancer Risk
AOC 1							
Soil							
	benzo(a)pyrene	—*	1E-06	2E-06	—	1E-06	2E-06
	Total for soil	**2**	**1E-06**	**5E-05**	**2**	**1E-06**	**5E-05**
Groundwater							
	naphthalene	29	—	4E-03	29	—	4E-03
	Total for groundwater	**27**	**0E+00**	**4E-03**	**27**	**0E+00**	**4E-03**
	Total for soil and groundwater	**29**	**1E-06**	**4E-03**	**29**	**1E-06**	**4E-03**

Note:
* dash indicates not applicable

Acronyms/Abbreviations:
AOC – area of concern
Cal/EPA – California Environmental Protection Agency
HHRA – human-health risk assessment
U.S. EPA – United States Environmental Protection Agency

Table 7-1
Summary of RI Results and Recommendations, AOC 1

DQO Problem	DQO Decision Questions	Nature and Extent	Risk Assessment	Recommendation
Previous investigations did not identify TPH or PAHs in soil at concentrations above screening criteria near Building 3; however, samples were not collected immediately adjacent to the three OWSs (063A, 063B, and 063C), two of which were used as grease pits for the kitchen, and groundwater was not assessed. Regulatory agencies requested soil and groundwater sampling at each OWS located in AOC 1 to assess whether soil and groundwater have been impacted by possible releases of contaminants.	Are contaminants present in soil or groundwater that indicate releases have occurred from the OWSs?	Yes. A possible release of naphthalene from OWS 063A is indicated.	NA	Move to FS (see Sections 8 through 11 of main RI/FS Report).
	Have the nature and extent of contamination been defined?	No. Naphthalene in groundwater is not completely defined in area southwest of OWS 063A.	NA	Refinement of the lateral extent of naphthalene in groundwater in area of OWS 063A is recommended for inclusion in FS alternatives.
	Are contaminants present at concentrations that contribute to an unacceptable risk to potential future residents?	NA	No. Without residential groundwater use, the Cal/EPA cancer risk is 5×10^{-5} (within the risk management range) with an HI of 2, due to the presence of naphthalene in groundwater. AOC 1 is located west of Saratoga Street, and groundwater at the AOC is not considered a drinking water source.	See above.

Acronyms/Abbreviations:
AOC – area of concern
Cal/EPA – California Environmental Protection Agency
DQO – data quality objective
FS – feasibility study
HI – hazard index
NA – not applicable
OWS – oil/water separator
PAH – polynuclear aromatic hydrocarbon
RI – remedial investigation
TPH – total petroleum hydrocarbons

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ATTACHMENT B

AREA OF CONCERN 2

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT ATTACHMENT B, AREA OF CONCERN 2 IR SITE 35, TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

Prepared by:

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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 2. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station [NAS] Alameda), Alameda, California (Figure 1-1).

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

AOC 2 is an approximately 1.1-acre area in the northwestern corner of Transfer Parcel Economic Development Conveyance (EDC)-5 that includes portions of Environmental Baseline Survey (EBS) Parcels 61A and 194 (Figure 1-1). Buildings 30, 30A, and 562 are in the north-central portion of AOC 2. EBS Parcel 61A was included in the 1994 EBS as EBS Parcel 61 (ERM-West 1994a). After the EBS was completed, EBS Parcel 61 was divided into two subparcels: EBS Parcels 61 and 61A.

The boundary of AOC 2 was revised, and the area was reduced from approximately 2.9 to 1.1 acres between issuance of the final RI Work Plan for IR Site 35 (BEI 2006) and preparation of the RI Report. As discussed in response to agency comments on the Work Plan (included in Attachment F of the Work Plan, Response to California Environmental Protection Agency [Cal/EPA] Department of Toxic Substances Control [DTSC] Geological Services Unit Specific Comment 5), the initial AOC 2 boundaries were defined to include locations of elevated polynuclear aromatic hydrocarbon (PAH) concentrations and the location of Resource Conservation and Recovery Act (RCRA) Unit NAS Generator Accumulation Point (GAP) 28A. Because of uncertainty concerning the location of the RCRA unit, the initial AOC 2 boundary included the northern portion of EBS Parcel 61A. Subsequently, the location of the RCRA unit was identified near Building 562 in the southern portion of EBS Parcel 61A. With incorporation of soil sampling location 32EDC-5-34 in the northern portion of EBS Parcel 61A, into the PAH Areas (Attachment W), the AOC 2 boundary was reduced to include only areas requiring additional sampling and the location of NAS GAP 28A.

1.2 HISTORICAL USE

The portion of EBS Parcel 61A located within AOC 2 historically had a sewage pump station (Building 562), storage, vehicle parking, open space, and a dog-training and kennel area. Two buildings of unknown use (Building 29 and a portion of Building 103) were also historically present on EBS Parcel 61A. During the EBS (IT 2001a), no chemical storage was observed in the buildings at EBS Parcel 61A; however, undocumented spills were noted on the west side of Building 562. While no releases been documented, the spills were attributed to the sewage pump station; a stained area measuring approximately 30 by 20 feet was observed. The sewage pump station at Building 562 has been refurbished in recent years to replace system equipment and to change the direction of flow. Sewage is now pumped to a lift station located to the east

towards the Posey Tube rather than to the west and across Oakland Inner Harbor (Delong, pers. com. 2007).

Numerous items were observed in the open space at EBS Parcel 61A, including two 55-gallon drums (one with unknown contents and the other containing solvent), an open container of solvent with paintbrushes, a gun-cleaning barrel, and cargo containers holding a total of 110 gallons of corrosives, nonhalogenated hydrocarbons, spray paint, dry-cleaning solvents, dispersant and toner, gasoline, paint, and floor polish. Also observed in the open space were additional storage containers, including two 40-foot storage trailers with paint, floor polish, paint thinner, and spray paint and an empty flammable liquid storage cabinet; however, neither the 1994 EBS nor the Parcel Evaluation Plan specifies whether these were located in EBS Parcel 61 or 61A (ERM-West 1994a,b).

EBS Parcel 194 historically housed a military police station (Building 30) and two buildings of unknown use (Building 30A and a portion of Building 103). Chemical storage in EBS Parcel 194 included approximately 10 gallons of nonhalogenated organic chemicals and petroleum products that were stored in Building 30. During the EBS, only minor stains associated with vehicle parking were observed in the open space of EBS Parcel 194 (IT 2001a). Photograph 1-1 shows Buildings 562 and 30A at the time of the RI.

1.3 PRELIMINARY SCREENING CRITERIA AND BACKGROUND METALS

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this AOC are the following:

- Soil
  - residential preliminary remediation goals (PRGs) (U.S. EPA 2004b), except PAHs classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (µg/kg) (DON 2001a)
  - environmental screening levels (ESLs) for total petroleum hydrocarbons (TPH) – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)
- Groundwater
  - maximum contaminant levels (MCLs) and advisory level for lead (U.S. EPA 2002, DHS 2006)
  - ESLs for TPH – water (RWQCB 2005)

Photograph 1-1
Buildings 562 and 30A, View to North

- Because AOC 2 is near Oakland Inner Harbor, groundwater concentrations were also compared to the following surface water criteria:
  - California Toxics Rule (Title 40 *Code of Federal Regulations* Section 131.38) for saltwater aquatic organisms (saltwater criterion continuous concentration [CCC]) and human-health consumption of organisms only (HHCO)
  - National Recommended Water Quality Criteria (NRWQC) (U.S. EPA 2002, 2006) for saltwater aquatic organisms (saltwater CCC) and HHCO
  - ESLs for TPH – surface water bodies (marine) (RWQCB 2005)

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being assessed. For example, groundwater concentrations from all study areas were compared to MCLs, whether or not the groundwater was considered a potential drinking water source in that area. Groundwater concentrations in areas near surface water bodies were also compared to surface water PSCs even though surface water criteria are not applicable to groundwater. Chemicals of potential concern (COPCs) identified in the health risk evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs.

In addition to the above-listed PSCs, metal concentrations in soil and groundwater at AOC 2 were compared to the following Alameda Point background concentrations to help discriminate between site-related and naturally occurring metals:

- Alameda Point background soil concentrations (95th percentile of the pink data set; Appendix E of the final RI Report of Operable Unit [OU]-1 Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)
- Alameda Point background groundwater concentrations (95th percentile; Appendix E of the final RI Report of OU-1 Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)

For ease of discussion in this report, the Alameda Point 95th percentile concentrations for metals in soil (pink background data set) and groundwater are referred to as "background."

Section 4.3 of the main RI/FS Report provides further discussion on the occurrence and interpretation of metals concentrations in soil and groundwater at IR Site 35.

1.4 PREVIOUS INVESTIGATIONS

During three previous investigations, soil samples were collected at AOC 2, and results are summarized below. Locations sampled in AOC 2 are shown on Figure 1-1. Analytical results for soil samples collected within AOC 2 are summarized in Appendix B.

1.4.1 Environmental Baseline Survey

During the EBS, two surface soil samples (061-0001 and 061-0002) were collected from the stained area within EBS Parcel 61A in the open space adjacent to Building 562. The samples were analyzed for TPH, semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and metals (IT 2001a). Additionally, six subsurface soil samples (061S-004, -004M, -005, -005M, -006, and -006M) were collected at three locations along the sanitary sewer corridor. These samples were analyzed for TPH, SVOCs, pesticides, PCBs, and metals. Reported concentrations of analytes in surface and subsurface samples were below PSCs.

No sampling was conducted at EBS Parcel 194 because no potential releases were identified.

1.4.2 2002 Polynuclear Aromatic Hydrocarbon Study

Soil boring 32EDC-5-33 was advanced in AOC 2 during the 2002 PAH study (BEI 2005a). Samples were collected from four depth intervals between 0 and 8 feet below ground surface (bgs) and analyzed for PAHs and SVOCs. The B(a)P equivalent concentration reported in the soil sample collected from 4 to 8 feet bgs was the only concentration above the PSC (620 µg/kg).

1.4.3 Solid Waste Management Unit Report

One solid waste management unit (SWMU) site (NAS GAP 28A) was included in the 2005 SWMU Report (SulTech 2005a). The location of NAS GAP 28A is listed as near

Building 562 in the SWMU Report; however, the exact location was not known. This contradicts the location given in the EBS (adjacent to Building 514). The location of NAS GAP 28A in the ArcView Query Station concurs with the location shown in the SWMU Report (both sources show the location near Building 562). In a letter dated November 4, 1999, the Cal/EPA DTSC recommended no further action for this SWMU.

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Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, geology, and potential groundwater beneficial use at AOC 2.

AOC 2 is located west of Saratoga Street. Topography at AOC 2 is relatively flat. The average ground elevation is 9 feet above mean sea level (MSL), based on data from the four borings (A02SB01 through A02SB04) advanced during the RI. The depth to water in the four RI borings was approximately 5 feet bgs. Groundwater depth was measured in temporary casings prior to groundwater sample collection. Total dissolved solids (TDS) concentrations measured in groundwater samples from borings A02SB01 and A02SB02 were 3,600 and 17,700 milligrams per liter, respectively.

The groundwater monitoring well nearest to AOC 2 is MBG-1, located approximately 1,500 feet south of AOC 2. A review of groundwater depths in this well over time (March 1995 through August 1998) shows a range of depth-to-water measurements from approximately 0.9 to 3.64 feet bgs. The deepest historical groundwater measured in this well is approximately 4 feet above MSL. This value, if subtracted from the ground elevation at AOC 2, would suggest groundwater in the vicinity of this AOC is as deep as 5 feet bgs.

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is north at AOC 2. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Tidal influence at AOC 2, located approximately 300 feet from Oakland Inner Harbor, would be expected to be negligible, based on tidal studies performed at other Alameda Point sites. Results of tidal studies at nearby sites (Section 2 of the main RI/FS Report) indicated a minimal effect on groundwater elevations in the fill material at the inland well, located approximately 200 feet from Oakland Inner Harbor.

Soil encountered in the RI borings consisted of silty sand to about 3.5 to 7 feet bgs in three of four borings. The silty sand then generally graded to poorly graded sand with silt to total boring depth. One exception was boring A02SB04, where poorly graded sand with silt was encountered from ground surface to total boring depth of 8 feet bgs. Coarse-grained bay sediment was encountered in borings A02SB01 and A02SB03 at 4.5 and 7 feet bgs, respectively. Fine-grained bay sediment (Young Bay Mud) was not encountered in the borings; however, based on observed lithology at IR Site 26 (BEI 2004b) and east of AOC 3, it is estimated that the Young Bay Mud beneath AOC 2 is at approximately 15 feet bgs (see cross sections on Figure 2-8 in the main RI/FS Report). RI boring logs are presented in Appendix D. As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust is not likely to be present beneath AOC 2; it was not encountered in borings advanced to 12 feet bgs during the RI.

Two geotechnical soil samples were collected from the vadose zone (artificial fill) at AOC 2 at depths of 2.5 to 4 feet bgs and 4 to 4.5 feet bgs. The soil in both samples was classified as silty sand.

Based on the location of AOC 2 west of Saratoga Street, groundwater at AOC 2 would not be considered a drinking water source. In a letter dated July 21, 2003, the Navy received concurrence from the San Francisco Bay Regional Water Quality Control Board (Water Board) that groundwater west of Saratoga Street meets exemption criteria for the municipal and

domestic water supply designation in the California State Water Resources Control Board source of drinking water policy Resolution (Res.) 88-63 (SWRCB 1988) and the California Regional Water Quality Control Board Res. 89-39 (RWQCB 2003).

Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for AOC 2. The RI was conducted in accordance with the sitewide data quality objectives (DQOs) for the evaluation of AOCs presented in Table 3-1 of the main RI/FS Report.

3.1 APPROACH

The open space adjacent to Building 562 was identified as a target area in the EBS due to hazardous materials storage and the presence of stains. Results from EBS samples collected at stained areas on the western and southern side of Building 562 did not identify TPH, metals, pesticides, PCBs, or SVOCs above PSCs or at high concentrations. However, the areas around the northern and eastern sides of Building 562 were not targeted for sampling, and groundwater was not assessed.

3.2 SCOPE

Soil and groundwater sampling was conducted at AOC 2 during the 2005 RI. Soil samples were collected from four borings outside Building 562. Groundwater samples were collected from the two soil borings on the assumed downgradient side of the building; the northwesternmost groundwater sample (A02SB01) was collected near the area where spillage from the sewage pump station occurred west of Building 562. Table 3-1 summarizes analytical results for samples collected during the RI and previous investigations. Figure 1-1 shows sampling locations from all investigations.

Soil and groundwater samples collected during the RI were analyzed for volatile organic compounds (VOCs), SVOCs, PAHs, pesticides, PCBs, and metals. Groundwater samples were also analyzed for TDS. Because AOC 2 is located near Oakland Inner Harbor, groundwater was also analyzed for low-detection-level mercury for comparison to the surface water PSC. In addition, two soil samples from one boring were submitted for geotechnical analyses (Table 3-5 of the main RI/FS Report).

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Section 4
NATURE AND EXTENT OF CONTAMINATION

This section presents the analytical results from previous investigations and the RI, along with the concentration ranges and spatial distributions of the analytes identified at AOC 2. Soil and/or groundwater samples were collected from ten locations during the EBS (IT 2001a), the 2002 PAH study (BEI 2005a), and the RI (Table 3-1 and Figure 4-1). Metals reported in soil and groundwater at concentrations above background are discussed in detail in Section 4.3.3 of the main RI/FS Report. Metals discussion in this section focuses primarily on concentrations above PSCs. Please note that regardless of concentration, all reported metals (except required human trace nutrients) were included in the risk evaluation (Section 6).

Statistical summaries of soil and groundwater results are presented in Tables 4-1 and 4-2, and soil and groundwater sample results are summarized in Tables 4-3, 4-4, and 4-5. Distributions of analytes reported at concentrations above PSCs are illustrated on Figures 4-1 and 4-2 for soil and groundwater, respectively. Complete analytical results for historical and RI samples collected within AOC 2 are included in Appendices B and G, respectively.

4.1 SOIL SAMPLING RESULTS

Analytical soil sampling results are discussed for each class of chemicals investigated at AOC 2.

4.1.1 Volatile Organic Compounds

Acetone was reported in soil from borings A02SB02 and A02SB03. Carbon disulfide and 2-butanone were reported in soil from borings A02SB01 through A02SB04. Reported VOC concentrations were below PSCs.

4.1.2 Semivolatile Organic Compounds

Non-PAH SVOCs (e.g., phthalates and phenols) were reported in soil from borings 061-0001, 061-0002, 061S-004, A02SB02, A02SB03, and A02SB04. Non-PAH SVOC concentrations were below PSCs.

PAHs were reported in soil samples from borings 32EDC-5-33 at 4 to 8 feet bgs and A02SB01 at 3 to 4 feet bgs. B(a)P equivalent concentrations were 1,400 and 760 µg/kg, respectively. These B(a)P equivalent concentrations were above the PSC (620 µg/kg). These exceedances were incorporated into the PAH Areas (Attachment W).

4.1.3 Total Petroleum Hydrocarbons

Motor oil–range TPH was reported in soil from boring 061-0001. Motor oil–range TPH concentrations were below the PSC.

4.1.4 Pesticides and Polychlorinated Biphenyls

The pesticides alpha-chlordane, dieldrin, endrin aldehyde, gamma-chlordane, 4,4'-dichlorodiphenyldichloroethane (DDD), and 4,4'-dichlorodiphenyldichloroethene (DDE) were reported in borings A02SB01 and A02SB03. Pesticide concentrations were below PSCs.

Pesticides were not reported at concentrations above laboratory detection limits in other soil samples from AOC 2.

Aroclor 1260 was the only PCB reported at concentrations above the PSC. Reported concentrations of Aroclor 1260 were 590 J and 670 J µg/kg at 7 to 8 and 2.5 to 4 feet bgs from borings A02SB03 and A02SB04, respectively. (The "J" qualifier indicates the value is estimated.) These concentrations were above the PSC (residential PRG of 220 µg/kg). Aroclor 1260 was not reported above laboratory detection limits in soil samples collected from adjacent locations, suggesting that the extent is limited.

4.1.5 Metals

Metals were reported in soil from borings A02SB01 through A02SB04, 061-0001, 061-0002, 061S-004M, 061S-005M, and 061S-006M. Metal concentrations were below PSCs, except for arsenic. The maximum arsenic concentration was 8.7 milligrams per kilogram (mg/kg), which is above the PRG of 0.062 mg/kg but below the background concentration of 9.14 mg/kg.

Cobalt was reported in all soil samples collected at AOC 2 and was reported at concentrations above background in 2 of 14 samples. The maximum reported concentration at A02SB02 (259 mg/kg, 1.5 to 2 feet bgs), however, is an order of magnitude greater than other cobalt concentrations at AOC 2 (next highest concentration is at A02SB03, 41 mg/kg, 1.2 to 2 feet bgs). It is also the only metal at a concentration above background in that sample. The two concentrations of cobalt above background (but below the PSC) were identified as outliers in the sitewide statistical evaluation (Section 4.3.1.2). It is not known whether the cobalt concentrations in soil at AOC 2 represent a release from Navy activities or are naturally occurring.

4.2 GROUNDWATER SAMPLING RESULTS

This section presents the results of the groundwater samples collected and analyzed during the RI. Groundwater samples were not collected at AOC 2 during previous investigations. Analytical results are presented for each class of chemicals investigated at AOC 2.

4.2.1 Volatile Organic Compounds

The VOCs cis-1,2-dichloroethene and methyl tert-butyl ether were the only VOCs reported in groundwater from boring A02SB01. VOC concentrations were below PSCs.

4.2.2 Semivolatile Organic Compounds

Pyrene was reported in groundwater from boring A02SB01. This SVOC concentration was below the PSC.

4.2.3 Pesticides and Polychlorinated Biphenyls

Pesticides and PCBs were not reported at concentrations above laboratory detection limits in groundwater samples from borings A02SB01 and A02SB02.

4.2.4 Metals

Thirteen metals were reported in groundwater from borings A02SB01 and A02SB02 at concentrations below PSCs.

Arsenic was the only metal reported at concentrations above the PSC. Arsenic was reported at 16.3 and 15.9 micrograms per liter (µg/L) in groundwater from A02SB01 and A02SB02, respectively. These concentrations were above the MCL (10 µg/L) and surface water PSC (NRWQC HHCO of 0.14 µg/L), but were below the background concentration of 20.72 µg/L.

MCLs and surface water criteria have not been established for manganese; however, manganese is discussed because concentrations contribute to a hazard index (HI) above 1 (discussed in Section 6). Manganese was reported at concentrations of 2,950 and 1,280 µg/L in groundwater samples from A02SB01 and A02SB02, respectively. The reported concentration of 2,950 µg/L was above the background concentration of 1,741 µg/L.

Manganese in groundwater at concentrations above background at AOC 2 is believed to result from dissolution of naturally occurring metals in soil due to reducing conditions. As discussed in Section 4.3.3.1 of the main RI/FS Report, the presence of high concentrations of dissolved manganese is indicative of reducing conditions in groundwater. Manganese was reported above background in only one of two groundwater samples and was not present at concentrations above background in soil. A potential source of organic material that could result in reducing conditions would be a release from the domestic sewage pumping station located in Building 562, if one occurred. However, any potential for sewage leaks has been reduced or eliminated through retrofitting and refurbishing activities. There are no known releases from the domestic sewage pumping station.

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Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for AOC 2. It discusses the conceptual site model, the physical and chemical changes that might occur to contaminants present at AOC 2, and the mechanisms that could potentially transfer the contaminants from the study area. The conceptual site model facilitates understanding of the present AOC conditions by integrating AOC-specific physical characteristics with the nature and extent of contaminants in the physical systems. Section 5.2 includes an evaluation of the mobility and persistence of compounds above PSCs not attributable to background and of risk drivers at AOC 2. Section 5.3 discusses potential migration pathways.

5.1 AOC 2 CONCEPTUAL SITE MODEL

Topography at AOC 2 is relatively flat, and the entire study area is currently paved or covered by buildings. The surface water nearest to AOC 2 is Oakland Inner Harbor, located approximately 300 feet to the north.

Based on a review of borings logs for AOC 2 and observations at a nearby site, the subsurface lithology at AOC 2 consists of approximately 12 feet of coarse-grained material (consisting of silty sand and poorly graded sand) overlying Young Bay Mud. Shallow groundwater of the first water-bearing zone beneath AOC 2 occurs in the fill material. The underlying Young Bay Mud would be expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. The Marsh Crust is unlikely to be located beneath AOC 2 (SWDIV 2001). Groundwater flow direction is approximately north, and average depth to water is approximately 5 feet bgs, which is consistent with historical groundwater depths. Negligible tidal influence is expected at AOC 2 because of its distance from Oakland Inner Harbor. Groundwater would not be considered a drinking water source based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.

PAHs and PCBs (Aroclor 1260) were reported in soil at AOC 2 at concentrations above PSCs. Aroclor 1260 was reported above its PSC in a soil sample from 2.5 to 4 feet bgs and in a soil sample from a different boring at 7 to 8 feet bgs. Aroclor 1260 was not reported above laboratory detection limits in soil from adjacent locations, suggesting that the extent is limited. Arsenic was reported in groundwater at concentrations above the PSC but below background. There is no PSC for manganese; however, one concentration was reported above background, and manganese contributes to an HI above 1. Both arsenic and manganese reported in groundwater at AOC 2 are believed to be naturally occurring. PAH exceedances are addressed in the PAH Areas (Attachment W).

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in the environment tends to remain in place. The tendency toward immobility and

persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Section 5 of the main RI/FS Report discusses the physical and chemical properties of contaminants, and their chemical class (e.g., PCBs), that affect their transport and persistence in the environment. Also discussed in Section 5 of the main RI/FS Report are mobility and persistence of naturally occurring metals and of PAHs. This section discusses the mobility and persistence of Aroclor 1260.

The most important property of PCBs in relation to mobility and persistence is their general inertness, as they resist both acids and alkalis and have thermal stability. PCBs have large molecular structures and typically bind to soil based on their size and physical characteristics. PCBs have high organic carbon partition coefficient values, causing them to be relatively immobile and resistant to transformation processes that can degrade some chemicals, causing them to persist in soil. Table 5-1 provides estimates of mobility and persistence for Aroclor 1260. The low solubility and mobility exhibited by PCBs retard their migration to groundwater, as indicated by the estimate that all of the Aroclor 1260 will remain sorbed to soil (Table 5-1). The average fraction organic carbon in the soil samples from AOC 2 is 0.015. Geotechnical results for samples collected at AOC 2 are presented in Table 3-5 of the main RI/FS Report.

Two mechanisms allow PCBs to change in the environment: degradation and weathering. Under normal conditions, PCBs degrade slowly in soil, with degradation occurring more rapidly in anaerobic systems than in aerobic systems. Aroclors are mixtures of PCB congeners whose names reflect the percent chlorine (by weight) of the mixture; Aroclor 1260 is 60 percent chlorine by weight. The more chlorinated mixtures are the most persistent and toxic. Individual congeners present in the Aroclor 1260 mixture are subject to different rates of microbial degradation. Microbial degradation depends on the position of the chlorine atom on the biphenyl molecule and the degree of chlorination. Higher chlorinated congeners (those with five or more chlorine atoms) are more persistent in the environment and are not readily transformed by bacteria. Approximately 99 percent of the Aroclor 1260 mixture consists of congeners with five or more chlorine atoms (ATSDR 2000).

5.3 CONTAMINANT MIGRATION

The migration pathways evaluated for relevance to this AOC include atmospheric transport (i.e., vapors and airborne fugitive dust), transport via surface water runoff, and groundwater transport (both off of AOC 2 and to surface water). Aroclor 1260 is the only contaminant identified at AOC 2 whose source may be activities at the site. Because of the depth at which Aroclor 1260 was reported (2.5 to 4 feet bgs and 7 to 8 feet bgs) and the fact that it is not very soluble, it is unlikely that Aroclor 1260 will be transported from its current location. Metals reported in groundwater at concentrations above either PSCs or background are believed to be naturally occurring.

Significant transport pathways were not identified at AOC 2 for the following reasons.

- Vapor migration of VOCs from soil or groundwater is not considered a significant transport mechanism because of their low concentrations.

- Particulate dispersion (either by wind or surface water) is not a primary transport mechanism because most of AOC 2 is paved. Additionally, Aroclor 1260 was reported in soil samples collected from depths greater than 2.5 feet bgs. However, if the surface cover at the AOC is disturbed or removed during and after redevelopment, particulate dispersion from soil is considered a possible transport pathway for nonvolatile compounds in surface soil.
- Transport due to groundwater flow is not considered a significant transport mechanism because arsenic and manganese are considered to be naturally occurring.
- Seasonal fluctuations of the groundwater table are not considered a significant mechanism for transport of PCBs from soil to groundwater because they have low water solubility and exhibit low mobility in soil.

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Section 6
TIER 1 EVALUATION

This section summarizes the Tier 1 risk evaluation results for AOC 2. In a Tier 1 evaluation, risk for a residential exposure scenario is assessed with the assumption that no remedial action would take place at the study area. This section also presents a qualitative uncertainty evaluation that identifies and characterizes the effects of uncertainties on the risk results.

A Tier 1 evaluation is a screening-level approach that calculates total cumulative risk values using published risk-based guidelines from the United States Environmental Protection Agency (U.S. EPA), Cal/EPA, and Water Board. The Tier 1 evaluation includes all chemicals identified in at least one sample except for PAHs in soil. PAHs in soil are not included because site-specific remediation goals for PAHs are being developed. The approach used to estimate risk is described in Section 6 of the main RI/FS Report. Tier 1 information is provided in Appendix J.

Cancer risk and noncancer hazard values for AOC 2 are shown in Table 6-1. Risk drivers for cancer and noncancer risk are presented in Table 6-2.

6.1 COPC IDENTIFICATION

The data selection and identification of COPCs are based on a compilation of all usable data for soil and groundwater. All chemicals reported in at least one sample collected during the RI and/or included in the historical data were included as Tier 1 COPCs, except calcium, magnesium, potassium, and sodium, which are known to be required human trace nutrients.

There are 36 Tier 1 COPCs in soil at AOC 2: 16 metals based on 14 to 17 samples, 7 pesticides or PCBs (Aroclor 1260) based on 15 samples, 9 non-PAH SVOCs based on 17 samples, and 4 VOCs based on 12 samples.

There are 13 Tier 1 COPCs in groundwater at AOC 2: 10 metals, 1 SVOC, and 2 VOCs based on two samples for all analytes except mercury, which is based on five samples.

6.2 RISK CHARACTERIZATION

The cancer risk and noncancer hazard values were calculated using the Tier 1 protocol from Cal/EPA (2005). The maximum concentration of each COPC in soil and groundwater was compared with a risk-based guideline to estimate cancer and noncancer risks. Two results are presented for three exposure groups, the total risk and a second value that does not include risk associated with metals concentrations that are below background.

For soil and groundwater data for the three exposure groups at AOC 2, the calculated cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 2×10^{-3} and 7

  Without metals below background: 1×10^{-5} and 4

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 2×10^{-4} and 3

  Without metals below background: 9×10^{-6} and 0.6

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 2×10^{-3} and 4

  Without metals below background: 4×10^{-8} and 4

For reasonable future use, for Exposure Group 2 without metals below background, the majority of the cancer risk for soil is associated with Aroclor 1260, which had a low detection frequency.

For residential use of groundwater, the Exposure Groups 1 and 3 noncancer hazard without metals below background is due largely to manganese (hazard quotient [HQ] of 3).

6.3 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation are representative of any potential health concerns at AOC 2. The results are consistent with the site history and previous investigations. This approximately 1.13-acre site was adequately characterized by the three investigations.

For the two VOCs reported in groundwater, the contribution of vapors to indoor air is negligible. The cancer risk and noncancer HI for these two VOCs, based on the tap water PRGs, are well below 10^{-6} and 1, respectively, and PRGs are higher than ESLs that are protective of indoor air. The uncertainty associated with the omission of the dermal pathway for groundwater is low because exposure from the dermal pathway for the Tier 1 COPCs would not result in an increase in the cancer risk or HI for residential use of groundwater (Exposure Groups 1 and 3). Cancer risk and hazard values are reported in one significant figure, so small changes will not necessarily result in an overall increase. This finding is based on the ratio of dermal exposure to ingestion for each Tier 1 COPC.

6.4 CONCLUSIONS

For all three exposure groups, the total cancer risks are above the risk management range due to arsenic in soil and groundwater. However, arsenic concentrations in soil and groundwater are below background, and the total cancer risks without arsenic are within the risk management range.

For exposure pathways for soil and VOC vapors from groundwater, the cancer risks without background are within the risk management range (9×10^{-6}) and the noncancer HI is below 1 (0.6). The residual cancer risk is associated with Aroclor 1260 in soil at 8×10^{-6}. Aroclor 1260, the only PCB reported, was found in 4 of 17 samples.

For residential use of groundwater, the noncancer HI above 1 is due to manganese in groundwater (HQ of 3).

Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at AOC 2, including the nature and extent of contamination and results of the Tier 1 risk evaluation. These results form the basis of responses to the DQO decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendations presented below.

7.1 SUMMARY

The open space adjacent to Building 562 at AOC 2 was identified as a target area in the EBS due to hazardous materials storage and the presence of stains. EBS samples collected from stained areas on the western and southern side of Building 562 did not identify TPH, metals, pesticides, PCBs, or SVOCs above PSCs or at high concentrations. However, the areas around the northern and eastern sides of Building 562 were not targeted for sampling, and groundwater was not assessed.

At AOC 2, no metals were reported in soil at concentrations above PSCs. However, two samples collected at AOC 2 had concentrations of cobalt above background (but below PSCs) that were identified as outliers in the sitewide statistical evaluation (Section 4.3.1.2 of the main RI/FS Report). It is not known whether the cobalt concentrations in soil at AOC 2 represent a release from Navy activities or are naturally occurring

Analytical results indicate that B(a)P equivalent concentrations were above the PSC (620 µg/kg) in soil samples from two locations (32-EDC-5-33 and A02SB01). These locations were incorporated into the PAH Areas.

For soil, the PCB Aroclor 1260 was reported at concentrations above the PSC in 2 soil samples from borings A02SB03 and A02SB04 from a total of 17 soil samples. Aroclor 1260 was not reported above laboratory detection limits in soil from adjacent locations, suggesting that the extent is limited to the areas around A02SB03 and A02SB04.

For groundwater, only manganese was reported at a concentration above background in one sample. As discussed in Section 4.3.3.1 of the main RI/FS Report, the presence of high concentrations of dissolved manganese is indicative of reducing conditions in groundwater in a limited area at AOC 2. Manganese was reported above background in only one of two groundwater samples and was not present at concentrations above background in soil. A potential source of organic material that could result in reducing conditions would be a release from the domestic sewage pumping station located in Building 562, if one occurred. However, any potential for sewage leaks has been reduced or eliminated through retrofitting and refurbishing activities. There are no known releases from the domestic sewage pumping station.

Results of the Tier 1 risk evaluation show a total cancer risk of 2×10^{-3} due to arsenic below background (above the risk management range) and an HI of 7, due largely to manganese in groundwater. Arsenic in soil is not believed to be associated with Navy activities. Furthermore, manganese in groundwater at concentrations above background is believed to result from dissolution of naturally occurring metals in soil due to reducing conditions. Without metals below background and without residential

groundwater use, the cancer risk is 9×10^{-6} (within the risk management range) with an HI of 0.6. Without residential use of groundwater, the cancer risk is due largely to the presence of Aroclor 1260.

7.2 AOC 2 CONCLUSIONS AND RECOMMENDATIONS

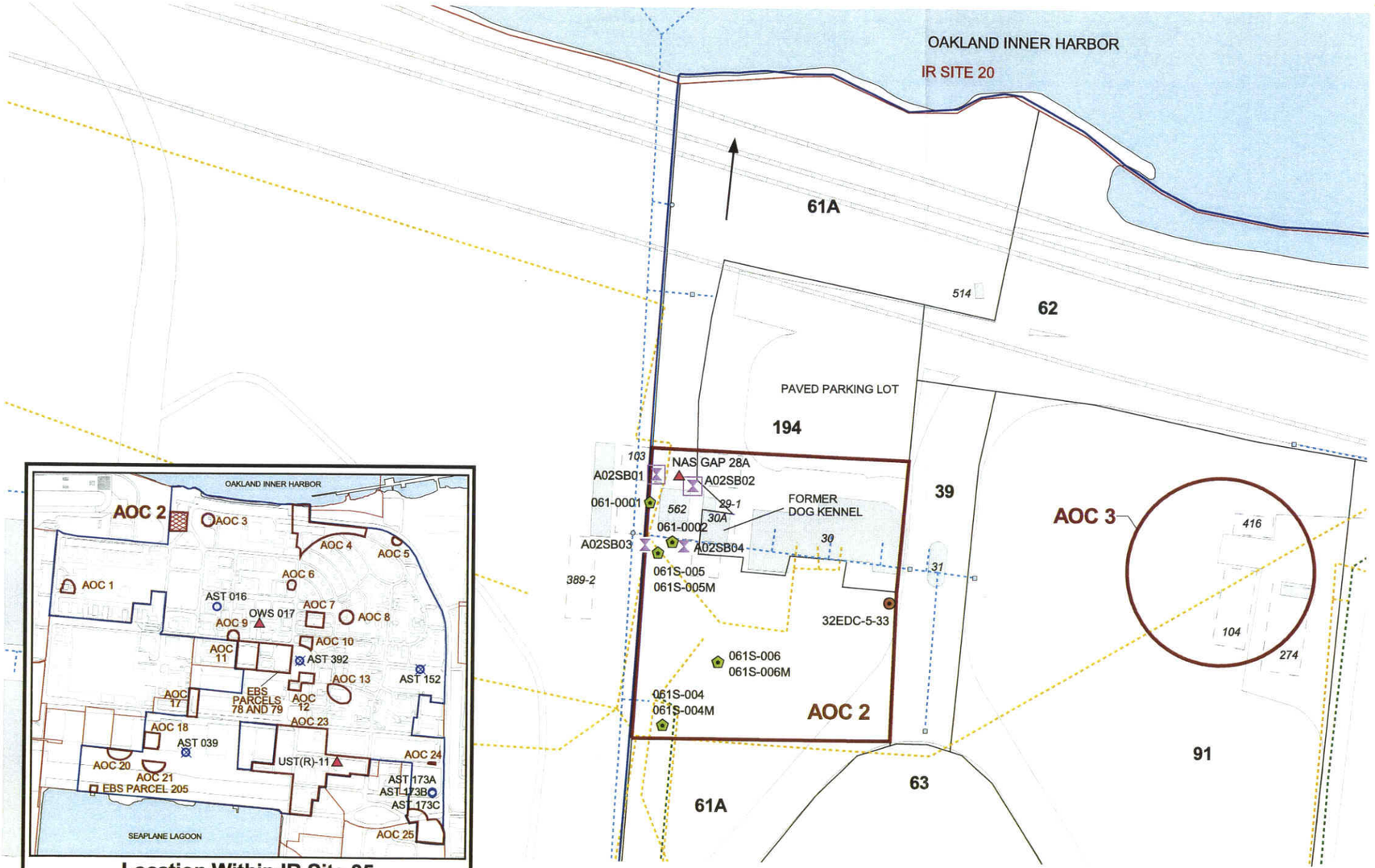
The RI was conducted using the seven-step U.S. EPA DQO process (U.S. EPA 2000); DQOs were developed for AOC 2 in the Work Plan (BEI 2006). The RI has addressed these DQOs, as summarized in Table 7-1.

Data collected during previous investigations and the RI defined the nature and extent of contamination sufficiently to perform a Tier 1 risk evaluation and support decisions on the necessity for remedial actions at AOC 2.

No further action is recommended at AOC 2. Further evaluation of the extent of PCBs (Aroclor 1260) and PAHs in soil and manganese in groundwater is not recommended for the following reasons.

- Groundwater at AOC 2 would not be a drinking water source, based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.
- PAHs at two locations are addressed as part of the PAH Areas (Attachment W).
- Risk results indicate that PCBs are not present in soil at concentrations that pose a significant risk to human health; cancer risk associated with soil is within the risk management range of 10^{-6} to 10^{-4}. Further, PCBs in soil are generally not soluble or mobile and are not expected to readily migrate to groundwater.
- Manganese concentrations above background in groundwater are limited in extent and likely due to reducing conditions.

FIGURES



Location Within IR Site 35

1500 0 1500 Feet

LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- WATER
- 71 EBS PARCEL
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

N

PAH STUDY SOIL SAMPLING LOCATION
- SVOCs ANALYSIS ONLY

EBS SOIL SAMPLING LOCATION
- SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY

RI SOIL SAMPLING LOCATION
- VOCs, SVOCs, PESTICIDES/PCBs, AND METALS ANALYSES ONLY

RI GROUNDWATER SAMPLING LOCATION
- VOCs, SVOCs, PESTICIDES/PCBs, AND METALS ANALYSES ONLY

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
NAS – NAVAL AIR STATION
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R)– RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOCs – VOLATILE ORGANIC COMPOUNDS

100 0 100 Feet

RI/FS Report for IR Site 35

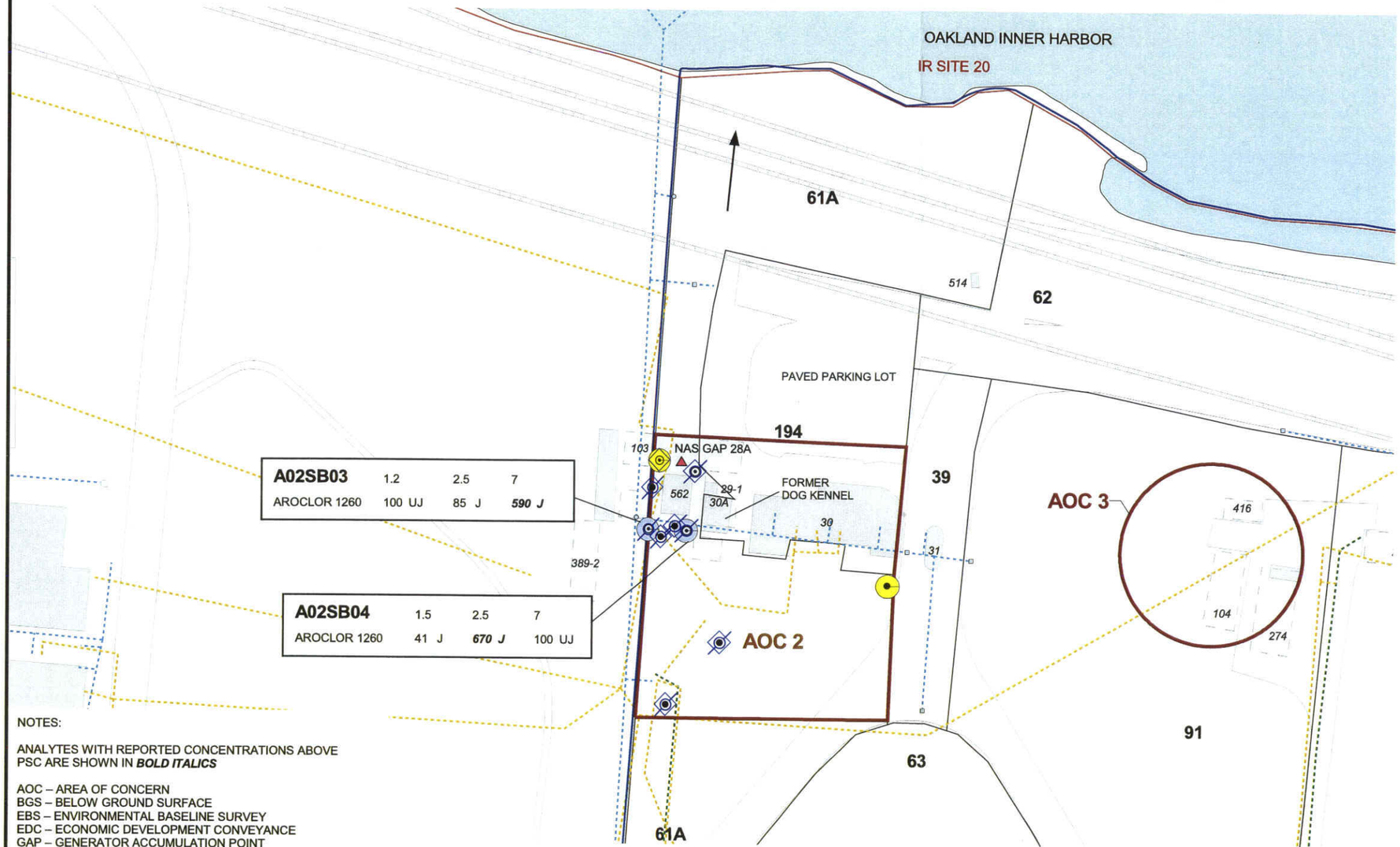
Figure 1-1

Study Area and Sampling Locations
Area of Concern 2

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/30/06
File No.: 077L14444
Job No.: 23818-077
Rev No.: C



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- WATER
- 71 EBS PARCEL
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL SOIL SAMPLING LOCATION
- RI SOIL SAMPLING LOCATION

N

SOIL SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC FOR :

- PESTICIDES/PCBs
- BENZO(A)PYRENE EQUIVALENT (SEE ATTACHMENT W, PAH AREAS, FOR ADDITIONAL INFORMATION AND CONCENTRATIONS)

SOIL SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :

- PESTICIDES/PCBs
- SVOCs

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

A02SB03	1.2	2.5	7
AROCLOR 1260	100 UJ	85 J	590 J

ANALYTE — REVIEW QUALIFIER — CONCENTRATION in µg/kg

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
µg/kg – MICROGRAMS PER KILOGRAM
NAS – NAVAL AIR STATION
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
PRG – PRELIMINARY REMEDIATION GOAL
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
SWMU – SOLID WASTE MANAGEMENT UNIT
UJ – THE ANALYTE WAS NOT REPORTED ABOVE THE DETECTION LIMIT. THE SAMPLE QUANTITATION LIMIT IS AN ESTIMATED QUANTITY

Analyte	PSC
AROCLOR 1260	220 µg/kg (Federal Residential PRG)

RI/FS Report for IR Site 35

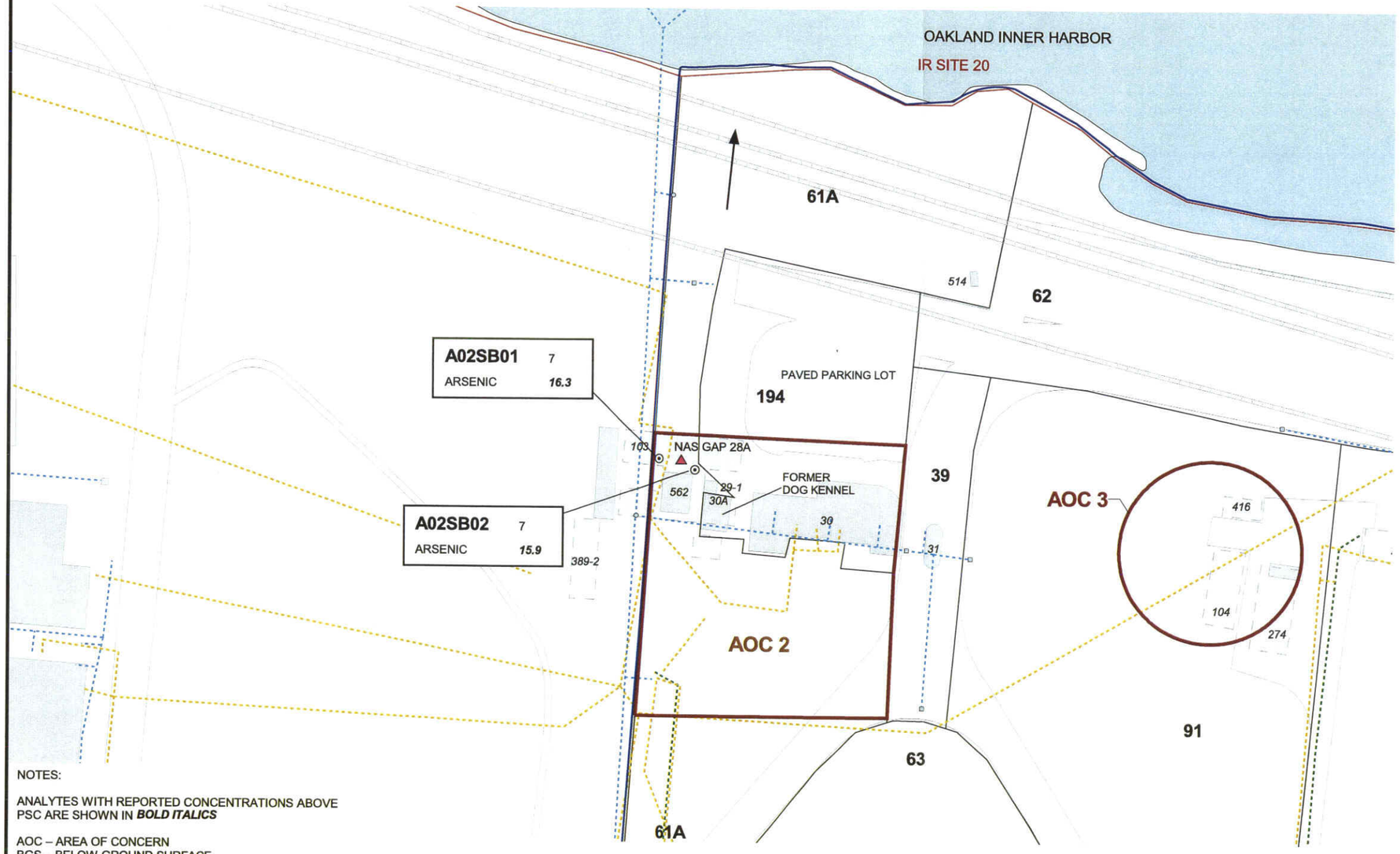
Figure 4-1

Soil Sampling Results for Analytes Above PSC – Area of Concern 2

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/30/06
File No.: 077L14467
Job No.: 23818-077
Rev No.: C



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- WATER
- 71 EBS PARCEL
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- RI GROUNDWATER SAMPLING LOCATION

N

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

A02SB01 7
ARSENIC 16.3

ANALYTE — CONCENTRATION in µg/L

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
MCL – MAXIMUM CONTAMINANT LEVEL
µg/L – MICROGRAMS PER LITER
NAS – NAVAL AIR STATION
NRWQC HHCO – NATIONAL RECOMMENDED WATER QUALITY CRITERIA HUMAN HEALTH CONSUMPTION OF ORGANISM
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT

Analyte	PSC	Surface Water PSC	Background 95th Percentile
ARSENIC	10 µg/L (California MCL)	0.14 µg/L (NRWQC HHCO)	20.72 µg/L

RI/FS Report for IR Site 35

Figure 4-2

Groundwater Sampling Results for Analytes Above PSC – Area of Concern 2

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/26/07
File No.: 077L14469
Job No.: 23818-077
Rev No.: D

TABLES

Table 3-1
Sample Analysis Summary, AOC 2

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE								
				VOCs	SVOCs	PAHs	TPH	Pest/PCBs	Metals	Mercury	Geotechnical Parameters[a]	TDS
Soil												
061-001-001	061-0001	EBS	3–3.5		X		X[b]	X	X			
061-001-002	061-0002	EBS	0.5–1		X		X[b]	X	X			
061-SN-004	061S-004[c]	EBS	7.5–8.5		X			X				
061-SN-004	061S-004M[c]	EBS	7.5–8.5				X[d]		X			
061-SN-005	061S-005[c]	EBS	9–9.5		X			X				
061-SN-005	061S-005M[c]	EBS	9–9.5				X[d]		X			
061-SN-006	061S-006[c]	EBS	5.5–6.5		X			X				
061-SN-006	061S-006M[c]	EBS	5.5–6.5				X[d]		X			
32EDC-5-33	C032C899	PAH Study	0–0.5		X	X						
32EDC-5-33	C032C900	PAH Study	0.5–2		X	X						
32EDC-5-33	C032C901 (FD)	PAH Study	0.5–2		X	X						
32EDC-5-33	C032C902	PAH Study	2–4		X	X						
32EDC-5-33	C032C903	PAH Study	4–8		X	X						
32EDC-5-34	C032C904	PAH Study	0–0.5		X	X						
32EDC-5-34	C032C905	PAH Study	0.5–2		X	X						
32EDC-5-34	C032C906	PAH Study	2–4		X	X						
32EDC-5-34	C032C907	PAH Study	4–8		X	X						
A02SB01	C077S021	Site 35 RI	1–2	X	X	X		X	X			
A02SB01	C077S022	Site 35 RI	3–4	X	X	X		X	X			
A02SB01	C077S023	Site 35 RI	6.5–8	X	X	X		X	X			
A02SB02	C077S024	Site 35 RI	1.5–2	X	X	X		X	X			
A02SB02	C077S025	Site 35 RI	3.5–4	X	X	X		X	X			
A02SB02	C077S026	Site 35 RI	7–8	X	X	X		X	X		X	
A02SB03	C077S027	Site 35 RI	1.2–2	X	X	X		X	X			
A02SB03	C077S028	Site 35 RI	2.5–4	X	X	X		X	X		X	
A02SB03	C077S029	Site 35 RI	7–8	X	X	X		X	X			
A02SB04	C077S030	Site 35 RI	1.5–2	X	X	X		X	X			
A02SB04	C077S031	Site 35 RI	2.5–4	X	X	X		X	X			
A02SB04	C077S032	Site 35 RI	7–8	X	X	X		X	X			
Groundwater												
A02SB01	C077G011	Site 35 RI	7–12	X	X	X		X	X	X		X
A02SB01	C077G012 (FD)	Site 35 RI	7–12							X		
A02SB02	C077G013	Site 35 RI	7–12	X	X	X		X	X	X		X
A02SB02	C077G014 (FD)	Site 35 RI	7–12			X						

References:
EBS (IT 2001a)
PAH Study (BEI 2005a)

Notes:
[a] see table in Appendix E for a list of geotechnical parameters and results
[b] analyzed for gasoline-, diesel-, and motor oil–range TPH
[c] samples 061S-004, -005, and -006 were analyzed by a fixed-base laboratory; samples 061S-004M, -005M, and -006M were analyzed by a mobile or screening laboratory; samples -004/-004M, -005/-005M, and -006/-006M were collected from the same respective locations
[d] analyzed for gasoline- and diesel-range TPH

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
EBS – environmental baseline survey
FD – field duplicate
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
Pest – pesticides
RI – remedial investigation
SVOC – semivolatile organic compound
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 2

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
Volatile Organic Compounds (µg/kg)										
acetone	12	3	25	0	5.5	29	42	14,000,000	—[c]	—
2-butanone	12	8	67	0	1.2	2.3	5	22,000,000	—	—
carbon disulfide	12	10	83	0	1.6	4.7	11	360,000	—	—
Fuels (µg/kg)										
motor oil	2	2	100	0	45,000	49,000	53,000	—	500,000	—
Semivolatile Organic Compounds (µg/kg)										
1,2,4-trichlorobenzene	5	1	20	0	25	25	25	62,000	—	—
acenaphthene	21	12	57	0	1.3	10	36	3,700,000	—	—
acenaphthylene	21	15	71	No PSC	1.7	36	200	—	—	—
anthracene	21	17	81	0	1.7	36	190	22,000,000	—	—
benz(a)anthracene	21	19	90	0	12	260	1,700	620	—	—
benzo(b)fluoranthene	21	19	90	0	18	300	2,200	620	—	—
benzo(k)fluoranthene	21	18	86	0	9.6	220	1,700	380 [d]	—	—
benzo(g,h,i)perylene	21	21	100	No PSC	3	270	2,400	—	—	—
benzo(a)pyrene	21	21	100	0	7.7	340	3,000	62	—	—
bis(2-ethylhexyl)phthalate	17	3	18	0	42	150	330	35,000	—	—
4-chloro-3-methylphenol	17	1	5.9	No PSC	68	68	68	—	—	—
2-chlorophenol	17	1	5.9	0	52	52	52	63,000	—	—
chrysene	21	18	86	0	16	300	2,200	3,800 [d]	—	—
dibenz(a,h)anthracene	21	13	62	0	2.8	33	220	62	—	—
di-n-butyl phthalate	17	6	35	0	55	83	130	6,100,000	—	—
diethyl phthalate	17	1	5.9	0	27	27	27	49,000,000	—	—
2,4-dinitrotoluene	17	1	5.9	0	42	42	42	720	—	—
fluoranthene	21	21	100	0	8.6	580	4,900	2,300,000	—	—
fluorene	21	9	43	0	1.6	19	120	2,700,000	—	—
indeno(1,2,3-cd)pyrene	21	19	90	0	6.9	250	2,300	620	—	—
2-methylnaphthalene	21	14	67	No PSC	5.2	20	87	—	—	—
naphthalene	21	14	67	0	1.8	25	93	1,700 [d]	—	—
4-nitrophenol	17	1	5.9	No PSC	120	120	120	—	—	—
N-nitroso-di-n-propylamine	17	1	5.9	0	46	46	46	69	—	—
pentachlorophenol	17	1	5.9	0	75	75	75	3,000	—	—
phenanthrene	21	21	100	No PSC	3.4	210	1,500	—	—	—
pyrene	21	21	100	0	13	630	7,000	2,300,000	—	—
Pesticides and Polychlorinated Biphenyls (µg/kg)										
Aroclor 1260	17	4	24	2	41	350	670	220	—	—
alpha-chlordane	15	1	6.7	0	3.2	3.2	3.2	1,600	—	—
gamma-chlordane	15	1	6.7	0	3.9	3.9	3.9	1,600	—	—
4,4'-DDD	15	1	6.7	0	1.8	1.8	1.8	2,400	—	—
4,4'-DDE	15	2	13	0	0.97	3.6	6.2	1,700	—	—
dieldrin	15	1	6.7	0	26	26	26	30	—	—
endrin aldehyde	15	1	6.7	No PSC	2.8	2.8	2.8	—	—	—

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 2

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
Metals (mg/kg)										
aluminum	14	14	100	0	3,660	6,600	13,000	76,000	—	13,960
arsenic	14	12	86	0	1.4	3.7	8.7	0.062 [d]	—	9.14
barium	14	14	100	0	12.5	44	84	5,400	—	93.68
beryllium	17	12	71	0	0.11	0.17	0.27	150	—	1.27
cadmium	17	6	35	0	0.05	0.08	0.13	37	—	1.72
calcium	14	14	100	No PSC	2,480	6,500	27,000	—	—	16,800
chromium	17	14	82	0	22.1	31	46	210	—	54.84
cobalt	14	14	100	0	3.4	27	259	900	—	14.30
copper	17	15	88	0	4.3	14	29	3,100	—	39.14
iron	14	14	100	0	7,720	13,000	20,900	23,000	—	22,280
lead	17	14	82	0	3.1	15	38	150 [d]	—	37.66
magnesium	14	14	100	No PSC	2,320	3,900	7,930	—	—	7,304
manganese	14	14	100	0	90.9	200	375	1,800	—	383.0
mercury	17	1	5.9	0	0.18	0.18	0.18	23	—	0.52
nickel	17	17	100	0	20.3	38	72	1,600	—	55.72
potassium	14	14	100	No PSC	642	820	1,070	—	—	1,232
sodium	14	3	21	No PSC	86.3	410	1,040	—	—	1,230
thallium	14	2	14	0	2.4	2.5	2.6	5.2	—	0.50
vanadium	14	14	100	0	15.3	24	42.4	78	—	47.34
zinc	17	17	100	0	16.9	35	76	23,000	—	67.48

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

Acronyms/Abbreviations:

AOC – area of concern
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
TPH – total petroleum hydrocarbons

Table 4-2
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, AOC 2

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background	Minimum[a]	Average[a]	Maximum[a]	California MCL	Background (95th Percentile)	Surface Water CTR CCC	Surface Water CTR HHCO	Surface Water NRWQC CCC	Surface Water NRWQC HHCO
Volatile Organic Compounds (µg/L)													
cis-1,2-dichloroethene	2	1	50	0	0.17	0.17	0.17	6	—[b]	—	—	—	—
methyl tert-butyl ether	2	1	50	0	0.24	0.24	0.24	13	—	—	—	—	—
Semivolatile Organic Compounds (µg/L)													
pyrene	3	1	33	0	0.29	0.29	0.29	—	—	—	11,000	—	4,000
Metals (µg/L)													
arsenic	2	2	100	0	15.9	16	16.3	10[c]	20.72	36	—	36	0.14
barium	2	2	100	0	137	200	261	1,000	569.5	—	—	—	—
beryllium	2	1	50	0	0.26	0.26	0.26	4	2.50	—	—	—	—
cadmium	2	1	50	0	1.6	1.6	1.6	5	—	9.3	—	8.8	—
calcium	2	2	100	No PSC	273,000	350,000	417,000	—	—	—	—	—	—
chromium	2	2	100	0	3.5	4.5	5.4	50	12.45	—	—	—	—
iron	2	2	100	No PSC	462	620	782	—	6,586	—	—	—	—
magnesium	2	2	100	No PSC	74,200	380,000	676,000	—	—	—	—	—	—
manganese	2	2	100	No PSC	1,280	2,100	2,950	—	1,741	—	—	—	—
mercury	5	3	60	0	0.00125	0.0015	0.00173	2	—	0.025	0.051	0.94	—
potassium	2	2	100	No PSC	28,200	78,000	128,000	—	—	—	—	—	—
selenium	2	2	100	0	17.8	18	19.1	50	8.58	71	—	71	4,200
sodium	2	2	100	No PSC	827,000	3,100,000	5,460,000	—	—	—	—	—	—
vanadium	2	1	50	No PSC	3.7	3.7	3.7	—	26.27	—	—	—	—
General Chemistry (µg/L)													
solids, total dissolved	2	2	100	No PSC	3,600,000	11,000,000	17,700,000	—	—	—	—	—	—

Notes:

[a] data review qualifiers are not included in this table

[b] dash indicates not applicable or not established

[c] Federal MCL

Acronyms/Abbreviations:

AOC – area of concern
CCC – criterion continuous concentration
CTR – California Toxics Rule
HHCO – human-health consumption of organisms only
µg/L – micrograms per liter
MCL – maximum contaminant level
NRWQC – National Recommended Water Quality Criteria
PSC – preliminary screening criteria (MCL, CTR, and NRWQC)

Table 4-3
Soil Sampling Results, AOC 2

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID:	061-001-001	061-001-002	061-SN-004	061-SN-004	061-SN-005	061-SN-005	061-SN-006	061-SN-006	32EDC-5-33	32EDC-5-33	32EDC-5-33	32EDC-5-33
					Sample:	061-0001	061-0002	061S-004	061S-004M	061S-005	061S-005M	061S-006	061S-006M	C032C899	C032C900	C032C901 (FD)	C032C902
					[a] Depth Interval:	3 - 3.5	0.5 - 1	7.5 - 8.5	7.5 - 8.5	9 - 9.5	9 - 9.5	5.5 - 6.5	5.5 - 6.5	0 - 0.5	0.5 - 2	0.5 - 2	2 - 4
					Collection Date:	01-Jun-95	26-May-95	24-Jan-95	24-Jan-95	24-Jan-95	24-Jan-95	24-Jan-95	24-Jan-95	14-May-02	14-May-02	14-May-02	14-May-02
					Result Units												
VOCs																	
acetone	14,000,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-butanone	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons																	
motor oil	—	—	500,000	—	µg/kg	45,000 J	53,000 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																	
acenaphthene	3,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	2.2 J	9.3	5.8 U	5.9 U
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	9 J	18 J	5.8 U	5.9 U
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	8.2	5.8 U	5.8 U	60
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	74 J	150 J	310 J	350 J
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	100 J	190 J	330 J	260 J
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	79 J	160 J	300 J	280 J
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	160 J	290 J	450 J	350 J
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	**140 J**[d]	**280 J**	**500 J**	**420 J**
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	360 U	42 J	410 U	NA	390 U	NA	420 U	NA	NA	NA	NA	NA
4-chloro-3-methylphenol	—	—	—	—	µg/kg	360 U	350 U	68 J	NA	390 U	NA	420 U	NA	NA	NA	NA	NA
2-chlorophenol	63,000	—	—	—	µg/kg	360 U	350 U	52 J	NA	390 U	NA	420 U	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	90 J	170 J	310 J	400 J
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	17	5.8 U	5.8 U	56
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	66 J	55 J	410 U	NA	390 U	NA	420 U	NA	NA	NA	NA	NA
diethyl phthalate	49,000,000	—	—	—	µg/kg	360 U	350 U	27 J	NA	390 U	NA	420 U	NA	NA	NA	NA	NA
2,4-dinitrotoluene	720	—	—	—	µg/kg	360 U	350 U	42 J	NA	390 U	NA	420 U	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	180 J	410 J	940 J	670 J
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.7 U	5.8 U	5.8 U	5.9 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	120 J	220 J	360 J	290 J
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.7 UJ	5.8 UJ	5.8 UJ	5.9 UJ
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.7 UJ	5.8 UJ	5.8 UJ	5.9 UJ
4-nitrophenol	—	—	—	—	µg/kg	870 U	850 U	120 J	NA	940 U	NA	1,000 U	NA	NA	NA	NA	NA
N-nitroso-di-n-propylamine	69	—	—	—	µg/kg	**360 U**[e]	**350 U**[e]	46 J	NA	**390 U**[e]	NA	**420 U**[e]	NA	NA	NA	NA	NA
pentachlorophenol	3,000	—	—	—	µg/kg	870 U	850 U	75 J	NA	940 U	NA	1,000 U	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	26 J	160 J	410 J	330 J
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	230 J	520 J	120 J	960 J
1,2,4-trichlorobenzene	62,000	—	—	—	µg/kg	360 U	350 U	25 J	NA	390 U	NA	420 U	NA	NA	NA	NA	NA
Pesticides/PCBs																	
Aroclor 1260	220	—	—	—	µg/kg	36 U	35 U	41 U	NA	39 U	NA	42 U	NA	NA	NA	NA	NA
alpha-chlordane	1,600	—	—	—	µg/kg	NA	NA	2.1 U	NA	2 U	NA	2.2 U	NA	NA	NA	NA	NA
gamma-chlordane	1,600	—	—	—	µg/kg	NA	NA	2.1 U	NA	2 U	NA	2.2 U	NA	NA	NA	NA	NA
4,4'-DDD	2,400	—	—	—	µg/kg	NA	NA	4.1 U	NA	3.9 U	NA	4.2 U	NA	NA	NA	NA	NA
4,4'-DDE	1,700	—	—	—	µg/kg	NA	NA	4.1 U	NA	3.9 U	NA	4.2 U	NA	NA	NA	NA	NA
dieldrin	30	—	—	—	µg/kg	NA	NA	4.1 U	NA	3.9 U	NA	4.2 U	NA	NA	NA	NA	NA
endrin aldehyde	—	—	—	—	µg/kg	NA	NA	4.1 U	NA	3.9 U	NA	4.2 U	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 2

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	061-001-001 061-0001 3 - 3.5 01-Jun-95	061-001-002 061-0002 0.5 - 1 26-May-95	061-SN-004 061S-004 7.5 - 8.5 24-Jan-95	061-SN-004 061S-004M 7.5 - 8.5 24-Jan-95	061-SN-005 061S-005 9 - 9.5 24-Jan-95	061-SN-005 061S-005M 9 - 9.5 24-Jan-95	061-SN-006 061S-006 5.5 - 6.5 24-Jan-95	061-SN-006 061S-006M 5.5 - 6.5 24-Jan-95	32EDC-5-33 C032C899 0 - 0.5 14-May-02	32EDC-5-33 C032C900 0.5 - 2 14-May-02	32EDC-5-33 C032C901 (FD) 0.5 - 2 14-May-02	32EDC-5-33 C032C902 2 - 4 14-May-02
Metals																	
aluminum	76,000	—	—	13,960	mg/kg	4,770 J	4,710 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	**3.7 U** [e]	**1.6 UJ** [e]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	37.1	30.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	0.15 U	0.4 U	NA	*25 U* [e,f]	NA	*25 U* [e]	NA	*25 U* [e]	NA	NA	NA	NA
cadmium	37	—	—	1.72	mg/kg	0.06 U	0.06 U	NA	*25 U* [e]	NA	*25 U* [e]	NA	*25 U* [e]	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	3,080	2,480	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	23.7 J	22.1 J	NA	25 U	NA	25 U	NA	25 U	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	3.7	3.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	10.6	13.2	NA	25 U	NA	29	NA	25 U	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	10,100	7,720	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	4.4 J	3 UJ	NA	*38*	NA	25 U	NA	25 U	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	2,550	2,320	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	133 J	90.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	mg/kg	0.16 U	0.16 U	NA	*25 U* [e]	NA	*25 U* [e]	NA	*25 U* [e]	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	20.6 J	20.3 J	NA	*72*	NA	*60*	NA	35	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	894	682	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	94.6	86.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	mg/kg	*2.4 J*	*2.6 J*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	22.1	18.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	33.1	21.8	NA	50	NA	*76*	NA	33	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 2

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	32EDC-5-33 C032C903 4 - 8 14-May-02	A02SB01 C077S021 1 - 2 15-Dec-05	A02SB01 C077S022 3 - 4 15-Dec-05	A02SB01 C077S023 6.5 - 8 15-Dec-05	A02SB02 C077S024 1.5 - 2 15-Dec-05	A02SB02 C077S025 3.5 - 4 15-Dec-05	A02SB02 C077S026 7 - 8 15-Dec-05	A02SB03 C077S027 1.2 - 2 15-Dec-05	A02SB03 C077S028 2.5 - 4 15-Dec-05	A02SB03 C077S029 7 - 8 15-Dec-05	A02SB04 C077S030 1.5 - 2 15-Dec-05	A02SB04 C077S031 2.5 - 4 15-Dec-05	A02SB04 C077S032 7 - 8 15-Dec-05
VOCs																		
acetone	14,000,000	—[b]	—	—	µg/kg	NA	100 U	100 U	100 U	100 U	5.5 J	39 J	42 J	100 U	100 U	100 U	100 U	100 U
2-butanone	22,000,000	—	—	—	µg/kg	NA	2 J	1.6 J	100 U	1.2 J	100 UJ	4.7 J	5 J	1.3 J	1.4 J	1.3 J	100 U	100 U
carbon disulfide	360,000	—	—	—	µg/kg	NA	2.2 J	11 J	4.2 J	4.1 J	1.6 J	4.2 J	5.3 J	2.9 J	100 U	5 J	6.2 J	100 U
Petroleum Hydrocarbons																		
motor oil	—	—	500,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																		
acenaphthene	3,700,000	—	—	—	µg/kg	15	19	36	3.1 J	7.9 J	3.1 J	6 U	3.3 J	5 U	22	5 U	1.3 J	6 U
acenaphthylene	—	—	—	—	µg/kg	37 J	12	200	10	5.3 J	17	6 U	16	2.9 J	83	5.8	4.4 J	6 U
anthracene	22,000,000	—	—	—	µg/kg	66	21	190	13	28	16	2.2 J	15	4.1 J	81	8.6	5.3	6 U
benz(a)anthracene	620[c]	—	—	—	µg/kg	**760 J**	74 J	570 J	64 J	120 J	88 J	6 U	83 J	22 J	390 J	38 J	40 J	6 U
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	**650 J**	110 J	620	100	170 J	150 J	6 U	120	35	410	63	100 J	6 U
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	**410 J**	110 J	170 J	16 J	170 J	160 J	6 U	29 J	5 U	130 J	9.6 J	100 J	6 U
benzo(g,h,i)perylene	—	—	—	—	µg/kg	1,000 J	44 J	340 J	60 J	46 J	62 J	4.5 J	61 J	17 J	170 J	41 J	41 J	3 J
benzo(a)pyrene	62[c]	—	—	—	µg/kg	**1,200 J**	59	**560**	**90**	**81**	**100**	7.7	**110**	30	**400**	57	**68**	8.2
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	NA	300 U	300 U	400 U	330 J	300 U	72 J	300 U	300 U	300 U	300 U	300 U	400 U
4-chloro-3-methylphenol	—	—	—	—	µg/kg	NA	300 U	300 U	400 U	700 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	400 U
2-chlorophenol	63,000	—	—	—	µg/kg	NA	300 U	300 U	400 U	700 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	400 U
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	870 J	100 J	470 J	36 J	150 J	61 J	6 U	61 J	5 U	320 J	18 J	**16 J**	6 U
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	6.6 U	15	55	5.3 J	10 U	6.5	6 U	5.3 J	5 U	28	5 U	2.8 J	6 U
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	300 U	300 U	400 U	700 U	130 J	300 U	300 U	77 J	82 J	300 U	90 J	400 U
diethyl phthalate	49,000,000	—	—	—	µg/kg	NA	300 U	300 U	400 U	700 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	400 U
2,4-dinitrotoluene	720	—	—	—	µg/kg	NA	300 U	300 U	400 U	700 U	300 U	300 U	300 U	300 U	300 U	300 U	300 U	400 U
fluoranthene	2,300,000	—	—	—	µg/kg	1,900 J	140 J	1,300 J	110 J	210 J	170 J	8.6 J	150 J	42 J	740 J	74 J	63 J	9.6 J
fluorene	2,700,000	—	—	—	µg/kg	6.6 U	11	120	3 J	10 U	4.2 J	6 U	3.9 J	5 U	21	1.6 J	5 U	6 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	**800 J**	17 J	230 J	33 J	14 J	33 J	6 UJ	30 J	6.9 J	110 J	15 J	20 J	6 UJ
2-methylnaphthalene	—	—	—	—	µg/kg	6.6 UJ	87 J	63 J	11 J	24 J	13 J	9 J	9.9 J	7.4 J	12 J	8.8 J	8.1 J	6 U
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	36 J	53	93	15	9.2 J	13	1.8 J	14	3 J	32	7.8	6.6	6 U
4-nitrophenol	—	—	—	—	µg/kg	NA	2,000 U	2,000 U	2,000 U	4,000 U	2,000 U	2,000 U	2,000 U	2,000 U	2,000 U	2,000 U	2,000 U	3,000 U
N-nitroso-di-n-propylamine	69	—	—	—	µg/kg	NA	**300 U**[e]	**300 U**[e]	**400 U**[e]	**700 U**[e]	**300 U**[e]	**300 U**[e]	**300 U**[e]	**300 U**[e]	**300 U**[e]	**300 U**[e]	**300 U**[e]	**400 U**[e]
pentachlorophenol	3,000	—	—	—	µg/kg	NA	2,000 U	2,000 U	2,000 U	**4,000 U**[e]	2,000 U	2,000 U	2,000 U	2,000 U	2,000 U	2,000 U	2,000 U	3,000 U
phenanthrene	—	—	—	—	µg/kg	130 J	180	1,500	48	200	83	7.7	57	17	430	32	20	3.4 J
pyrene	2,300,000	—	—	—	µg/kg	200 J	180 J	1,400 J	170 J	260 J	240 J	13 J	230 J	57 J	1,200 J	98 J	90 J	19 J
1,2,4-trichlorobenzene	62,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs																		
Aroclor 1260	220	—	—	—	µg/kg	NA	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	85 J	**590 J**	41 J	**670 J**	100 UJ
alpha-chlordane	1,600	—	—	—	µg/kg	NA	3.2 J	6 U	6 U	5 U	5 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U
gamma-chlordane	1,600	—	—	—	µg/kg	NA	3.9 J	6 U	6 U	5 U	5 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U
4,4'-DDD	2,400	—	—	—	µg/kg	NA	5 U	6 U	1.8 J	5 U	5 U	6 U	6 U	5 U	120 U	5 U	110 U	6 U
4,4'-DDE	1,700	—	—	—	µg/kg	NA	6.2	6 U	0.97 J	5 U	5 U	6 U	6 U	5 U	6 U	5 U	5 U	6 U
dieldrin	30	—	—	—	µg/kg	NA	5 U	6 U	6 U	5 U	5 U	6 U	6 U	5 U	26 J	5 U	**110 U**[e]	6 U
endrin aldehyde	—	—	—	—	µg/kg	NA	5 UJ	6 UJ	6 UJ	5 UJ	5 UJ	6 UJ	6 UJ	2.8 J	120 UJ	5 UJ	110 UJ	6 UJ

Table 4-3
Soil Sampling Results, AOC 2

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	32EDC-5-33 C032C903 4 - 8 14-May-02	A02SB01 C077S021 1 - 2 15-Dec-05	A02SB01 C077S022 3 - 4 15-Dec-05	A02SB01 C077S023 6.5 - 8 15-Dec-05	A02SB02 C077S024 1.5 - 2 15-Dec-05	A02SB02 C077S025 3.5 - 4 15-Dec-05	A02SB02 C077S026 7 - 8 15-Dec-05	A02SB03 C077S027 1.2 - 2 15-Dec-05	A02SB03 C077S028 2.5 - 4 15-Dec-05	A02SB03 C077S029 7 - 8 15-Dec-05	A02SB04 C077S030 1.5 - 2 15-Dec-05	A02SB04 C077S031 2.5 - 4 15-Dec-05	A02SB04 C077S032 7 - 8 15-Dec-05
Metals																		
aluminum	76,000	—	—	13,960	mg/kg	NA	9,070	9,110	3,860	8,110	6,900	3,660	6,660	6,210	5,840	6,080	13,000	4,880
arsenic	0.39	0.062	—	9.14	mg/kg	NA	**3.9**	**7.2**	**3**	**3.1**	**3.1**	**8.7**	**3**	**2.6**	**1.4**	**2.6**	**3.1**	**2.7**
barium	5,400	—	—	93.68	mg/kg	NA	63.8	81.4	14.1	75.2	84	12.5	50	41.8	28.7	32.4	34.6	29.7
beryllium	150	—	—	1.27	mg/kg	NA	0.18 J	0.27	0.11 J	0.19 J	0.18 J	0.12 J	0.18 J	0.18 J	0.15 J	0.15 J	0.18 J	0.14 J
cadmium	37	—	—	1.72	mg/kg	NA	0.6 U	0.13 J	0.6 U	0.073 J	0.062 J	0.6 U	0.045 J	0.063 J	0.6 U	0.5 U	0.11 J	0.6 U
calcium	—	—	—	16,800	mg/kg	NA	5,080 J	*27,000 J*	2,570 J	6,020 J	2,850 J	14,500 J	7,870 J	3,070 J	3,080 J	2,960 J	7,700 J	2,550 J
chromium	210	—	—	54.84	mg/kg	NA	27.6	28.7	22.7	32.5	33.3	36.4	33	29.3	29.2	32.5	46	35.5
cobalt	900	—	—	14.30	mg/kg	NA	7.4	7	4.4	*259*	7	6.7	*41*	5.2	5.5	5.4	10.7	4.8
copper	3,100	—	—	39.14	mg/kg	NA	12.9 J	26.7 J	5.3 J	13.7 J	12.8 J	4.3 J	13.4 J	11.2 J	9.5 J	13.2 J	24.2 J	6.2 J
iron	23,000	—	—	22,280	mg/kg	NA	18,500 J	17,600 J	10,100 J	13,300 J	13,700 J	15,900 J	13,000 J	11,000 J	11,700 J	11,900 J	20,900 J	10,600 J
lead	400	150	—	37.66	mg/kg	NA	6.1 J	31.5 J	18 J	11.2 J	11.7 J	3.1 J	13.5 J	17.2 J	8.9 J	14 J	19.3 J	14 J
magnesium	—	—	—	7,304	mg/kg	NA	6,750 J	5,330 J	2,890 J	3,250 J	3,560 J	5,790 J	3,360 J	2,880 J	2,880 J	2,850 J	*7,930 J*	2,690 J
manganese	1,800	—	—	383.0	mg/kg	NA	357 J	375 J	120 J	184 J	150 J	330 J	176 J	155 J	132 J	147 J	367 J	103 J
mercury	23	—	—	0.52	mg/kg	NA	0.18 J	0.08 UJ	0.028 UJ	0.037 UJ	0.029 UJ	0.1 UJ	0.026 UJ	0.1 UJ	0.035 UJ	0.1 UJ	0.1 UJ	0.031 UJ
nickel	1,600	—	—	55.72	mg/kg	NA	47.9	28.7	23.3	*56.2*	34	52.3	31.4	27.8	26.1	27.8	48.2	30.6
potassium	—	—	—	1,232	mg/kg	NA	1,000	878	642	1,070	869	678	941	842	737	739	758	708
sodium	—	—	—	1,230	mg/kg	NA	145 U	474 U	1,040	250 U	110 U	291 U	214 U	182 U	210 U	106 U	260 U	487 U
thallium	5.2	—	—	0.50	mg/kg	NA	*2 U* [e]	*2 U* [e]	*2 U* [e]	*2 U* [e]	*2 U* [e]	*2 U* [e]	*2 U* [e]	*2 U* [e]	*2 U* [e]	*2 U* [e]	*2 U* [e]	*3 U* [e]
vanadium	78	—	—	47.34	mg/kg	NA	25.7	30.3	15.3	24.3	25.7	23.8	21.9	20.3	25.3	21.6	42.4	24.1
zinc	23,000	—	—	67.48	mg/kg	NA	33.2 J	45.5 J	19.4 J	50.5 J	34 J	16.9 J	42.1 J	28.4 J	22.2 J	28.5 J	40.6 J	21.8 J

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[d] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL
[e] detection limit exceeds criteria
[f] italicized font indicates result exceeds background

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
Cal – California
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 4-4
Groundwater Sampling Results, AOC 2

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	Groundwater TPH ESL	Background	Result Units	Station ID: A02SB01 Sample: C077G011 [a] Depth Interval: 7 - 12 Collection Date: 15-Dec-05	A02SB01 C077G012 (FD) 7 - 12 15-Dec-05	A02SB02 C077G013 7 - 12 15-Dec-05	A02SB02 C077G014 (FD) 7 - 12 15-Dec-05
VOCs									
cis-1,2-dichloroethene	70	6	—[b]	—	µg/L	0.17 J	NA	0.5 U	NA
methyl tert-butyl ether	—	13	—	—	µg/L	0.24 J	NA	0.5 U	NA
SVOCs									
pyrene	—	—	—	—	µg/L	0.29	NA	0.2 U	0.2 U
Pesticides/PCBs						ND	NA	ND	NA
Metals									
arsenic	10	50	—	20.72	µg/L	**16.3** [c]	NA	**15.9**	NA
barium	2,000	1,000	—	569.5	µg/L	261	NA	137	NA
beryllium	4	4	—	2.50	µg/L	2 U	NA	0.26 J	NA
cadmium	5	5	—	—	µg/L	1.6 J	NA	5 U	NA
calcium	—	—	—	—	µg/L	417,000	NA	273,000	NA
chromium	100	50	—	12.45	µg/L	3.5 J	NA	5.4	NA
iron	—	—	—	6,586	µg/L	782	NA	462	NA
magnesium	—	—	—	—	µg/L	676,000	NA	74,200	NA
manganese	—	—	—	1,741	µg/L	*2950* [d]	NA	1,280	NA
potassium	—	—	—	—	µg/L	128,000	NA	28,200	NA
selenium	50	50	—	8.58	µg/L	*19.1*	NA	*17.8*	NA
sodium	—	—	—	—	µg/L	5,460,000	NA	827,000	NA
vanadium	—	—	—	26.27	µg/L	5 U	NA	3.7 J	NA
Low-Level Mercury									
mercury	2	2	—	—	µg/L	0.00163	0.00125	0.00173	NA
General Chemistry									
solids, total dissolved	—	—	—	—	µg/L	3,600,000	NA	17,700,000	NA

Table 4-4
Groundwater Sampling Results, AOC 2

Notes:

[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] bolded font indicates result above one of the following:
Fed MCL, Cal MCL, TPH ESL
[d] italicized font indicates result exceeds background

Acronyms/Abbreviations:

AOC – area of concern
Cal – California
ESL – environmental screening level
(San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/L – micrograms per liter
MCL – maximum contaminant level
NA – not analyzed
ND – not detected
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:

J – indicates an estimated value
U – indicates the compound or analyte was analyzed for,
but was not detected above the stated detection limit

Table 4-5
Groundwater Sampling Results Compared to
Surface Water Preliminary Screening Criteria, AOC 2

Analyte	PRELIMINARY SCREENING CRITERIA: SW TPH ESL	CTR CCC	CTR HHCO	NRWQC CCC	NRWQC HHCO	Background	Result Units	Station ID: A02SB01 / Sample: C077G011 / [a]Depth Interval: 7 - 12 / Collection Date: 15-Dec-05	A02SB01 C077G012 (FD) 7 - 12 15-Dec-05	A02SB02 C077G013 7 - 12 15-Dec-05	A02SB02 C077G014 (FD) 7 - 12 15-Dec-05
VOCs											
cis-1,2-dichloroethene	—[b]	—	—	—	—	—	µg/L	0.17 J	NA	0.5 U	NA
methyl tert-butyl ether	—	—	—	—	—	—	µg/L	0.24 J	NA	0.5 U	NA
SVOCs											
pyrene	—	—	11,000	—	4,000	—	µg/L	0.29	NA	0.2 U	0.2 U
Pesticides/PCBs								ND	NA	ND	NA
Metals											
arsenic	—	36	—	36	0.14	20.72	µg/L	**16.3**[c]	NA	**15.9**	NA
barium	—	—	—	—	—	569.5	µg/L	261	NA	137	NA
beryllium	—	—	—	—	—	2.50	µg/L	2 U	NA	0.26 J	NA
cadmium	—	9.3	—	8.8	—	—	µg/L	1.6 J	NA	5 U	NA
calcium	—	—	—	—	—	—	µg/L	417,000	NA	273,000	NA
chromium	—	—	—	—	—	12.45	µg/L	3.5 J	NA	5.4	NA
iron	—	—	—	—	—	6,586	µg/L	782	NA	462	NA
magnesium	—	—	—	—	—	—	µg/L	676,000	NA	74,200	NA
manganese	—	—	—	—	—	1,741	µg/L	*2950*[d]	NA	1,280	NA
potassium	—	—	—	—	—	—	µg/L	128,000	NA	28,200	NA
selenium	—	71	—	71	4200	8.58	µg/L	*19.1*	NA	*17.8*	NA
sodium	—	—	—	—	—	—	µg/L	5,460,000	NA	827,000	NA
vanadium	—	—	—	—	—	26.27	µg/L	5 U	NA	3.7 J	NA
Low-Level Mercury											
mercury	—	0.025	0.051	0.94	—	—	µg/L	0.00163	0.00125	0.00173	NA
General Chemistry											
solids, total dissolved	—	—	—	—	—	—	µg/L	3,600,000	NA	17,700,000	NA

Table 4-5
Groundwater Sampling Results Compared to
Surface Water Preliminary Screening Criteria, AOC 2

Notes:

[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] bolded font indicates result above one of the following: TPH ESL, CTR CCC, CTR HHCO, NRWQC CCC, NRWQC HHCO
[d] italicized font indicates result exceeds background

Acronyms/Abbreviations:

AOC – area of concern
CCC – criterion continuous concentration
CTR – California Toxics Rule
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
HHCO – human-health consumption of organisms only
µg/L – micrograms per liter
NA – not analyzed
ND – not detected
NRWQC – National Recommended Water Quality Criteria
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
SW – surface water
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:

J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit

Table 5-1
Estimates of Mobility and Persistence for Aroclor 1260, AOC 2

Analyte	K_{oc} (L/kg)	f_{oc}	Percent Sorbed[a]	Half-Life in Soil (years)[b]
Aroclor 1260	3.47E+05	0.015	100	4.1E+05

Notes:
[a] percent sorbed = $[K_{oc}f_{oc} / (1+K_{oc}f_{oc})] * 100$
[b] for microbially mediated degradation in soil (Howard et al. 1991)

Acronyms/Abbreviations:
AOC – area of concern
f_{oc} – fraction organic carbon; average value for silty sand at AOC 2
K_{oc} – organic carbon partition coefficient
L/kg – liters per kilogram

Table 6-1
Tier 1 Evaluation Results by Exposure Group, AOC 2

Exposure Group [a]	Cancer Risk	Hazard Index
1. All soil and groundwater exposure pathways		
Total [b]	2E-03	7
Without metals below background	1E-05	4
2. Exposure pathways for soil and vapors from VOCs in groundwater		
Total [b]	2E-04	3
Without metals below background	9E-06	0.6
3. Exposure pathways for residential use of groundwater		
Total [b]	2E-03	4
Without metals below background	4E-08	4

Notes:

[a] PAHs are not included

[b] includes all COPCs

Acronyms/Abbreviations:

AOC – area of concern

COPC – chemical of potential concern

PAH – polynuclear aromatic hydrocarbon

VOC – volatile organic compound

Table 6-2
Tier 1 Evaluation Results by Risk Driver, AOC 2

Study Area	Analyte Name	TOTAL		WITHOUT BACKGROUND	
		Hazard Quotient	Cancer Risk	Hazard Quotient	Cancer Risk
AOC 2					
Soil					
	Aroclor 1260	—*	8E-06	—	8E-06
	arsenic	—	1E-04	—	—
	iron	0.9	—	—	—
	lead	0.3	—	—	—
	manganese	0.2	—	—	—
	thallium	0.5	—	0.5	—
	vanadium	0.5	—	—	—
	Total for soil	**3**	**2E-04**	**0.6**	**9E-06**
Groundwater					
	arsenic	—	2E-03	—	—
	manganese	3	—	3	—
	Total for groundwater	**4**	**2E-03**	**4**	**4E-08**
	Total for soil and groundwater	**7**	**2E-03**	**4**	**1E-05**

Note:
* dash indicates not applicable

Acronym/Abbreviation:
AOC – area of concern

Table 7-1
Summary of RI Results and Recommendations, AOC 2

DQO Problem	DQO Decision Questions	Nature and Extent	Tier 1 Evaluation	Recommendation
The open space adjacent to Building 562 was identified as a target area in the EBS due to hazardous materials storage and the presence of stains. EBS samples collected from stained areas on the western and southern side of Building 562 did not identify TPH, metals, pesticides, PCBs, or SVOCs above PSCs, or at high concentrations when no screening criteria existed. However, the areas around the northern and eastern sides of Building 562 were not targeted for sampling, and groundwater was not assessed.	Have the nature and extent of contamination been defined?	Definition is adequate. PCBs (Aroclor 1260) in soil appear to be limited in extent based on results of nearby samples. The definition is considered adequate for performing a risk assessment and support decisions on the necessity for remedial actions at AOC 2.	NA	No further action. PAHs will be addressed as part of the PAH Areas in Attachment W. Groundwater beneath AOC 2 is not considered a drinking water source.
	Are contaminants present in soil or groundwater at concentrations that pose unacceptable risk to potential future residents?	NA	No. Without metals below background, the cancer risk is within the risk management range of 10^{-6} to 10^{-4}, and without residential groundwater use, the HI is less than 1.	No further action. See above.
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?	NA	No. Contaminants in groundwater are not present at concentrations above surface water PSCs.	No further action.

Acronyms/Abbreviations:
AOC – area of concern
DQO – data quality objective
EBS – environmental baseline survey
HI – hazard index
NA – not applicable
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PSC – preliminary screening criterion
RI – remedial investigation
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons

ATTACHMENT C

AREA OF CONCERN 3

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT ATTACHMENT C, AREA OF CONCERN 3 IR SITE 35, TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 3. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station Alameda), Alameda, California (Figure 1-1).

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

AOC 3 is an approximately 0.4-acre picnic and recreation area near the northwestern corner of Transfer Parcel Economic Development Conveyance (EDC)-5 (Figure 1-1) and in the northeastern corner of Environmental Baseline Survey (EBS) Parcel 91. Former Buildings 104 (Photograph 1-1) and 416 are entirely in AOC 3; former Building 274 is partially in this AOC. Currently, there is a structure (Photograph 1-2; not shown on Figure 1-1) in the eastern portion of the AOC that houses restrooms for the surrounding picnic and recreation areas.

1.2 HISTORICAL USE

AOC 3 is entirely within EBS Parcel 91, which was historically used as a golf course, clubhouse and youth center (former Building 104), general recreation area, nursery building and lath house (former Building 274; demolished in 1962), and for miscellaneous storage (former Building 416) of materials including wood, recreational equipment, broken lawn mowers, and old tires (Photographs 1-1 through 1-4). Pesticides may have been stored, mixed, and used in and around the plant nursery (IT 2001a). Two 55-gallon drums containing gasoline and diesel, two cases of motor oil, wood stain, and paint were also observed during EBS investigations (IT 2001a). Conex boxes containing fuels and petroleum products, grease, transmission fluid, wood stain, and paint were present in the open space. Severe stains were observed on the metal floors of the Conex boxes during the EBS. Minor stains associated with vehicle parking were also present.

1.3 PRELIMINARY SCREENING CRITERIA

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 4.3 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this AOC are the following:

- preliminary remediation goals (PRGs) (U.S. EPA 2004b), except polynuclear aromatic hydrocarbons (PAHs) classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (µg/kg) (DON 2001a)

1.4 PREVIOUS INVESTIGATIONS

During two previous investigations, soil samples were collected at AOC 3, and results are summarized below. Locations sampled in the AOC are shown on Figure 1-1. Analytical results for samples collected within the AOC are summarized in Appendix B.

Photograph 1-1
Location of Former Building 104, View to South

Photograph 1-2
Location of Building 274 (currently a restroom), View to Southeast

Photograph 1-3
Location of Former Building 416, View to North

Photograph 1-4
General View to Northwest

1.4.1 Environmental Baseline Survey

During the EBS, a surface soil sample from boring 091-0001 was collected from EBS Parcel 91 because of likely historical storage, mixing, and use of pesticides in that area (IT 2001a). The sample was analyzed for pesticides and polychlorinated biphenyls (PCBs). The pesticide dieldrin was reportedly at a concentration above the PSC (i.e., residential soil PRG). However, a reanalysis of the soil sample (091-0001-RE) showed dieldrin at a concentration below the PSC; the reanalysis result was identified as validated data while the initial sampling result was not. PCBs were not reported above the detection limits in the sample.

1.4.2 2002 Polynuclear Aromatic Hydrocarbon Study

One soil boring (32EDC-5-43) was advanced in AOC 3 during the 2002 PAH study (BEI 2005a). Samples were collected from four depth intervals between 0 and 8 feet below ground surface (bgs) and analyzed for PAHs. B(a)P equivalent concentrations reported in the samples were below the PSC for PAHs.

Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, and geology at AOC 3.

Topography at AOC 3 is relatively flat. The average ground elevation is approximately 9.5 feet above mean sea level (MSL), based on elevation data from the six borings (A03SB01 through A03SB06) advanced during the RI. Three soil borings (A03SB01 through A03SB03) were advanced to 4 feet bgs, while the remaining borings were drilled to total depths from 12 to 14 feet bgs. The average depth to water in the RI borings was approximately 5 feet bgs. Groundwater depth was measured in temporary casings prior to groundwater sample collection.

The groundwater monitoring well nearest to AOC 3 is MBG-1, located approximately 1,300 feet east of the AOC. A review of groundwater depths in this well over time (March 1995 through September 2001) shows a range in depth to water from approximately 1 to 4 feet bgs. The deepest historical groundwater measured in this well is approximately 4 feet above MSL. This value, if subtracted from the ground elevation at AOC 3, would suggest that historical groundwater depths were similar to those observed during the RI (5 feet bgs).

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is north-northeast at AOC 3. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Based on tidal studies performed at other Alameda Point sites, minimal tidal influence would be expected at AOC 3, located approximately 180 feet from Oakland Inner Harbor. Results of tidal studies performed at a nearby site indicated a minimal effect on groundwater elevations in the fill material at the inland well, located approximately 200 feet from Oakland Inner Harbor.

Soil encountered in the six RI borings consists of silty sand and poorly graded sand. Fill material was encountered in these borings to approximately 7 to 8.5 feet bgs. Fine-grained bay sediment (Young Bay Mud) was not encountered in the borings; however, based on observed lithology in borings east and west of AOC 3, it is estimated that the Young Bay Mud beneath AOC 3 is at approximately 15 feet bgs (see cross section C-C′ on Figure 2-8 in the main RI/FS Report). RI boring logs are presented in Appendix D. As shown on Figure 2-11 of the main RI/FS Report, the Marsh Crust is not likely to be located beneath AOC 3.

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Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for AOC 3. The RI was conducted in accordance with the sitewide data quality objectives (DQOs) for the evaluation of AOCs presented in Table 3-1 of the main RI/FS Report.

3.1 APPROACH

The pesticide dieldrin was reported in a surface soil sample collected in AOC 3 during the EBS at a concentration that may have been above the residential soil PRG. (A reanalysis of the soil sample showed dieldrin at a concentration below the residential soil PRG.) The extent of pesticides at the AOC was not determined during the EBS investigation. Therefore, additional soil samples were collected near the EBS sample to assess the distribution of pesticides in this area. In response to a regulatory agency request, grab groundwater samples for pesticide analysis were also collected in the AOC and submitted to the laboratory for archive. These groundwater samples were to be analyzed if pesticides were present in any of the deepest soil samples.

3.2 SCOPE

During the 2005 RI sampling, soil samples were collected from six borings around the EBS sampling location (Figure 1-1). Two soil samples (depths of approximately 1.5 to 2 and 3.5 to 4 feet bgs) were collected from borings A03SB01 through A03SB03. Three soil samples (depths of approximately 1.5 to 2, 3 to 4, and 5.5 to 8 feet bgs) were collected from the three borings (A03SB04 through A03SB06) closest to the original EBS sampling location with the elevated pesticide concentration. Locations were targeted outside the footprints of previous buildings because historical pesticide handling and usage would likely have taken place outdoors. All soil samples were analyzed for pesticides. Table 3-1 provides a summary for samples collected during the RI and previous investigations. Figure 1-1 shows sampling locations from all investigations.

Grab groundwater samples for pesticide analysis were collected from the three deepest borings (A03SB04 through A03SB06); these samples were extracted and held by the laboratory pending soil sample results. In accordance with the Work Plan, these groundwater samples were not analyzed because pesticides were not reported in any of the deepest soil samples.

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Section 4
NATURE AND EXTENT OF CONTAMINATION

This section presents the analytical results from previous investigations and from the RI, and describes the concentration ranges and spatial distributions of the analytes identified at AOC 3. Soil samples were collected at eight locations during the EBS (IT 2001a), the 2002 PAH study (BEI 2005a), and the RI (Table 3-1 and Figure 1-1).

Soil sample results for analytes reported at concentrations above PSCs are illustrated on Figure 4-1. Statistical summaries of soil results are presented in Table 4-1, and soil analytical results are summarized in Table 4-2. Complete analytical results for historical and RI samples collected within the AOC are included in Appendices B and G, respectively.

Soil sampling results are described below for each class of chemicals investigated at AOC 3. As outlined in the RI Work Plan (BEI 2006), the groundwater samples collected at AOC 3 during the RI were not analyzed because pesticides were not reported in any of the deepest soil samples.

4.1 POLYNUCLEAR AROMATIC HYDROCARBONS

Seventeen PAHs were reported in soil samples collected from location 32EDC-5-43. All concentrations were below PSCs.

4.2 PESTICIDES AND POLYCHLORINATED BIPHENYLS

PCBs were not reported above detection limits in soil samples collected at AOC 3.

During the EBS, in sampling location 091-0001, the pesticides alpha-chlordane, 4,4'-dichlorodiphenyldichloroethane (DDD), 4,4'-dichlorodiphenyldichloroethene (DDE), 4,4'-dichlorodiphenyltrichloroethane (DDT), and dieldrin were reported at concentrations up to 820, 14, 39, 130, and 470 µg/kg, respectively, in the surface soil sample. However, a reanalysis of the soil sample (091-0001RE) showed dieldrin at a significantly lower concentration of 8.7 µg/kg. The concentrations of alpha-chlordane, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT and the reanalyzed concentration of dieldrin were below PSCs. The reanalyzed sampling result was validated, while the initial sampling result was not; therefore, only the reanalyzed sampling result is shown in Table 4-2.

Heptachlor was the only pesticide reported above the detection limits in soil samples collected from the six RI borings (located around the boring location 091-0001). Heptachlor was reported at a concentration of 18,000 J µg/kg in the soil sample from A03SB02 at a depth of 1.5 to 2 feet bgs; this concentration was above the residential soil PRG of 110 µg/kg. (The "J" qualifier indicates the value is estimated.) Heptachlor was not reported above the detection limit in the deeper soil sample (3.5 to 4 feet bgs) from this boring, nor in the 14 soil samples from other borings. However, since there are no sampling locations west of boring A03SB02, the western extent of heptachlor in soil has not been defined. Heptachlor was not reported above the laboratory detection limit in deeper soil samples or in those collected to the north, east, and south, suggesting the extent may be limited.

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Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for AOC 3. It discusses the conceptual site model, the physical and chemical changes that might occur to contaminants present at AOC 3, and the mechanisms that could potentially transfer the contaminants from the study area. The conceptual site model facilitates understanding of the present AOC conditions by integrating AOC-specific physical characteristics with the nature and extent of contaminants in the physical systems. Section 5.2 includes an evaluation of the mobility and persistence of compounds above PSCs not attributable to background at AOC 3. Section 5.3 discusses potential migration pathways.

5.1 AOC 3 CONCEPTUAL SITE MODEL

AOC 3 is located near the northwestern corner of Transfer Parcel EDC-5. The study area is flat and covered predominantly with grass and landscaped areas, pavement, concrete pads from former buildings, and a small existing building structure. The nearest surface water is Oakland Inner Harbor, approximately 200 feet north of AOC 3.

Based on a review of RI borings logs, the subsurface lithology at the AOC consists of silty sand and poorly graded sand to about 14 feet bgs, which was the deepest RI boring depth. The underlying Young Bay Mud, estimated at approximately 15 feet bgs, is expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. The Marsh Crust is not likely to be located beneath AOC 3. Groundwater flow direction is approximately north-northeast, and average depth to water in the RI borings was approximately 5 feet bgs. Minimal tidal influence is expected at AOC 3 because of its distance from Oakland Inner Harbor.

Only one pesticide, heptachlor, was reported above its PSC at AOC 3. Heptachlor was reported in one soil sample collected at 1.5 to 2 feet bgs and not in deeper samples. Other pesticides (i.e., alpha chlordane and dieldrin) were reported in an adjacent boring at concentrations below PSCs and contributed to risk (discussed in Section 6). While the western extent of pesticides in soil has not been defined, the relatively small affected area in the other directions suggests the western extent may also be limited, with the pesticide-affected soil possibly localized at soil boring A03SB02.

In accordance with the Work Plan, although grab groundwater samples were collected at AOC 3, they were not analyzed because pesticides were not reported in the deepest soil samples (up to 8 feet bgs).

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in the environment tends to remain in place. The tendency toward immobility and persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Section 5 of the main RI/FS Report discusses the physical and chemical properties of contaminants, and their chemical class (e.g., pesticides), that affect their transport and persistence in the environment. This section discusses the mobility and persistence of pesticides, specifically alpha-chlordane, dieldrin, and heptachlor.

Characteristics of most organochlorine pesticides such as heptachlor (as well as dieldrin and alpha-chlordane, also reported at the study area) are low water solubility, propensity for sorption to organic matter, and high persistence in the environment. Pesticides have high organic carbon partition coefficient values, causing them to be relatively immobile and to persist in soil and sediment. Heptachlor, dieldrin, and alpha-chlordane are expected to adsorb strongly to soil and sediment and resist leaching to groundwater.

Table 5-1 provides estimates of mobility and persistence for selected pesticides reported at AOC 3, considering physical soil data collected at IR Site 35. Geotechnical samples were not collected from AOC 3; therefore, the fraction organic carbon in the soil for the upper soil sample collected at AOC 2 was used in the estimate. The low solubility and mobility exhibited by these compounds retard their migration to groundwater, as indicated by the calculated estimate that over 96 percent of the pesticides will tend to remain sorbed to soil.

Two mechanisms allow pesticides to change in the environment: degradation and weathering. Under normal conditions, pesticides biodegrade very slowly in soil, atmosphere, and animal tissues, occurring more rapidly under anaerobic conditions (ATSDR 2005b). For heptachlor in soil, hydrolysis and biodegradation are important mechanisms. Heptachlor degrades to primarily 1-hydroxychlordene and heptachlor epoxide, which are also persistent and bioaccumulate in the environment. Hydrolysis of heptachlor in moist soils may be significant (ATSDR 2005b).

5.3 CONTAMINANT MIGRATION

The potential migration pathways considered for this AOC include atmospheric transport (i.e., vapors and airborne fugitive dust) and transport by surface water runoff. Groundwater transport was not considered because there is no reason to believe that activities at the study area have impacted groundwater, and pesticides of concern were not reported in soil samples at concentrations above PSCs deeper than approximately 2 feet bgs. Therefore, pesticides are not in contact with groundwater.

Significant transport pathways were not identified for pesticides at AOC 3 for the following reasons.

- Vapor migration of pesticides from soil is not considered a significant transport mechanism due to the fact that pesticides are not very volatile.
- Particulate dispersion (either by wind or surface water) is not a primary transport mechanism because AOC 3 is covered with pavement, grass, or buildings. However, if the surface cover at the AOC is disturbed or removed during and after redevelopment, particulate dispersion from soil is considered a possible transport pathway for nonvolatile compounds in surface soil.
- Seasonal fluctuation of the groundwater table is not considered a significant mechanism for transport of pesticides from soil to groundwater because pesticides have low water solubility and exhibit low mobility in soil. Additionally, pesticide concentrations above PSCs were in the upper 2 feet of soil.

Section 6
HUMAN-HEALTH RISK ASSESSMENT

This section summarizes the baseline human-health risk assessment (HHRA) results for AOC 3. In the baseline HHRA, risk for a residential exposure scenario is assessed with the assumption that no remedial action would take place at the study area. Baseline risks were evaluated for reasonable maximum exposure (RME). This section also presents a qualitative uncertainty evaluation that identifies and characterizes the effects of uncertainties on the risk results.

The HHRA calculates total cumulative risk values and was conducted in accordance with guidelines published by the United States Environmental Protection Agency (U.S. EPA) in the Risk Assessment Guidance for Superfund Part A (U.S. EPA 1989), Part B (U.S. EPA 1991), and Part E (U.S. EPA 2004a) and supporting documents and guidelines published by the California Environmental Protection Agency (Cal/EPA) (1993, 1994, 1999, 2005). The approach used to calculate risk is described in Section 6 of the main RI/FS Report. HHRA information is provided in Appendix J.

Cancer risk and noncancer values for AOC 3 are shown in Table 6-1. Risk drivers for cancer and noncancer risk are presented in Table 6-2.

6.1 COPC IDENTIFICATION

The data selection and identification of chemicals of potential concern (COPCs) are based on a compilation of all usable data for soil. There were no groundwater data for AOC 3 (samples were collected, but in accordance with the RI Work Plan, not analyzed because pesticides were not reported in deeper soil samples). All chemicals reported in at least one sample collected during the RI and/or included in the historical data were included as HHRA COPCs. The HHRA included PAHs in soil. The identification of HHRA COPCs in soil was based on the results from analyses of samples collected from 0 to 10 feet bgs or to groundwater if depth to groundwater is less than 10 feet bgs.

There are 24 COPCs in soil: 17 semivolatile organic compounds (SVOCs) (including PAHs; 9 of the SVOCs are considered volatile for indoor and outdoor air risk calculations) based on 4 samples, and 7 pesticides based on 13 samples.

6.2 RISK CHARACTERIZATION

This section presents the results of the U.S. EPA and Cal/EPA cancer risk calculations and noncancer hazard values. For cancer risk, specific exposure pathways are discussed in the following sections. Results are presented in terms of exposure groups:

- **Exposure Group 1**. All soil and groundwater exposure pathways (includes residential use of groundwater)
- **Exposure Group 2**. Exposure pathways for soil and vapors from volatile organic compounds in groundwater (does not include residential use of groundwater)
- **Exposure Group 3**. Exposure pathways for residential use of groundwater

In accordance with the Work Plan (BEI 2006), groundwater samples were not analyzed; therefore, results for AOC 3 apply to Exposure Group 2.

Two results are presented in Table 6-1 for each exposure group, the total risk and a second value that does not include risk associated with metals concentrations that are below Alameda Point background. For cancer risk, specific exposure pathways are also discussed.

6.2.1 Cancer Risk

The total U.S. EPA and Cal/EPA RME cancer risks (including background risks) are both 3×10^{-3}. The total RME cancer risks rank-ordered by exposure pathway for U.S. EPA and Cal/EPA, respectively, are as follows:

- ingestion of homegrown produce (3×10^{-3} for both)
- direct contact with soil (8×10^{-5} and 7×10^{-5})
- inhalation of vapors in indoor air (no carcinogens and 1×10^{-7})
- inhalation of particulates and vapors in outdoor air (4×10^{-9} and 6×10^{-9})

The U.S. EPA and Cal/EPA cancer risks are above the risk management range due to uptake of heptachlor into homegrown produce. Heptachlor and the other pesticides were reported only in 1 of 13 samples. Without the homegrown produce pathway, the U.S. EPA and Cal/EPA cancer risks are within the risk management range at 8×10^{-5} and 7×10^{-5}, respectively.

6.2.2 Noncancer Hazard

The noncancer hazard index (HI) value of 3 for soil is associated with ingestion of homegrown produce and heptachlor. Without this pathway, the HI value is below 1.

6.3 UNCERTAINTY ANALYSIS

The number of samples (13) is considered adequate for this approximately 0.4-acre area. The identification of the pesticide, heptachlor, as a COPC is consistent with the former plant nursery with likely storage and mixing of pesticides that was located in AOC 3.

6.4 CONCLUSIONS

There are no data for groundwater; therefore, only risks for Exposure Group 2 were calculated. For reasonable future use exposure (Exposure Group 2), the U.S. EPA and Cal/EPA cancer risks are 3×10^{-3} with and without PAHs. The noncancer HI is 3. The cancer risk is associated largely with uptake of the pesticide heptachlor by homegrown produce. It is unlikely that current or future use of AOC 3 would include a large garden on this approximately 0.4-acre area. Soil samples were not analyzed for metals in accordance with the Work Plan (BEI 2006).

Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at AOC 3, including the nature and extent of contamination and results of the baseline HHRA. RI results form the basis of responses to the DQO decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendations presented below.

7.1 SUMMARY

The RI assessed the extent of pesticides in soil at AOC 3. The pesticide dieldrin was reported in one unvalidated EBS soil sample at a concentration above the PSC (although it was not reported in a validated reanalysis of the sample and thus may not have been present). Additionally, if pesticides were reported above the detection limits in the deepest soil samples, groundwater samples were to be analyzed to assess possible impact to groundwater.

The pesticide heptachlor was reported in soil above the PSC in one RI soil sample collected within the upper 2 feet bgs. Only the western extent of heptachlor remains undefined; the proximity of sampling locations in the other directions with results reported as not detected suggests the extent may be limited. In accordance with the Work Plan, because pesticides were not reported in the deepest RI soil samples, the groundwater samples were not analyzed.

Results of the baseline HHRA show both a U.S. EPA and Cal/EPA RME total cancer risk for soil of 3×10^{-3} (above the risk management range); the noncancer HI is 3. Both the cancer risk and noncancer HI are due to ingestion of heptachlor in homegrown produce. Without the homegrown produce pathway, U.S. EPA and Cal/EPA cancer risks are within the risk management range (at 8×10^{-5} and 7×10^{-5}, respectively), and noncancer HIs are less than 1.

7.2 AOC 3 CONCLUSIONS AND RECOMMENDATIONS

The RI was conducted using the seven-step U.S. EPA DQO process (U.S. EPA 2000); DQOs were developed for AOC 3 in the Work Plan (BEI 2006). The RI has addressed these DQOs, as summarized in Table 7-1.

Data collected during the RI were sufficient to define the nature and approximate extent of pesticides, perform a baseline HHRA, and support decisions on the necessity for remedial actions at AOC 3.

An FS is recommended to address heptachlor in the upper 2 feet of soil at AOC 3 for the reason listed below. Additional sampling to define the western extent of heptachlor in soil is also recommended as part of the FS alternatives to be considered for AOC 3.

- The total cancer risk is above the risk management range of 10^{-6} to 10^{-4} and the HI is above 1 due to heptachlor in shallow soil.

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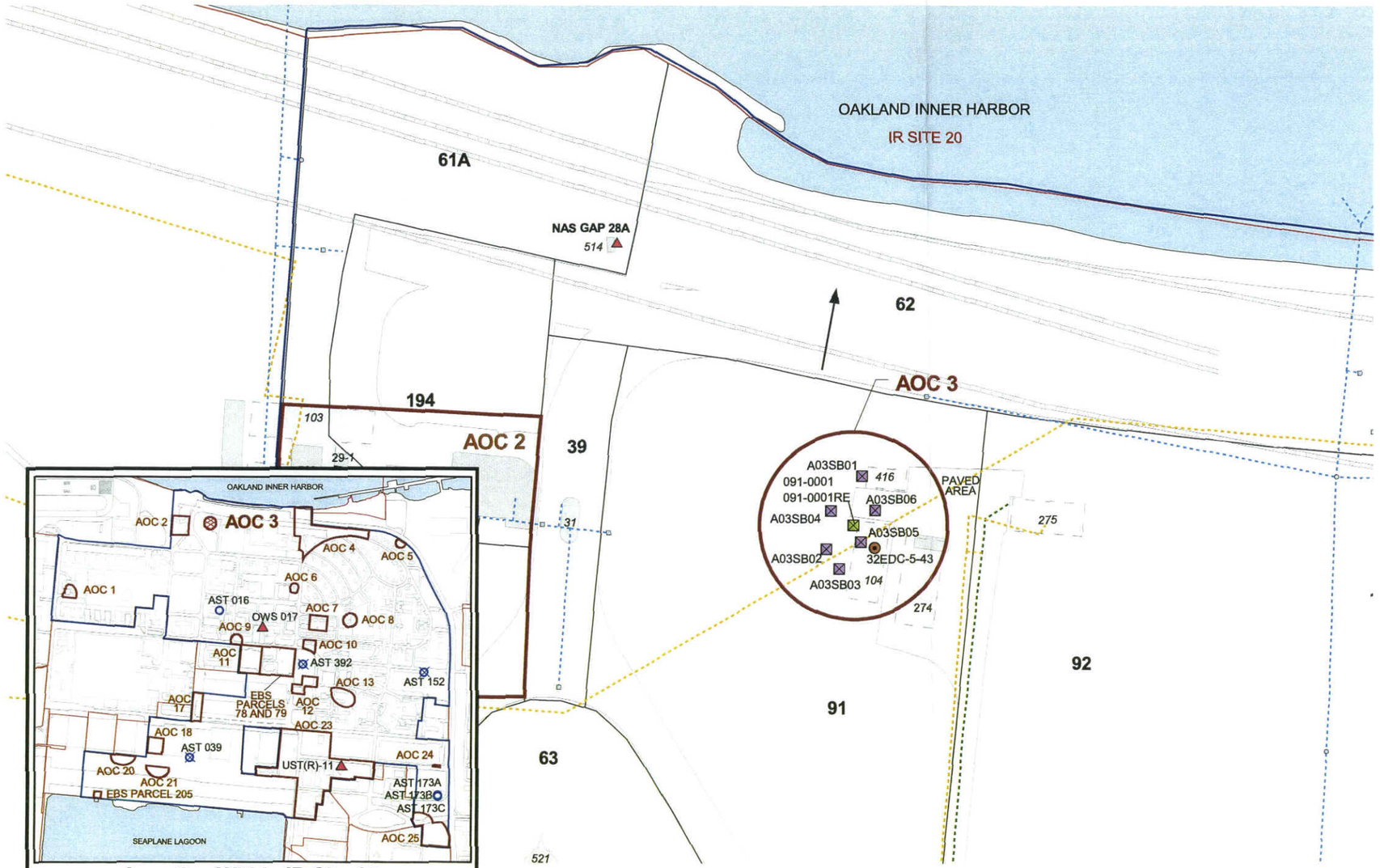
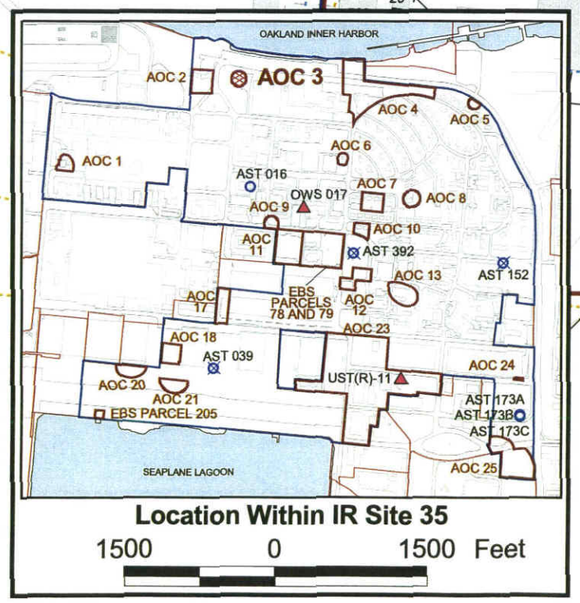
FIGURES





Location Within IR Site 35

1500 0 1500 Feet

LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- WATER
- 71 EBS PARCEL
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

EBS SOIL SAMPLING LOCATION WITH SAMPLE ID
- PESTICIDES/PCBs ANALYSIS ONLY

RI SOIL SAMPLING LOCATION WITH STATION ID
- PESTICIDES/PCBs ANALYSES ONLY

PAH STUDY SOIL SAMPLING LOCATION WITH STATION ID
- SVOCs ANALYSIS ONLY

N

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC -- ECONOMIC DEVELOPMENT CONVEYANCE
GAP -- GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
NAS -- NAVAL AIR STATION
OWS – OIL/WATER SEPARATOR
PAH -- POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK

100 0 100 Feet

RI/FS Report for IR Site 35

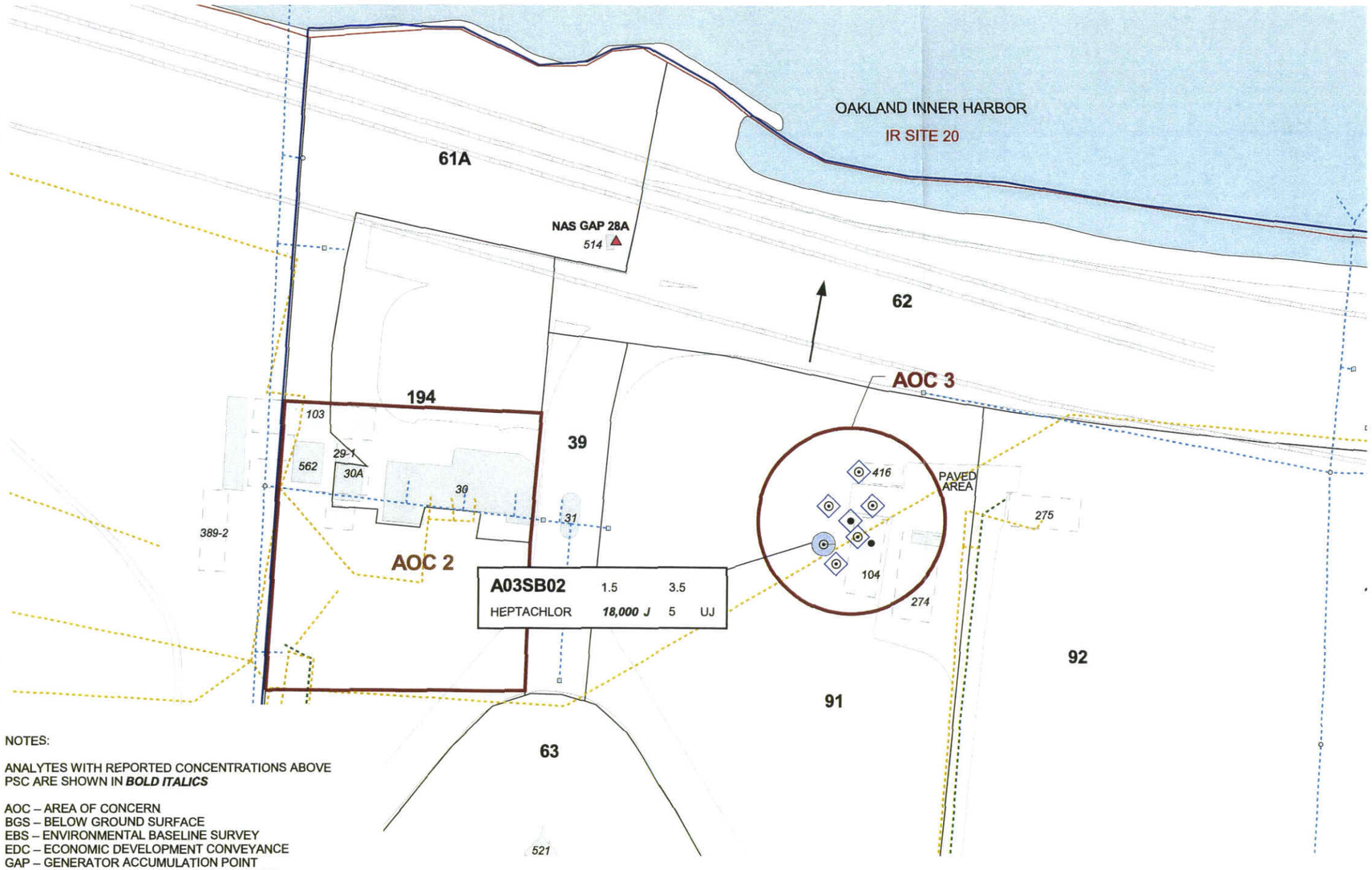
Figure 1-1

Study Area and Sampling Locations
Area of Concern 3

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/30/06
File No.: 077L14445
Job No.: 23818-077
Rev No.: B



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- WATER
- 71 EBS PARCEL
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL SOIL SAMPLING LOCATION
- RI SOIL SAMPLING LOCATION

SOIL SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC FOR :
- PESTICIDES/PCBs

SOIL SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :
- PESTICIDES/PCBs

N

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

A03SB02	1.5	3.5	
HEPTACHLOR	*18,000 J*	5	UJ

ANALYTE — REVIEW QUALIFIER — CONCENTRATION in µg/kg

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
PCBs – POLYCHLORINATED BIPHENYLS
PRG – PRELIMINARY REMEDIATION GOAL
PSC – PRELIMINARY SCREENING CRITERION
µg/kg – MICROGRAMS PER KILOGRAM
NAS – NAVAL AIR STATION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILTY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
UJ – THE ANALYTE WAS NOT REPORTED ABOVE THE DETECTION LIMIT. THE SAMPLE QUANTITATION LIMIT IS AN ESTIMATED QUANTITY

Analyte	PSC
HEPTACHLOR	110 µg/kg (Federal Residential PRG)

RI/FS Report for IR Site 35

Figure 4-1

Soil Sampling Results for Analytes Above PSC – Area of Concern 3

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/30/06
File No.: 077L14470
Job No.: 23818-077
Rev No.: C

TABLES

Table 3-1
Sample Analysis Summary, AOC 3

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE		
				SVOCs	Pest/PCBs	Pest
Soil						
091-001-001	091-0001	EBS	0-0.5		X	
32EDC-5-43	C032C943	PAH Study	0–0.5	X		
32EDC-5-43	C032C944	PAH Study	0.5–2	X		
32EDC-5-43	C032C945 (FD)	PAH Study	0.5–2	X		
32EDC-5-43	C032C946	PAH Study	2–4	X		
32EDC-5-43	C032C947	PAH Study	4–8	X		
A03SB01	C077S041	Site 35 RI	1.5–2			X
A03SB01	C077S042	Site 35 RI	2.5–4			X
A03SB02	C077S043	Site 35 RI	1.5–2			X
A03SB02	C077S044	Site 35 RI	3.5–4			X
A03SB03	C077S045	Site 35 RI	1.5–2			X
A03SB03	C077S046	Site 35 RI	3.5–4			X
A03SB04	C077S047	Site 35 RI	1.5–2			X
A03SB04	C077S048	Site 35 RI	3–4			X
A03SB04	C077S049	Site 35 RI	6.5–7			X
A03SB05	C077S050	Site 35 RI	1.5–2			X
A03SB05	C077S051	Site 35 RI	3.5–4			X
A03SB05	C077S052	Site 35 RI	7.5–8			X
A03SB06	C077S053	Site 35 RI	1.5–2			X
A03SB06	C077S054	Site 35 RI	3.5–4			X
A03SB06	C077S055	Site 35 RI	5.5–6			X
Groundwater						
A03SB04	C077G021*	Site 35 RI	9–14			
A03SB05	C077G023*	Site 35 RI	9–14			
A03SB06	C077G025*	Site 35 RI	7–12			

References:
EBS (IT 2001a)
PAH Study (BEI 2005a)

Note:
* groundwater samples were collected and submitted to the laboratory for archive; groundwater samples were not analyzed because pesticides were not reported in the deepest soil samples

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
EBS – environmental baseline survey
FD – field duplicate
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
Pest – pesticide
RI – remedial investigation
SVOC – semivolatile organic compound

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 3

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG
Semivolatile Organic Compounds (µg/kg)								
acenaphthene	5	2	40	0	1.5	1.5	1.5	3,700,000
acenaphthylene	5	3	60	No PSC	3.4	19	44	—[c]
anthracene	5	3	60	0	7.6	51	130	22,000,000
benz(a)anthracene	5	5	100	0	7.4	81	260	620
benzo(b)fluoranthene	5	5	100	0	15	78	200	620
benzo(k)fluoranthene	5	5	100	0	9.9	85	260	380[d]
benzo(g,h,i)perylene	5	5	100	No PSC	19	80	180	—
benzo(a)pyrene	5	5	100	0	12	110	310	62
chrysene	5	5	100	0	13	98	320	3,800[d]
dibenz(a,h)anthracene	5	3	60	0	10	19	34	62
fluoranthene	5	5	100	0	10	210	760	2,300,000
fluorene	5	3	60	0	1.9	11	29	2,700,000
indeno(1,2,3-cd)pyrene	5	5	100	0	11	78	190	620
2-methylnaphthalene	5	3	60	No PSC	1.1	2.5	4.7	—
naphthalene	5	3	60	0	4	5.1	6.8	1,700[d]
phenanthrene	5	4	80	No PSC	12	170	590	—
pyrene	5	5	100	0	12	280	1,000	2,300,000
Pesticides and PCBs (µg/kg)								
alpha-chlordane	16	1	6.3	0	28	28	28	1,600
gamma-chlordane	16	1	6.3	0	26	26	26	1,600
4,4'-DDD	16	1	6.3	0	14	14	14	2,400
4,4'-DDE	16	1	6.3	0	39	39	39	1,700
4,4'-DDT	16	1	6.3	0	47	47	47	1,700
dieldrin	16	1	6.3	0	8.7	8.7	8.7	30
heptachlor	16	1	6.3	1	18,000	18,000	18,000	110

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 3

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

Acronyms/Abbreviations:

AOC – area of concern
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
µg/kg – micrograms per kilogram
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion (PRG)

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Table 4-2
Soil Sampling Results, AOC 3

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: 091-001-001 / Sample: 091-0001 / [a]Depth Interval: 0 - 0.5 / Collection Date: 27-Apr-95	32EDC-5-43 C032C943 / 0 - 0.5 / 14-May-02	32EDC-5-43 C032C944 / 0.5 - 2 / 14-May-02	32EDC-5-43 C032C945 (FD) / 0.5 - 2 / 14-May-02	32EDC-5-43 C032C946 / 2 - 4 / 14-May-02	32EDC-5-43 C032C947 / 4 - 8 / 14-May-02	A03SB01 C077S041 / 1.5 - 2 / 14-Dec-05	A03SB01 C077S042 / 2.5 - 4 / 14-Dec-05	A03SB02 C077S043 / 1.5 - 2 / 14-Dec-05	A03SB02 C077S044 / 3.5 - 4 / 14-Dec-05
SVOCs															
acenaphthene	3,700,000	—[b]	—	—	µg/kg	NA	1.5 J	52 U	52 U	100 U	1.5 J	NA	NA	NA	NA
acenaphthylene	—	—	—	—	µg/kg	NA	8.3	44 J	52 U	100 U	3.4 J	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	NA	7.6	130	52 U	100 U	14	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	62	260	7.4 J	8.1 J	68	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	94	200	15 J	15 J	67	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	83	260	10 J	9.9 J	62	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	120	180 J	26 J	19 J	53	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	**130**[d]	**310**	12 J	12 J	**75**	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	70	320	13 J	13 J	75	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	13	34 J	52 U	**100 U**[e]	10	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	NA	120	760	18 J	10 J	140	NA	NA	NA	NA
fluorene	2,700,000	—	—	—	µg/kg	NA	2 J	29 J	52 U	100 U	1.9 J	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	110	190	21 J	11 J	57	NA	NA	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg	NA	1.7 J	4.7 J	52 U	100 U	1.1 J	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	4.4 J	6.8 J	52 U	100 U	4 J	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg	NA	38	590	12 J	100 U	30	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	NA	200	1,000	23 J	12 J	150	NA	NA	NA	NA
Pesticides/PCBs															
alpha-chlordane	1,600	—	—	—	µg/kg	28 J	NA	NA	NA	NA	NA	5 UJ	5 UJ	6 UJ	5 UJ
gamma-chlordane	1,600	—	—	—	µg/kg	26 J	NA	NA	NA	NA	NA	5 UJ	5 UJ	6 UJ	5 UJ
4,4'-DDD	2,400	—	—	—	µg/kg	14 J	NA	NA	NA	NA	NA	5 UJ	5 UJ	6 UJ	5 UJ
4,4'-DDE	1,700	—	—	—	µg/kg	39 J	NA	NA	NA	NA	NA	5 UJ	5 UJ	6 UJ	5 UJ
4,4'-DDT	1,700	—	—	—	µg/kg	47 J	NA	NA	NA	NA	NA	5 UJ	5 UJ	6 UJ	5 UJ
dieldrin	30	—	—	—	µg/kg	8.7 J	NA	NA	NA	NA	NA	5 UJ	5 UJ	6 UJ	5 UJ
heptachlor	110	—	—	—	µg/kg	9.2 UJ	NA	NA	NA	NA	NA	5 UJ	5 UJ	**18,000 J**	5 UJ

Table 4-2
Soil Sampling Results, AOC 3

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	A03SB03 C077S045 1.5 - 2 14-Dec-05	A03SB03 C077S046 3.5 - 4 14-Dec-05	A03SB04 C077S047 1.5 - 2 14-Dec-05	A03SB04 C077S048 3 - 4 14-Dec-05	A03SB04 C077S049 6.5 - 7 14-Dec-05	A03SB05 C077S050 1.5 - 2 14-Dec-05	A03SB05 C077S051 3.5 - 4 14-Dec-05	A03SB05 C077S052 7.5 - 8 14-Dec-05	A03SB06 C077S053 1.5 - 2 14-Dec-05	A03SB06 C077S054 3.5 - 4 14-Dec-05	A03SB06 C077S055 5.5 - 6 14-Dec-05
SVOCs																
acenaphthene	3,700,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs																
alpha-chlordane	1,600	—	—	—	µg/kg	5 UJ	6 UJ	5 UJ	5 UJ	6 UJ	5 UJ	5 UJ	6 UJ	5 UJ	6 UJ	6 UJ
gamma-chlordane	1,600	—	—	—	µg/kg	5 UJ	6 UJ	5 UJ	5 UJ	6 UJ	5 UJ	5 UJ	6 UJ	5 UJ	6 UJ	6 UJ
4,4'-DDD	2,400	—	—	—	µg/kg	5 UJ	6 UJ	5 UJ	5 UJ	6 UJ	5 UJ	5 UJ	6 UJ	5 UJ	6 UJ	6 UJ
4,4'-DDE	1,700	—	—	—	µg/kg	5 UJ	6 UJ	5 UJ	5 UJ	6 UJ	5 UJ	5 UJ	6 UJ	5 UJ	6 UJ	6 UJ
4,4'-DDT	1,700	—	—	—	µg/kg	5 UJ	6 UJ	5 UJ	5 UJ	6 UJ	5 UJ	5 UJ	6 UJ	5 UJ	6 UJ	6 UJ
dieldrin	30	—	—	—	µg/kg	5 UJ	6 UJ	5 UJ	5 UJ	6 UJ	5 UJ	5 UJ	6 UJ	5 UJ	6 UJ	6 UJ
heptachlor	110	—	—	—	µg/kg	5 UJ	6 UJ	5 UJ	5 UJ	6 UJ	5 UJ	5 UJ	6 UJ	5 UJ	6 UJ	6 UJ

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[d] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL

[e] detection limit exceeds criteria

Acronyms/Abbreviations:

AOC – area of concern
B(a)P – benzo(a)pyrene
Cal – California
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/kg – micrograms per kilogram
NA – not analyzed
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons

Review Qualifiers:

J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 5-1
Estimates of Mobility and Persistence for Pesticides, AOC 3

Analyte	K_{oc} (L/kg)	f_{oc}	Percent Sorbed*	Half-Life in Soil (years)
chlordane	2.00E+04	0.0164	100	0.96
dieldrin	1.2E+04	0.0164	99	3
heptachlor	5.24E+04	0.0164	100	0.68

Note:
* percent sorbed = $[K_{oc}f_{oc} / (1+K_{oc}f_{oc})] * 100$

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
f_{oc} – fraction organic carbon; value for soil from 2.5 to 4.0 feet bgs classified silty sand at AOC 2
K_{oc} – organic carbon partition coefficient
L/kg – liters per kilogram

Table 6-1
HHRA Results by Exposure Group, AOC 3

Exposure Group	CANCER RISK		Hazard Index
	U.S. EPA	Cal/EPA	
1. All soil and groundwater exposure pathways			
Total*	NA	NA	NA
Without metals below background	NA	NA	NA
2. Exposure pathways for soil and vapors from VOCs in groundwater			
Total*	3E-03	3E-03	3
Without metals below background	NM	NM	NM
Without metals below background and PAHs in soil	3E-03	3E-03	3
3. Exposure pathways for residential use of groundwater			
Total*	NA	NA	NA
Without metals below background	NA	NA	NA

Note:
* includes all COPCs

Acronyms/Abbreviations:
AOC – area of concern
Cal/EPA – California Environmental Protection Agency
COPC – chemical of potential concern
HHRA – human health risk assessment
NA – not applicable
NM – no metals data
PAH – polynuclear aromatic hydrocarbon
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Table 6-2
HHRA Results by Risk Driver, AOC 3

Study Area	Analyte Name	TOTAL			WITHOUT BACKGROUND		
		Hazard Quotient	U.S. EPA Cancer Risk	Cal/EPA Cancer Risk	Hazard Quotient	U.S. EPA Cancer Risk	Cal/EPA Cancer Risk
AOC 3							
Soil							
	benzo(a)pyrene	—*	5E-06	1E-05	—	5E-06	1E-05
	alpha-chlordane	—	—	1E-06	—	—	1E-06
	dieldrin	—	1E-05	1E-05	—	1E-05	1E-05
	heptachlor	3	3E-03	3E-03	3	3E-03	3E-03
	Total for soil	**3**	**3E-03**	**3E-03**	**3**	**3E-03**	**3E-03**

Note:
* dash indicates not applicable

Acronyms/Abbreviations:
AOC – area of concern
Cal/EPA – California Environmental Protection Agency
HHRA – human health risk assessment
U.S. EPA – United States Environmental Protection Agency

Table 7-1
Summary of RI Results and Recommendations, AOC 3

DQO Problem	DQO Decision Questions	Nature and Extent	Risk Assessment	Recommendation
The RI assessed the extent of pesticides in soil identified during previous investigations that may have been above the PSC at AOC 3. Additionally, regulatory agencies requested collection of groundwater to assess possible impact, if detectable levels of pesticides were reported in the deepest soil samples.	Have the nature and extent of contamination been defined?	No. The extent of the pesticide heptachlor is not completely defined (to the west). However, the definition is adequate to support a risk evaluation and decisions on the necessity for remedial action. The proximity of results below detection limits in other directions suggests the extent may be limited. Since pesticides were not reported in the deepest RI soil samples, groundwater samples were not analyzed.	NA	Conduct feasibility study on shallow soil with reported heptachlor. Include sampling to define the western extent. See Sections 8 through 11 of the main RI/FS Report.
	Are contaminants present in soil or groundwater at concentrations that pose unacceptable risk to potential future residents?	NA	Both U.S. EPA and Cal/EPA total cancer risk for soil is 3×10^{-3}, above the risk management range; the noncancer HI is 3. Both cancer risk and noncancer HI due to ingestion of heptachlor in homegrown produce. Without the homegrown produce pathway, U.S. EPA and Cal/EPA cancer risks are within the risk management range (at 8×10^{-5} and 7×10^{-5}, respectively) and the noncancer HI is less than 1. Based on its fate and transport characteristics, pesticides would not be expected to be dissolved in groundwater at AOC 3.	See above.
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?	NA	Based on its fate and transport characteristics, pesticides would not be expected to be dissolved in groundwater at AOC 3, or to migrate approximately 200 feet to Oakland Inner Harbor.	No further action.

Table 7-1 (continued)

Acronyms/Abbreviations:
AOC – area of concern
Cal/EPA – California Environmental Protection Agency
DQO – data quality objective
FS – feasibility study
HI – hazard index
IR – Installation Restoration
NA – not applicable
PSC – preliminary screening criterion
RI – remedial investigation
U.S. EPA – United States Environmental Protection Agency

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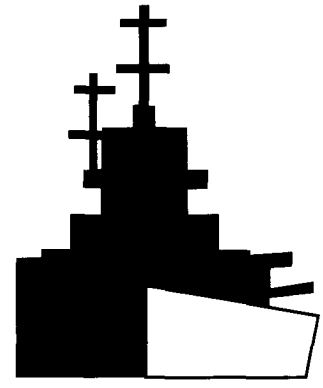
NAVY
CLEAN 3
PROGRAM



FINAL
REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT IR SITE 35, AREAS OF CONCERN IN TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105-1
April 2007

Volume III of V

Submitted to:

Department of the Navy
Base Realignment and Closure
Program Management Office West

1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Department of the Navy
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Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

FINAL
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CTO-0077/0105-1
April 2007
Volume III of V

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ATTACHMENT D

AREA OF CONCERN 4

Department of the Navy
Base Realignment and Closure
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COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL
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ATTACHMENT D, AREA OF CONCERN 4
IR SITE 35, TRANSFER PARCEL EDC-5
ALAMEDA POINT
ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

Prepared by:

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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 4. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station [NAS] Alameda), Alameda, California (Figure 1-1).

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

AOC 4 is an approximately 4.6-acre area in the northeastern portion of Transfer Parcel Economic Development Conveyance (EDC)-5 (Figure 1-1). AOC 4 includes a portion of the eastern edges of Environmental Baseline Survey (EBS) Parcels 62 and 96, the entirety of EBS Parcel 97, and a small portion of the northern edge of EBS Parcel 98.

Current uses at AOC 4 are described by EBS parcel as follows:

- EBS Parcel 62 – open space/parking lot
- EBS Parcel 96 – open space/parking lot, paved road
- EBS Parcel 97 – Building 95 (water tank), Building 176 (U.S. Army well with potable water pump station), Building 177 (transformer house), an aboveground storage tank between Buildings 95 and 176, and landscaped open space
- EBS Parcel 98 – landscaped open space, paved road

1.2 HISTORICAL USE

Most of AOC 4 is in the portion of Transfer Parcel EDC-5 known as the West Housing Area. Historical uses of AOC 4 are described below by EBS parcel (Photographs 1-1 through 1-4).

- The portion of EBS Parcel 62 located in AOC 4 was formerly used as a parking lot.
- The portion of EBS Parcel 96 located in AOC 4 was formerly used for materials storage, washdown, vehicle parking, and disposal.
- EBS Parcel 97 (located completely within AOC 4) contained a water storage tank (Building 95), a well with a potable-water pump station (Building 176) that was shut down due to mercury contamination, and a transformer house (Building 177) used to store irrigation equipment.
- Only a small portion of EBS Parcel 98 is located in AOC 4; this area was formerly open space (used for material storage, vehicle parking, outdoor repair, drum storage, and recreation).

Minor vehicle parking stains were noted during the EBS in those EBS parcels that include parking areas.

Photograph 1-1
General View to West

Photograph 1-2
Buildings 95 (left) and 176 (right), View to Northwest

Photograph 1-3
Aboveground Storage Tank Between Buildings 95 (left) and 176 (right), View to Northwest

Photograph 1-4
Building 177, View to Northeast

1.3 PRELIMINARY SCREENING CRITERIA AND BACKGROUND METALS

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this AOC are the following:

- Soil
  - residential preliminary remediation goals (PRGs) (U.S. EPA 2004b), except polynuclear aromatic hydrocarbons (PAHs) classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (µg/kg) (DON 2001a)
  - environmental screening levels (ESLs) for total petroleum hydrocarbons (TPH) – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)
- Groundwater
  - maximum contaminant levels (MCLs) and advisory level for lead (U.S. EPA 2002, DHS 2006)
  - ESLs for TPH (RWQCB 2005)
  - Because AOC 4 is adjacent to Oakland Inner Harbor, groundwater concentrations were also compared to the following surface water criteria:
    - California Toxics Rule (CTR) (Title 40 *Code of Federal Regulations* Section 131.38) for saltwater aquatic organisms (saltwater criterion continuous concentration [CCC]) and human-health consumption of organisms only (HHCO)
    - National Recommended Water Quality Criteria (NRWQC) for saltwater aquatic organisms (saltwater CCC) and HHCO (U.S. EPA 2002, 2006)
    - ESLs for TPH – surface water bodies (marine) (RWQCB 2005)

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being assessed. For example, groundwater concentrations from all study areas were compared to MCLs, whether or not the groundwater was considered a potential drinking water source in that area. Groundwater concentrations in areas near surface water bodies were also compared to surface water PSCs even though surface water criteria are not applicable to groundwater. Chemicals of potential concern (COPCs) identified in the health risk evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs.

In addition to the above-listed PSCs, metals concentrations in soil and groundwater at AOC 4 were compared to the following Alameda Point background concentrations to help discriminate between site-related and naturally occurring metals:

- Alameda Point background soil concentrations (95th percentile of the pink data set; Appendix E of the final RI Report of Operable Unit [OU]-1 Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)
- Alameda Point background groundwater concentrations (95th percentile; Appendix E of the final RI Report of OU-1 Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)

For ease of discussion in this report, the Alameda Point 95th percentile concentrations for metals in soil (pink background data set) and groundwater are referred to as "background."

Section 4.3 of the main RI/FS Report provides further discussion regarding the occurrence and interpretation of metals concentrations in soil and groundwater at IR Site 35.

1.4 PREVIOUS INVESTIGATIONS

During three previous investigations, soil and groundwater samples were collected at AOC 4, and results are summarized below. Locations sampled in AOC 4 are shown on Figure 1-1. Analytical results for soil and groundwater samples collected within AOC 4 are provided in Appendix B.

1.4.1 Remedial Investigation and Feasibility Study for IR Sites 4 and 5

Background sampling of soil and groundwater was conducted as part of the NAS Alameda RI/FS in 1992. At four locations within NAS Alameda, soil borings were sampled and then converted to monitoring wells MBG-1 through MBG-4 (PRC and Montgomery 1995). An additional round of background groundwater sampling from these wells was conducted in 1998 (TtEMI 1999).

Well MBG-1 is in AOC 4. Soil samples collected from this location during well installation were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and metals. One soil sample collected at 3 to 3.5 feet below ground surface (bgs) during installation of well MBG-1 had concentrations of iron that were above the PSC (residential PRG of 23,000 milligrams per kilogram [mg/kg]) and the background concentration (22,280 mg/kg); other sample concentrations were below background values. A former well (associated with a potable-water pump station [Building 176] and water storage tank [Building 95]) at AOC 4 was reported to have been shut down due to mercury contamination. Results from soil samples collected from MBG-1 did not indicate elevated mercury concentrations; reported soil results for mercury were below detection limits (Appendix B). Soil detection limits ranged from 0.077 to 0.104 mg/kg compared to the PSC of 23 mg/kg (residential PRG) and the background concentration of 0.52 mg/kg.

Groundwater samples collected in 1998 from well MBG-1 were analyzed for VOCs, TPH, SVOCs, pesticides, PCBs, and metals. Arsenic was reported above the PSC (MCL of 10 micrograms per liter [µg/L]) but below the background concentration of 20.72 µg/L. Mercury and zinc were reported in only one of the three samples collected in 1998; both concentrations were above surface water PSCs. Mercury was reported at 0.14 µg/L, which is above the lowest surface water PSC (CTR criterion of 0.025 µg/L);

the detection limit for the other two samples was lower (0.1 µg/L), but above the PSC. Zinc was reported at 113 µg/L, which is above the lowest surface water PSC (NRWQC and CTR CCC of 81 µg/L), and is also above the background concentration of 36.39 µg/L. Zinc was reported at 12 µg/L and below the laboratory detection limit of 2.8 µg/L in the other two samples; both are also below background.

1.4.2 2002 Polynuclear Aromatic Hydrocarbon Study

Some soil samples collected in AOC 4 during the 2002 PAH study had PAHs at concentrations above the screening criterion (620 µg/kg for B[a]P equivalent concentrations). Excavation conducted for the time-critical removal action (TCRA) removed PAH-contaminated soil to approximately 2 feet bgs, thereby removing soil with B(a)P equivalent concentrations above the screening criterion. The excavation locations are shown on Figure 1-1.

Because deeper soil from one boring (32EDC-5-89) advanced in AOC 4 during the 2002 PAH study was not removed during the PAH TCRA, the sample location is shown in yellow on Figure 4-1. The soil sample from the 4- to 8-foot-bgs interval (beneath the depth to which soil was removed) from boring 32EDC-5-89 had a B(a)P equivalent concentration above the PSC. PAH concentrations in the other soil samples collected at AOC 4 during the 2002 PAH study were below the PSC (BEI 2005a).

1.4.3 Polynuclear Aromatic Hydrocarbon Removal Action

The identification of PAH concentrations above the screening criterion in soil samples collected from Transfer Parcel EDC-5 during the 2002 PAH study (BEI 2005a) prompted the Navy to conduct a TCRA in portions of the West Housing Area (FWEC 2004). PAH TCRA soil removals in the West Housing Area were conducted using a grid pattern at several EBS parcels, including two grid areas in AOC 4 (one in portions of EBS Parcels 62 and 96, and the other in portions of EBS Parcels 96 and 97). Soil was removed to a depth of approximately 2 feet bgs from certain grid areas to address elevated concentrations of PAHs. The excavations were backfilled using clean fill material. Locations of the removals at AOC 4 are shown on Figure 1-1. Only laboratory results for soil samples collected outside of or below the TCRA excavations were reviewed for this report.

Soil samples were collected from 47 borings during TCRA activities in AOC 4 from soil still in place after the removals (H26–H33, I18–I31, J18–J27, J30–J32, K27–K32, L29–L31, L31RA, M30, and M31). These samples were analyzed for PAHs. B(a)P equivalent concentrations at eight locations (H29–H33, I26, J25, and J26) were above the PSC (620 µg/kg); sample depths were between 2 and 8 feet bgs.

1.5 ADJACENT SITES

IR Site 20 is a portion of the Oakland Inner Harbor located along part of the northern boundary of Alameda Point. This site extends along a 3,960-foot length of shoreline at the eastern end of Alameda Point, including the northern boundary of AOC 4. This entire

shoreline area was developed for industrial use, including port facilities, a ship-building and repair facility, sand and gravel off-loading areas, and marinas. Stormwater and industrial wastes have been discharged into the Oakland Inner Harbor via a series of drains located along the shore. The 2006 RI Report for IR Site 20 (Battelle et al. 2006) evaluated offshore sediment samples taken from the surface, subsurface, and deeper core locations for PCBs, PAHs, pesticides, and metals. Results indicated that these chemicals in sediment were not present at concentrations exceeding screening criteria; therefore, contaminant migration from the surface water runoff into Oakland Inner Harbor is unlikely.

IR Site 28 (Todd Shipyards area) is located north of AOC 4 and does not share a border with Transfer Parcel EDC-5 except at the extreme western boundary of IR Site 28. The site was used for various shipyard activities including ship building and repair. Groundwater contamination (i.e., arsenic, manganese, and nickel) at IR Site 28 is not migrating to Transfer Parcel EDC-5. Groundwater flow direction at IR Site 28 is toward Oakland Inner Harbor and away from Transfer Parcel EDC-5 (BEI 2004a).

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Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, and geology at AOC 4.

Topography at AOC 4 is relatively flat. AOC 4 is estimated to be at an elevation similar to AOC 5, at about 8 feet above mean sea level (MSL). Groundwater monitoring well MBG-1 is located within the south-central portion of AOC 4. A review of groundwater depths in this well over time (March 1995 through August 1998) shows a range in depth to water from approximately 1 to 4 feet bgs. The deepest historical groundwater level measured in this well was approximately 4 feet above MSL.

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is approximately north-northwest at AOC 4. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Based on tidal studies performed at other Alameda Point sites, tidal influence would be expected near the shoreline, but negligible near inland well MBG-1, located approximately 400 feet from Oakland Inner Harbor. Results of tidal studies performed at nearby sites (see Section 2 of the main RI/FS Report) indicated a minimal effect on groundwater elevations in the fill material at the inland well, located approximately 200 feet from Oakland Inner Harbor.

Soil encountered in well MBG-1 during drilling consisted of sand and gravelly sand to about 2.5 feet bgs, where sandy clay and clay were encountered to about 4 feet bgs. Silty sand was observed below the clay to 8.5 feet bgs, and then sand was observed to total boring depth (18 feet bgs). Clay lenses were observed within the silty sand. Fill material is estimated to extend to a depth of approximately 8 to 10 feet bgs at AOC 4, and the Young Bay Mud is estimated at approximately 9 feet bgs (see cross sections C-C′ on Figure 2-8 and H-H′ on Figure 2-9 in the main RI/FS Report). Groundwater was measured in well MBG-1 at 2.52 feet bgs in May 1992, when the well was installed. As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust is not likely to be located beneath AOC 4.

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Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

AOC 4 addresses PAHs in soil and metals in soil and groundwater. No sampling was conducted for the RI at AOC 4 because the Navy and regulatory agencies agreed that existing analytical results were sufficient to support a risk evaluation and decisions on the necessity for remedial actions at AOC 4. Results from previous investigations provide the basis for the discussion of contaminant nature and extent in the conceptual site model in Section 5. Table 3-1 includes a summary of sampling conducted during previous investigations.

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Section 4
NATURE AND EXTENT OF CONTAMINATION

No sampling was conducted for the RI at AOC 4 because the Navy and regulatory agencies agreed that existing analytical results are sufficient. Historical sampling and analytical results are discussed in Section 1.4. Metals reported in soil and groundwater at concentrations above background are discussed in detail in Section 4.3.3 of the main RI/FS Report. Please note that regardless of concentration, all reported metals (except required human trace nutrients) were included in the risk evaluation (Section 6).

Tables 4-1 and 4-2 present a statistical summary of historical soil and groundwater samples. Table 4-3 summarizes the analytical results for soil; Table 4-4 summarizes the analytical results for groundwater and compares the results to groundwater PSCs; and Table 4-5 compares the analytical results for groundwater to surface water PSCs because AOC 4 is located adjacent to Oakland Inner Harbor. Figures 4-1 and 4-2 show soil and groundwater sampling results, respectively, above PSCs. PAH exceedances are included as part of the evaluation of the PAH Areas (Attachment W).

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Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for AOC 4. It discusses the conceptual site model, the physical and chemical changes that might occur to contaminants present at AOC 4, and the mechanisms that could potentially transfer the contaminants from the study area. The conceptual site model facilitates understanding of the present AOC conditions by integrating AOC-specific physical characteristics with the nature and extent of contaminants in the physical systems. Section 5.2 includes an evaluation of the mobility of compounds above PSCs not attributable to background at AOC 4. Section 5.3 discusses potential migration pathways.

5.1 AOC 4 CONCEPTUAL SITE MODEL

AOC 4 is an approximately 4.6-acre area in the northeastern portion of Transfer Parcel EDC-5, located east of Saratoga Street. Topography at AOC 4 is relatively flat and generally gently sloping down to the north towards Oakland Inner Harbor. Most of AOC 4 is grass-covered open space, paved parking, and landscaped areas. The surface water nearest to AOC 4 is Oakland Inner Harbor, which partially borders AOC 4 along the northern boundary of the study area.

Based on a review of the boring logs for well MBG-1 and borings 32EDC-5-88 and -89, located within the south-central portion of AOC 4, the subsurface lithology consists of poorly graded sand, and silty sand and sand to 18 feet bgs (total boring depth). Observations in nearby borings indicate the Young Bay Mud is generally at approximately 8 to 10 feet bgs, but was not reached in borings at AOC 4. The underlying Young Bay Mud would be expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. Marsh Crust is unlikely to be located beneath AOC 4 (SWDIV 2001). Groundwater flow direction is approximately north-northwest, and maximum depth to water is approximately 4 feet bgs. Based on tidal studies performed at other Alameda Point sites, tidal influence is expected in portions of AOC 4 near the shoreline, but negligible near inland well MBG-1, located approximately 400 feet from Oakland Inner Harbor.

PAHs in soil and metals in soil and groundwater were reported at concentrations above PSCs. PAH exceedances at AOC 4 are included as part of the PAH Areas (Attachment W).

In soil, iron was reported above the PSC and background in one of four soil samples. Iron was the only metal reported in soil samples at AOC 4 at a concentration above both the PSC and the background concentration. The soil sample was collected during the installation of well MBG-1. This sample was part of the data set used to develop the pink background values. As discussed in Section 4.3 of the main RI/FS Report, iron in soil is believed to be naturally occurring.

In groundwater, arsenic was reported above the PSC but below the background concentration. Mercury and zinc were reported above surface water PSCs in one of the three groundwater samples collected in well MBG-1, located approximately 400 feet from the shoreline. Mercury was not reported above laboratory detection limits in four soil samples collected from this well boring (detection limits were below background).

Zinc was not reported above background in soil, and was not consistently reported above the surface water PSC and background in groundwater (reported in one of three samples). For these reasons, it appears that zinc and mercury do not have a source in soil or groundwater at AOC 4. Zinc concentrations may be within background concentration values, or the zinc and mercury may be isolated occurrences in the fill material at AOC 4.

In addition, although AOC 4 data were compared to aquatic criteria because the study area borders Oakland Inner Harbor, the location of the soil and groundwater samples with reported metals is approximately 400 feet from the harbor, and migration of these metals to the surface water at concentrations above PSCs is not considered likely, especially since their concentrations are within the background range of concentrations.

Iron was reported in groundwater at a concentration above background in one of three samples collected from well MBG-1. As discussed in Section 4.3 of the main RI/FS Report, the high concentrations of iron in groundwater result from dissolution of iron in soil due to reducing conditions. No site-related source of organic material that could have caused the reducing conditions was identified in soil or groundwater. One potential non-site-related source might be the natural conditions associated with a sediment layer (Young Bay Mud) encountered at 9 feet bgs.

The nature and extent of metals have been adequately characterized to support a risk evaluation and decisions on the necessity for remedial actions.

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in the environment tends to remain in place. The tendency toward immobility and persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Section 5 of the main RI/FS Report discusses the physical and chemical properties of contaminants, and their chemical class (e.g., PAHs and naturally occurring metals), that affect their transport and persistence in the environment. This section discusses the mobility of mercury.

Mercury is not subject to most degradation reactions that apply to organics, making it naturally persistent in the environment. However, metals are vulnerable to oxidation-reduction (redox) reactions that can change their valence, species, and net ionic charge. This redox vulnerability of each metal species strongly influences the transport behavior of the metal in the environment and determines whether the metal will be present as an immobile phase in soil or as a mobile dissolved phase in groundwater.

The distribution of mercury species in soil (elemental mercury, mercurous irons, and mercuric ions) is dependent on soil pH and redox potential. Both the mercurous and mercuric mercury cations are adsorbed by clay minerals, oxides, and organic matter. Adsorption is pH dependent, increasing with increasing pH. Mercurous and mercuric mercury are also immobilized by forming various precipitates. Mercurous mercury precipitates with chloride, phosphate, carbonate, and hydroxide. In alkaline soils,

mercuric mercury will precipitate with carbonate and hydroxide to form a stable solid phase. At lower pH and high chloride concentration, mercuric chloride ($HgCl_2$) is formed. Divalent mercury also will form complexes with soluble organic matter, chlorides, and hydroxides that may contribute to its mobility (McLean and Bledsoe 1992).

However, under mildly reducing conditions, both organically bound mercury and inorganic mercury compounds may be degraded to the elemental form of mercury. Elemental mercury can readily be converted to methyl or ethyl mercury by biotic and abiotic processes. Both methyl and ethyl mercury are volatile and soluble in water.

Estimates of the mobility of mercury in the subsurface are shown in Table 5-1. Estimates indicate that most of the mercury would be adsorbed to soil and that mercury in groundwater would tend to travel 116 times slower than the groundwater flow.

5.3 CONTAMINANT MIGRATION

The potential migration pathways considered for this AOC include atmospheric transport (i.e., airborne fugitive dust and vapors), transport by surface water runoff, and groundwater transport (both off the study area and to Oakland Inner Harbor). Volatile compounds were reported at low concentrations in soil samples at the study area, making atmospheric transport in vapors insignificant. Samples collected from surface soil did not have reported concentrations of analytes above PSCs. Additionally, most of the study area is covered by grass, and the remainder is paved or covered by buildings. Therefore, significant transport by airborne dust or by surface water runoff is unlikely.

The most likely migration pathway for contaminants at AOC 4 is discussed below.

- Transport due to groundwater flow could potentially carry metals in groundwater from the study area to other portions of IR Site 35 or to surface water. Transport of mercury or zinc by migration of groundwater to surface water that is over approximately 400 feet away is not likely given the distance and expected retardation of mercury relative to groundwater flow in the subsurface (Table 5-1).

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Section 6
TIER 1 EVALUATION

This section summarizes the Tier 1 risk evaluation results for AOC 4. In a Tier 1 evaluation, risk for a residential exposure scenario is assessed with the assumption that no remedial action would take place at the study area. This section also presents a qualitative uncertainty evaluation that identifies and characterizes the effects of uncertainties on the risk results.

A Tier 1 evaluation is a screening-level approach that calculates total cumulative risk values using published risk-based guidelines from the United States Environmental Protection Agency (U.S. EPA), California Environmental Protection Agency (Cal/EPA), and San Francisco Bay Regional Water Quality Control Board. The Tier 1 evaluation includes all chemicals identified in at least one sample except for PAHs in soil. PAHs in soil are not included because site-specific remediation goals for PAHs are being developed. PAH exceedances are evaluated in the PAH Areas (Attachment W). The approach used to estimate risk is described in Section 6 of the main RI/FS Report. Tier 1 information is provided in Appendix J.

Cancer risk and noncancer values for AOC 4 are shown in Table 6-1. Risk drivers for cancer and noncancer risk are presented in Table 6-2.

6.1 COPC IDENTIFICATION

The data selection and identification of COPCs are based on a compilation of all usable data for soil and groundwater. All chemicals reported in at least one sample in the historical data were included as Tier 1 COPCs, except calcium, magnesium, potassium, and sodium, which are known to be required human trace nutrients.

There are 15 Tier 1 COPCs in soil at AOC 4: 13 metals based on 2 samples (except arsenic based on 11 samples), a PCB (Aroclor 1260) based on 11 samples, and a VOC (tetrachloroethene) based on 4 samples.

There are 13 Tier 1 COPCs in groundwater at AOC 4: 12 metals based on three samples and an SVOC (pyrene) based on one sample.

6.2 RISK CHARACTERIZATION

The cancer risk and noncancer hazard values were calculated using the Tier 1 protocol from Cal/EPA (2005). The maximum concentration of each COPC in soil and groundwater was compared with a risk-based guideline to estimate cancer and noncancer risks. The maximum metals concentrations were compared to background. Two results are presented for three exposure groups, the total risk and a second value that does not include risk associated with metals concentrations that are below background.

For soil and groundwater data for the three exposure groups at AOC 4, the calculated cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 2×10^{-3} and 5

  Without metals below background: 5×10^{-7} and 3

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 9×10^{-5} and 2

  Without metals below background: 5×10^{-7} and 2

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 2×10^{-3} and 3

  Without metals below background: 4×10^{-9} and 1

For the three exposure groups, the cancer risk and noncancer hazards without metals below background are below 10^{-6} and are less than a hazard index (HI) of 1 without iron, respectively.

6.3 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation are representative of any potential health concerns at AOC 4. The results are consistent with the site history. This approximately 4.6-acre site is adequately characterized with three investigations and a Tier 1 evaluation based on 11 soil samples for PCBs and samples for other organic chemicals in soil and groundwater.

The uncertainty associated with the omission of the dermal pathway for groundwater is low because exposure from the dermal pathway for the Tier 1 COPCs would not result in an increase in the cancer risk or HI for residential use of groundwater (Exposure Groups 1 and 3). Cancer risk and hazard values are reported in one significant figure, so small changes will not necessarily result in an overall increase. This finding is based on the ratio of dermal exposure to ingestion for each Tier 1 COPC.

6.4 CONCLUSIONS

For all three exposure groups, the total cancer risk that includes residential use of groundwater (Exposure Groups 1 and 3) is above the risk management range. The cancer risk without metals below background is below the de minimis level of 10^{-6} for all three exposure groups.

The noncancer HI values above 1 for soil and groundwater are due largely to iron. Without iron, the HI values do not exceed 1. The soil sample for iron is part of the background data set and so is considered to be background. The maximum concentration in groundwater of 7,070 µg/L is only slightly above the background concentration of 6,586 µg/L and well below the maximum background concentration of 24,000 µg/L. Also, as noted in Section J1.2.4 of Appendix J, the health effects of iron are not considered additive with other chemicals.

Also, as discussed in Section 4 of the main RI/FS Report, correlation analysis indicates that the concentrations of iron are naturally occurring and not due to a release resulting from Navy activities.

Section 7

CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at AOC 4, including the nature and extent of contamination and results of the Tier 1 risk evaluation. Results form the basis of responses to the data quality objective (DQO) decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendations presented below.

7.1 SUMMARY

Sampling was not conducted during the RI because results from previous investigations were sufficient to support a Tier 1 risk evaluation. The primary chemicals reported at AOC 4 during previous investigations were metals in groundwater at concentrations above background or surface water PSCs. Specifically, mercury and zinc were reported above laboratory detection limits in one of three samples collected from a well approximately 400 feet from the shoreline. However, a mercury source was not indicated by soil results from the well boring, and it is unlikely that mercury would migrate 400 feet in groundwater and result in a surface water concentration above the PSC. Zinc was reported in one of three groundwater samples above background or the surface water PSC. The iron concentrations in one of three groundwater samples are indicative of reducing conditions. No site-related source of organic material that could have caused the reducing conditions was identified in soil or groundwater. One potential non-site-related source might be the natural conditions associated with the presence of Bay Sediment Unit sediment in the interval from which groundwater was collected, as discussed in Section 4.3.2.2 of the main RI/FS Report.

B(a)P equivalent concentrations above the PSC in soil at nine locations were incorporated into the PAH Areas (Attachment W).

Results of the Tier 1 risk evaluation show a total cancer risk of 2×10^{-3} and a noncancer HI of 5. Total cancer risk without metals that are present at concentrations below background is 5×10^{-7} (below the risk management range) and the noncancer hazard is 3 (the HI is 2 without residential use of groundwater). The noncancer HI values above 1 are due mostly to iron in soil and groundwater. However, iron in soil is considered naturally occurring, and iron was only reported in groundwater at a concentration above background in one of three samples collected from well MBG-1. The presence of iron in groundwater appears to be caused by reducing conditions. Additionally, the health effects of iron are not considered additive with other chemicals.

7.2 AOC 4 CONCLUSIONS AND RECOMMENDATIONS

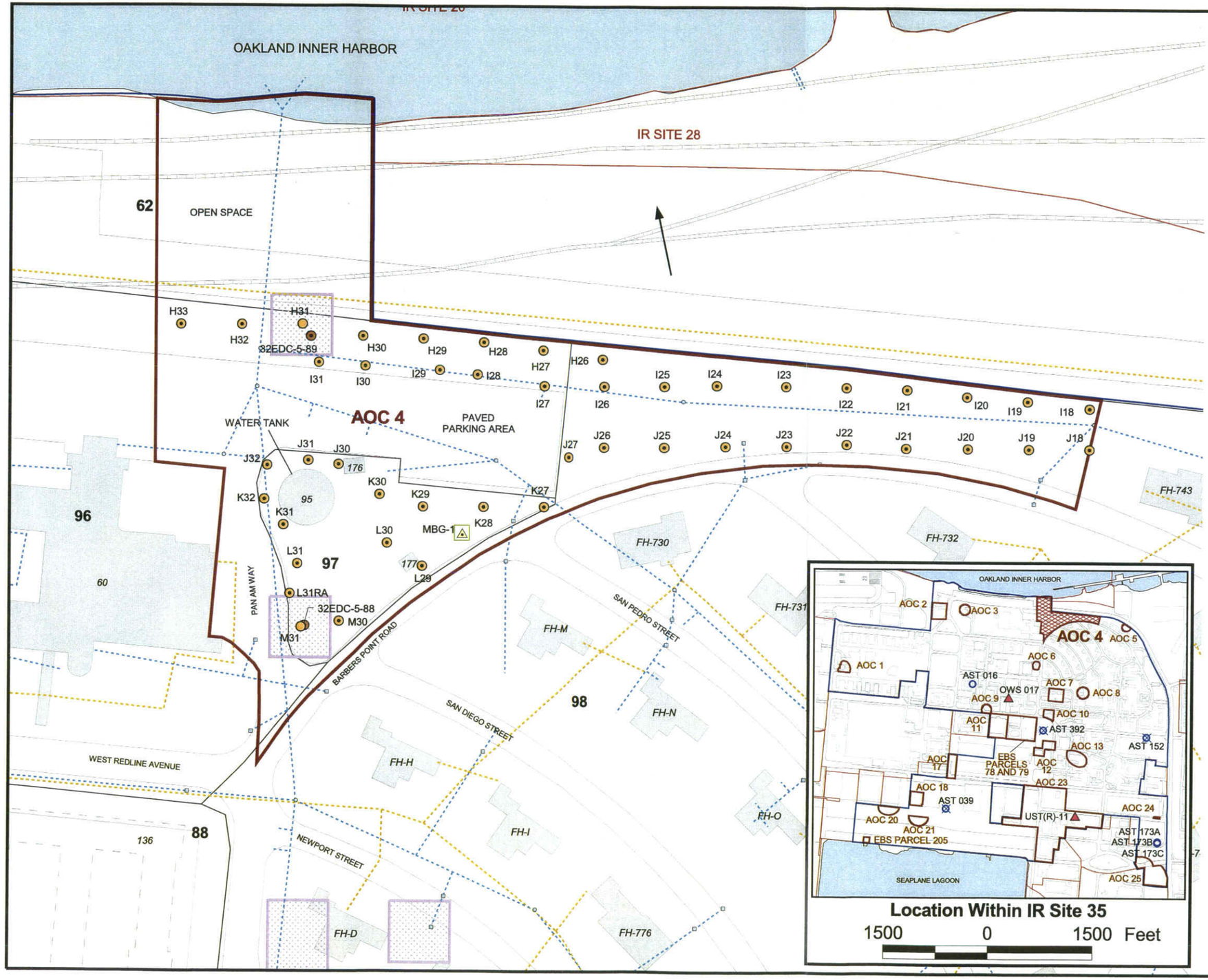
The RI was conducted using the seven-step U.S. EPA DQO process (U.S. EPA 2000); DQOs were developed for AOC 4 in the Work Plan (BEI 2006). Previous investigations have adequately addressed DQOs, as summarized in Table 7-1.

Sampling was not conducted during the RI because results from previous investigations were sufficient to support a Tier 1 risk evaluation and decisions on the necessity for remedial action at AOC 4.

No further action is recommended at AOC 4. Further evaluation of the extent of metals (iron, mercury, and zinc) in groundwater and iron, vanadium, and PAHs in soil is not recommended for the following reasons.

- Without metals above background, total cancer risk is below the risk management range of 10^{-6} to 10^{-4}. The HI above 1 is due mostly to iron in soil and groundwater, which are considered to be naturally occurring. Additionally, the health effects of iron are not considered additive with other chemicals.
- Mercury and zinc were reported above surface water PSCs; however, zinc was not consistently reported above background or the PSC. A mercury source was not indicated by soil results from the well boring, and it is unlikely that mercury would migrate 400 feet in groundwater and result in a surface water concentration above the PSC.
- PAHs are addressed as part of the PAH Areas (Attachment W).

FIGURES



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- WATER
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

N

PAH REMOVAL ACTION SOIL SAMPLING LOCATION WITH STATION ID
- SVOCs ANALYSIS ONLY
- SVOCs, PESTICIDES/PCBs, AND METALS ANALYSES ONLY

PAH STUDY SOIL SAMPLING LOCATION WITH STATION ID
- SVOCs ANALYSIS ONLY

BACKGROUND SOIL SAMPLING LOCATION WITH STATION ID
- VOCs, SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY

BASEWIDE GROUNDWATER MONITORING PROGRAM GROUNDWATER SAMPLING LOCATION WITH STATION ID
- VOCs, SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY

Location Within IR Site 35

1500 0 1500 Feet

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOCs – VOLATILE ORGANIC COMPOUNDS

100 0 100 Feet

RI/FS Report for IR Site 35

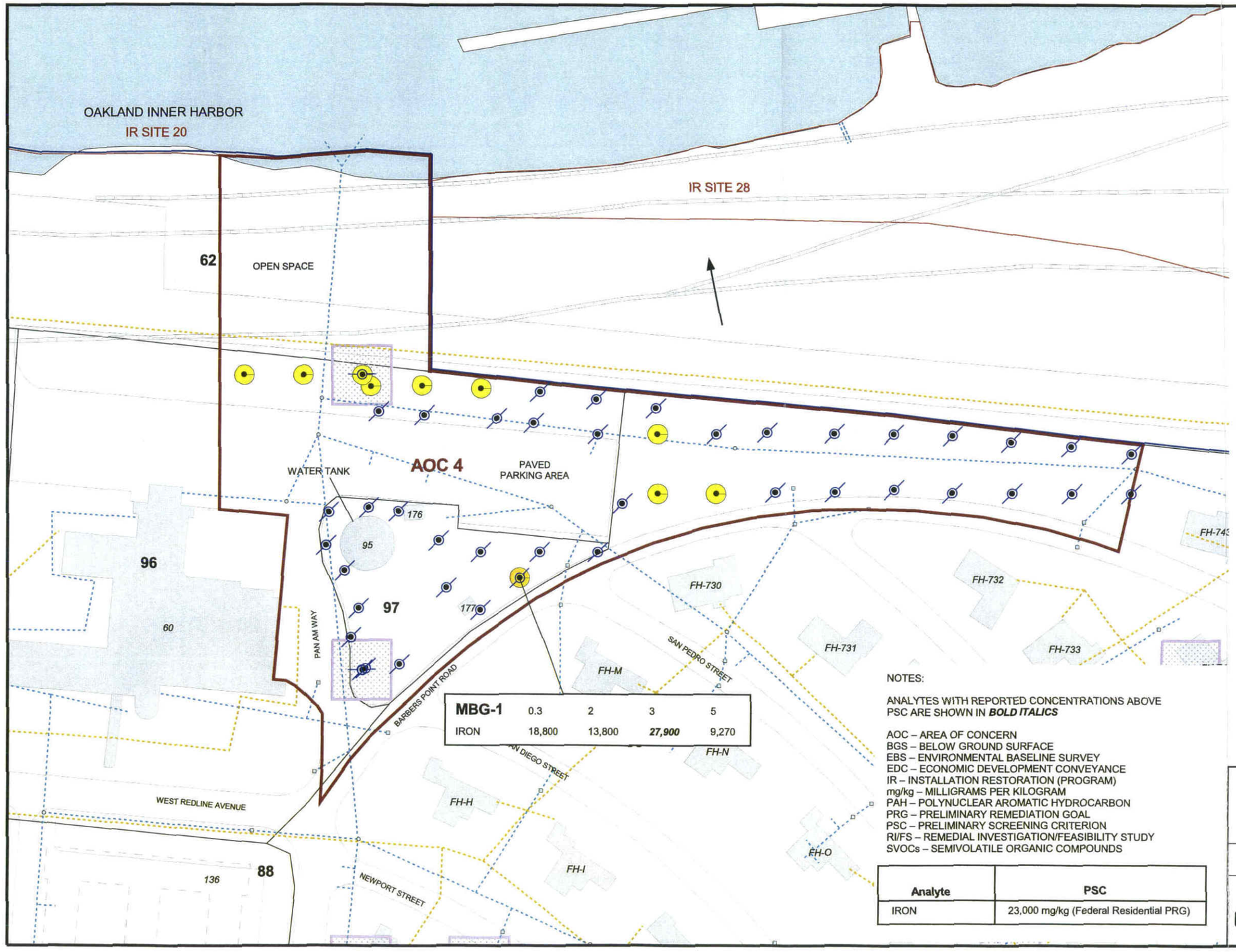
Figure 1-1

Study Area and Sampling Locations
Area of Concern 4

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/30/06
File No.: 077L14446
Job No.: 23818-077
Rev No.: C



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- WATER
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL SOIL SAMPLING LOCATION

N

SOIL SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC FOR :

- METALS
- BENZO(A)PYRENE EQUIVALENT (SEE ATTACHMENT W, PAH AREAS, FOR ADDITIONAL INFORMATION AND CONCENTRATIONS)

SOIL SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :

- METALS
- SVOCs

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

MBG-1	0.3	2
IRON	18,800	13,800

ANALYTE — CONCENTRATION in mg/kg

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
mg/kg – MILLIGRAMS PER KILOGRAM
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PRG – PRELIMINARY REMEDIATION GOAL
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS

Analyte	PSC
IRON	23,000 mg/kg (Federal Residential PRG)

RI/FS Report for IR Site 35

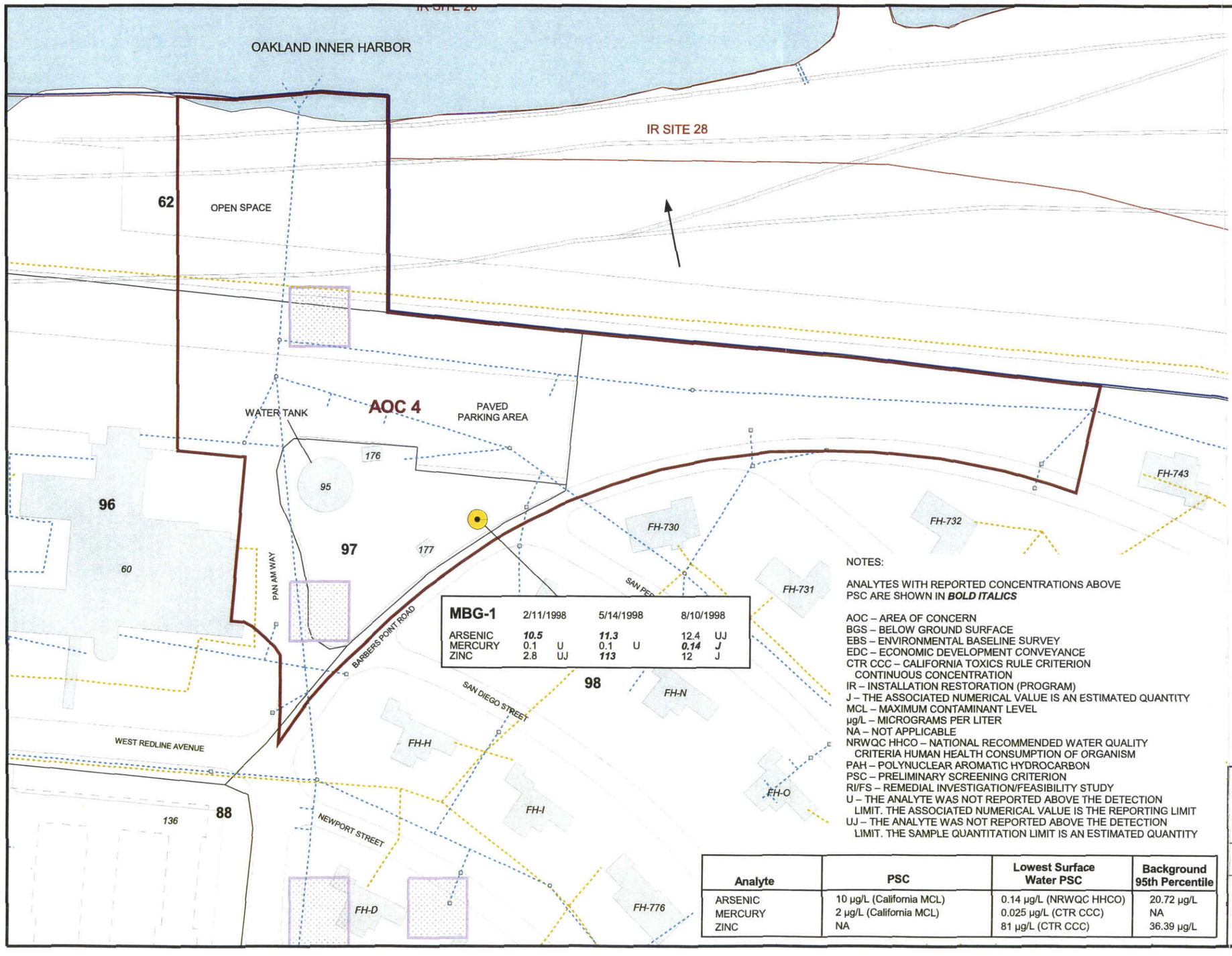
Figure 4-1

Soil Sampling Results for Analytes Above PSC – Area of Concern 4

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/30/06
File No.: 077L14480
Job No.: 23818-077
Rev No.: C



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- WATER
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL GROUNDWATER SAMPLING LOCATION

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC AND GREATER THAN BACKGROUND FOR :

- METALS

N

STATION ID — COLLECTION DATE

MBG-1	2/11/1998		5/14/1998	
ARSENIC	***10.5***		***11.3***	
MERCURY	0.1	U	0.1	U
ZINC	2.8	UJ	***113***	

ANALYTE — REVIEW QUALIFIER — CONCENTRATION in µg/L

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
CTR CCC – CALIFORNIA TOXICS RULE CRITERION CONTINUOUS CONCENTRATION
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
MCL – MAXIMUM CONTAMINANT LEVEL
µg/L – MICROGRAMS PER LITER
NA – NOT APPLICABLE
NRWQC HHCO – NATIONAL RECOMMENDED WATER QUALITY CRITERIA HUMAN HEALTH CONSUMPTION OF ORGANISM
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
U – THE ANALYTE WAS NOT REPORTED ABOVE THE DETECTION LIMIT. THE ASSOCIATED NUMERICAL VALUE IS THE REPORTING LIMIT
UJ – THE ANALYTE WAS NOT REPORTED ABOVE THE DETECTION LIMIT. THE SAMPLE QUANTITATION LIMIT IS AN ESTIMATED QUANTITY

Analyte	PSC	Lowest Surface Water PSC	Background 95th Percentile
ARSENIC	10 µg/L (California MCL)	0.14 µg/L (NRWQC HHCO)	20.72 µg/L
MERCURY	2 µg/L (California MCL)	0.025 µg/L (CTR CCC)	NA
ZINC	NA	81 µg/L (CTR CCC)	36.39 µg/L

100 0 100 Feet

RI/FS Report for IR Site 35

Figure 4-2

Groundwater Sampling Results for Analytes Above PSC – Area of Concern 4

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/26/07
File No.: 077L14481
Job No.: 23818-077
Rev No.: D

TABLES

Table 3-1
Sample Analysis Summary, AOC 4

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE					
				VOCs	SVOCs	PAHs	TPH	Pest/PCBs	Metals
Soil									
32EDC-5-88	C032CB44	PAH Study	2–4			X			
32EDC-5-88	C032CB45	PAH Study	4–8			X			
32EDC-5-89	C032CB48	PAH Study	2–4			X			
32EDC-5-89	C032CB49	PAH Study	4–8			X			
MBG-1	M-BG1-000	Basewide GW Mon. Program	0.3–0.5	X	X		X[a]	X	X
MBG-1	M-BG1-002	Basewide GW Mon. Program	2–2.5	X	X		X[a]	X	X
MBG-1	M-BG1-003	Basewide GW Mon. Program	3–3.5	X	X		X[a]	X	X
MBG-1	M-BG1-004	Basewide GW Mon. Program	5–5.5	X	X		X[a]	X	X
H26	0040-WHA-3518	PAH TCRA	0–0.5			X			
H26	0040-WHA-3519	PAH TCRA	0.5–2			X			
H27	0040-WHA-3520	PAH TCRA	0–0.5			X			
H27	0040-WHA-3521	PAH TCRA	0.5–2			X			
H27	0040-WHA-3522	PAH TCRA	2–4			X			
H27	0040-WHA-3523	PAH TCRA	4–8			X			
H27	0040-WHA-3524 (FD)	PAH TCRA	4–8			X			
H28	0040-WHA-3525	PAH TCRA	0–0.5			X			
H28	0040-WHA-3526	PAH TCRA	0.5–2			X			
H28	0040-WHA-3527	PAH TCRA	2–4			X			
H28	0040-WHA-3528	PAH TCRA	4–8			X			
H29	0040-WHA-3529	PAH TCRA	0–0.5			X			
H29	0040-WHA-3530	PAH TCRA	0.5–2			X			
H29	0040-WHA-3531	PAH TCRA	2–4			X			
H29	0040-WHA-3532	PAH TCRA	4–8			X			
H30	0040-WHA-3533	PAH TCRA	0–0.5			X			
H30	0040-WHA-3534	PAH TCRA	0.5–2			X			
H30	0040-WHA-3537 (FD)	PAH TCRA	0.5–2			X			
H30	0040-WHA-3535	PAH TCRA	2–4			X			
H30	0040-WHA-3536	PAH TCRA	4–8			X			
H31	0040-WHA-5084	PAH TCRA	0–0.5			X		X	X[b]
H31	0040-WHA-5085 (FD)	PAH TCRA	0–0.5			X		X	X[b]
H31	0040-WHA-6111	PAH TCRA	0.5–2			X		X	X[b]

Table 3-1
Sample Analysis Summary, AOC 4

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE					
				VOCs	SVOCs	PAHs	TPH	Pest/PCBs	Metals
H31	0040-WHA-6112 (FD)	PAH TCRA	0.5–2			X		X	X[b]
H31	0040-WHA-3540	PAH TCRA	2–4			X			
H31	0040-WHA-3541	PAH TCRA	4–8			X			
H32	0040-WHA-3542	PAH TCRA	0–0.5			X			
H32	0040-WHA-3546	PAH TCRA	0–0.5			X			
H32	0040-WHA-3543	PAH TCRA	0.5–2			X			
H32	0040-WHA-3544	PAH TCRA	2–4			X			
H32	0040-WHA-3545	PAH TCRA	4–8			X			
H33	0040-WHA-3547	PAH TCRA	0–0.5			X			
H33	0040-WHA-3548	PAH TCRA	0.5–2			X			
H33	0040-WHA-3549	PAH TCRA	2–4			X			
H33	0040-WHA-3550	PAH TCRA	4–8			X			
I18	0040-WHA-3434	PAH TCRA	0–0.5			X			
I18	0040-WHA-3435	PAH TCRA	0.5–2			X			
I18	0040-WHA-3436	PAH TCRA	2–4			X			
I18	0040-WHA-3437	PAH TCRA	4–8			X			
I18	0040-WHA-3438 (FD)	PAH TCRA	4–8			X			
I19	0040-WHA-3456	PAH TCRA	0–0.5			X			
I19	0040-WHA-3457	PAH TCRA	0.5–2			X			
I19	0040-WHA-3458	PAH TCRA	2–4			X			
I19	0040-WHA-3459	PAH TCRA	4–8			X			
I20	0040-WHA-3460	PAH TCRA	0–0.5			X			
I20	0040-WHA-3461	PAH TCRA	0.5–2			X			
I20	0040-WHA-3462	PAH TCRA	2–4			X			
I20	0040-WHA-3464 (FD)	PAH TCRA	2–4			X			
I20	0040-WHA-3463	PAH TCRA	4–8			X			
I21	0040-WHA-3469	PAH TCRA	0–0.5			X			
I21	0040-WHA-3470	PAH TCRA	0.5–2			X			
I21	0040-WHA-3471	PAH TCRA	2–4			X			
I21	0040-WHA-3472	PAH TCRA	4–8			X			
I22	0040-WHA-3478	PAH TCRA	0–0.5			X			
I22	0040-WHA-3479	PAH TCRA	0.5–2			X			

Table 3-1
Sample Analysis Summary, AOC 4

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE					
				VOCs	SVOCs	PAHs	TPH	Pest/PCBs	Metals
I22	0040-WHA-3480	PAH TCRA	2–4			X			
I22	0040-WHA-3481	PAH TCRA	4–8			X			
I23	0040-WHA-3482	PAH TCRA	0–0.5			X			
I23	0040-WHA-3486 (FD)	PAH TCRA	0–0.5			X			
I23	0040-WHA-3483	PAH TCRA	0.5–2			X			
I23	0040-WHA-3484	PAH TCRA	2–4			X			
I23	0040-WHA-3485	PAH TCRA	4–8			X			
I24	0040-WHA-3495	PAH TCRA	0–0.5			X			
I24	0040-WHA-3496	PAH TCRA	0.5–2			X			
I24	0040-WHA-3497	PAH TCRA	2–4			X			
I24	0040-WHA-3498	PAH TCRA	4–8			X			
I25	0040-WHA-3505	PAH TCRA	0–0.5			X			
I25	0040-WHA-3506	PAH TCRA	0.5–2			X			
I25	0040-WHA-3507	PAH TCRA	2–4			X			
I25	0040-WHA-3508	PAH TCRA	4–8			X			
I26	0040-WHA-3513	PAH TCRA	0–0.5			X			
I26	0040-WHA-3514	PAH TCRA	0.5–2			X			
I26	0040-WHA-3517 (FD)	PAH TCRA	0.5–2			X			
I26	0040-WHA-3515	PAH TCRA	2–4			X			
I26	0040-WHA-3516	PAH TCRA	4–8			X			
I27	0040-WHA-0083	PAH TCRA	0.5–1			X			
I28	0040-WHA-0082	PAH TCRA	0.5–1.5			X			
I29	0040-WHA-0079	PAH TCRA	1–1.5			X			
I30	0040-WHA-0080	PAH TCRA	0.5–1			X			
I31	0040-WHA-0081	PAH TCRA	1–1.5			X			
J18	0040-WHA-3443	PAH TCRA	0–0.5			X			
J18	0040-WHA-3444	PAH TCRA	0.5–2			X			
J18	0040-WHA-3445	PAH TCRA	2–4			X			
J18	0040-WHA-3446	PAH TCRA	4–8			X			
J19	0040-WHA-3447	PAH TCRA	0–0.5			X			
J19	0040-WHA-3448	PAH TCRA	0.5–2			X			
J19	0040-WHA-3449	PAH TCRA	2–4			X			

Table 3-1
Sample Analysis Summary, AOC 4

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE					
				VOCs	SVOCs	PAHs	TPH	Pest/PCBs	Metals
J19	0040-WHA-3450	PAH TCRA	4–8			X			
J20	0040-WHA-3451	PAH TCRA	0–0.5			X			
J20	0040-WHA-3452	PAH TCRA	0.5–2			X			
J20	0040-WHA-3455 (FD)	PAH TCRA	0.5–2			X			
J20	0040-WHA-3453	PAH TCRA	2–4			X			
J20	0040-WHA-3454	PAH TCRA	4–8			X			
J21	0040-WHA-3465	PAH TCRA	0–0.5			X			
J21	0040-WHA-3466	PAH TCRA	0.5–2			X			
J21	0040-WHA-3467	PAH TCRA	2–4			X			
J21	0040-WHA-3468	PAH TCRA	4–8			X			
J22	0040-WHA-3473	PAH TCRA	0–0.5			X			
J22	0040-WHA-3477 (FD)	PAH TCRA	0–0.5			X			
J22	0040-WHA-3474	PAH TCRA	0.5–2			X			
J22	0040-WHA-3475	PAH TCRA	2–4			X			
J22	0040-WHA-3476	PAH TCRA	4–8			X			
J23	0040-WHA-3487	PAH TCRA	0–0.5			X			
J23	0040-WHA-3488	PAH TCRA	0.5–2			X			
J23	0040-WHA-3489	PAH TCRA	2–4			X			
J23	0040-WHA-3490	PAH TCRA	4–8			X			
J24	0040-WHA-3491	PAH TCRA	0–0.5			X			
J24	0040-WHA-3492	PAH TCRA	0.5–2			X			
J24	0040-WHA-3493	PAH TCRA	2–4			X			
J24	0040-WHA-3494	PAH TCRA	4–8			X			
J25	0040-WHA-3499	PAH TCRA	0–0.5			X			
J25	0040-WHA-3500	PAH TCRA	0.5–2			X			
J25	0040-WHA-3503 (FD)	PAH TCRA	0.5–2			X			
J25	0040-WHA-3501	PAH TCRA	2–4			X			
J25	0040-WHA-3502	PAH TCRA	4–8			X			
J26	0040-WHA-3509	PAH TCRA	0–0.5			X			
J26	0040-WHA-3510	PAH TCRA	0.5–2			X			
J26	0040-WHA-3511	PAH TCRA	2–4			X			
J26	0040-WHA-3512	PAH TCRA	4–8			X			

Table 3-1
Sample Analysis Summary, AOC 4

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE					
				VOCs	SVOCs	PAHs	TPH	Pest/PCBs	Metals
J27	0040-WHA-0084	PAH TCRA	0.5–1			X			
J30	0040-WHA-555	PAH TCRA	0.5–1			X			
J31	0040-WHA-554	PAH TCRA	0.5–1			X			
J32	0040-WHA-553	PAH TCRA	1.5–2			X			
K27	0040-WHA-0085	PAH TCRA	1.5–2			X			
K28	0040-WHA-0086	PAH TCRA	1–1.5			X			
K29	0040-WHA-0087	PAH TCRA	0.5–1			X			
K30	0040-WHA-0088	PAH TCRA	0.5–1			X			
K31	0040-WHA-551	PAH TCRA	1–1.5			X			
K32	0040-WHA-552	PAH TCRA	1–1.5			X			
L29	0040-WHA-0090	PAH TCRA	0.5–1			X			
L30	0040-WHA-0089	PAH TCRA	0.5–1			X			
L31	0040-WHA-587	PAH TCRA	0.5–1			X			
L31RA	0040-WHA-559	PAH TCRA	1.5–2			X			
M30	0040-WHA-0178	PAH TCRA	1.5–2			X			
M31	0040-WHA-5038	PAH TCRA	0–0.5			X		X	X[b]
M31	0040-WHA-5039 (FD)	PAH TCRA	0–0.5			X		X	X[b]
M31	0040-WHA-6042	PAH TCRA	0.5–2			X		X	X[b]
Groundwater									
MBG-1	108-SBG-009	Basewide GW Mon. Program	5–15						X
MBG-1	108-SBG-013 (FD)	Basewide GW Mon. Program	5–15	X	X		X[c]	X	X

References:
Basewide GW Mon. Program (Shaw 2004b)
PAH Study (BEI 2005a)
PAH TCRA (FWEC 2004)

Notes:
[a] analyzed for TRPH
[b] analyzed for arsenic only
[c] analyzed for gasoline-, diesel-, and motor oil–range TPH

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
FD – field duplicate
GW – groundwater
Mon. – monitoring
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
Pest – pesticide
SVOC – semivolatile organic compound
TCRA – time-critical removal action
TPH – total petroleum hydrocarbons
TRPH – total recoverable petroleum hydrocarbons
VOC – volatile organic compound

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Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 4

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	Background (95th Percentile)
Volatile Organic Compounds (µg/kg)									
tetrachloroethene	4	1	25	0	5.5	5.5	5.5	480	—[c]
Fuels (µg/kg)									
petroleum hydrocarbons, total recoverable	4	1	25	No PSC	43,600	44,000	43,600	—	—
Semivolatile Organic Compounds (µg/kg)									
acenaphthene	141	61	43	0	1	14	150	3,700,000	—
acenaphthylene	140	89	64	No PSC	1	37	880	—	—
anthracene	141	101	72	0	1	54	1,600	22,000,000	—
benz(a)anthracene	141	125	89	0	1	150	3,000	620	—
benzo(b)fluoranthene	141	131	93	0	1	180	3,200	620	—
benzo(k)fluoranthene	141	126	89	0	1	100	1,500	380 [d]	—
benzo(g,h,i)perylene	141	127	90	No PSC	2	180	2,100	—	—
benzo(a)pyrene	141	131	93	0	2	200	3,300	62	—
chrysene	141	128	91	0	1	150	2,600	3,800 [d]	—
dibenz(a,h)anthracene	141	70	50	0	0	31	320	62	—
fluoranthene	141	134	95	0	2	330	6,200	2,300,000	—
fluorene	141	51	36	0	1	28	520	2,700,000	—
indeno(1,2,3-cd)pyrene	141	124	88	0	2	150	1,600	620	—
2-methylnaphthalene	114	18	16	No PSC	2	4.6	35	—	—
naphthalene	141	85	60	0	1	13	360	1,700 [d]	—
phenanthrene	141	126	89	No PSC	1	200	5,900	—	—
pyrene	141	134	95	0	2	460	12,000	2,300,000	—
Pesticides and Polychlorinated Biphenyls (µg/kg)									
Aroclor 1260	11	3	27	0	8	8.7	9	220	—
Metals (mg/kg)									
aluminum	4	4	100	0	6,180	11,000	19,000	76,000	13,960
arsenic	11	11	100	0	1.48	2.8	5.4	0.062 [d]	9.14
barium	4	4	100	0	33.9	46	54.5	5,400	93.68
beryllium	4	2	50	0	0.591	0.69	0.792	150	1.27
calcium	4	4	100	No PSC	2,290	3,700	5,210	—	16,800
chromium	4	4	100	0	26.7	41	66.7	210	54.84
cobalt	4	3	75	0	5.81	7.2	9.62	900	14.30
copper	4	4	100	0	5.6	14	25.7	3,100	39.14
iron	4	4	100	1	9,270	17,000	27,900	23,000	22,280
lead	4	4	100	0	3.39	12	20	150 [d]	37.66
magnesium	4	4	100	No PSC	2,240	5,100	8,800	—	7,304
manganese	4	4	100	0	99.5	220	330	1,800	383.0
nickel	4	4	100	0	19	35	53.5	1,600	55.72
potassium	4	4	100	No PSC	850	1,300	2,480	—	1,232
sodium	4	4	100	No PSC	433	750	1,430	—	1,230
vanadium	4	4	100	0	20.3	35	51.1	78	47.34
zinc	4	4	100	0	20.7	43	61.8	23,000	67.48

Notes:
[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[b] data review qualifiers are not included in this table
[c] dash indicates not applicable or not established
[d] California PRG

Acronyms/Abbreviations:
AOC – area of concern
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criterion (PRG)

Table 4-2
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, AOC 4

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background	Minimum[a]	Average[a]	Maximum[a]	California MCL	Background (95th Percentile)	Surface Water CTR CCC	Surface Water CTR HHCO	Surface Water NRWQC CCC	Surface Water NRWQC HHCO
Semivolatile Organic Compounds (µg/L)													
pyrene	1	1	100	0	2	2	2	—[b]	—	—	11,000	—	4,000
Metals (µg/L)													
aluminum	3	1	33	0	888	890	888	1,000	1,070	—	—	—	—
arsenic	3	2	67	0	10.5	11	11.3	10[c]	20.72	36	—	36	0.14
barium	3	3	100	0	416	560	735	1,000	569.5	—	—	—	—
cadmium	3	1	33	0	0.48	0.48	0.48	5	—	9.3	—	8.8	—
calcium	3	3	100	No PSC	120,000	140,000	151,000	—	—	—	—	—	—
chromium	3	1	33	0	1.8	1.8	1.8	50	12.45	—	—	—	—
cobalt	3	2	67	No PSC	1.8	2.5	3.1	—	—	—	—	—	—
copper	3	1	33	0	2.1	2.1	2.1	—	24.03	3.1	—	3.1	—
iron	3	3	100	No PSC	6,030	6,600	7,070	—	6,586	—	—	—	—
magnesium	3	3	100	No PSC	319,000	350,000	373,000	—	—	—	—	—	—
manganese	3	3	100	No PSC	1,470	1,700	1,970	—	1,741	—	—	—	—
mercury	3	1	33	1	0.14	0.14	0.14	2	—	0.025	0.051	0.94	—
nickel	3	1	33	0	4.8	4.8	4.8	100	—	8.2	4,600	8.2	4,600
potassium	3	3	100	No PSC	177,000	200,000	218,000	—	—	—	—	—	—
sodium	3	3	100	No PSC	2,690,000	3,100,000	3,370,000	—	—	—	—	—	—
zinc	3	2	67	1	12	63	113	—	36.39	81	—	81	26,000

Notes:

[a] data review qualifiers are not included in this table

[b] dash indicates not applicable or not established

[c] Federal MCL

Acronyms/Abbreviations:

AOC – area of concern
CCC – criterion continuous concentration
CTR – California Toxics Rule
HHCO – human-health consumption of organisms only
µg/L – micrograms per liter
MCL – maximum contaminant level
NRWQC – National Recommended Water Quality Criteria
PSC – preliminary screening criteria (MCL, CTR, and NRWQC)

Table 4-3
Soil Sampling Results, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	32EDC-5-88 C032CB44 2 - 4 16-May-02	32EDC-5-88 C032CB45 4 - 8 16-May-02	32EDC-5-89 C032CB48 2 - 4 20-May-02	32EDC-5-89 C032CB49 4 - 8 20-May-02	H26 0040-WHA-3518 0 - 0.5 17-Jul-03	H26 0040-WHA-3519 0.5 - 2 17-Jul-03	H27 0040-WHA-3520 0 - 0.5 17-Jul-03	H27 0040-WHA-3521 0.5 - 2 17-Jul-03	H27 0040-WHA-3522 2 - 4 17-Jul-03
VOCs														
tetrachloroethene	480	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons														
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs														
acenaphthene	3,700,000	—	—	—	µg/kg	5.8 UJ	6.1 UJ	5.6 U	150	9	5.1 U	5.2 U	5.2 U	6 U
acenaphthylene	—	—	—	—	µg/kg	2.4 J	NA	2.1 J	250	12	5.1 U	2.5 J	3.6 J	4.7 U
anthracene	22,000,000	—	—	—	µg/kg	2.7 J	0.51 J	3.3 J	510	27 J	1.7 J	3.7 J	4.6 J	6 U
benz(a)anthracene	620[c]	—	—	—	µg/kg	11 J	1.8 J	11	**1300**[d]	100	14	29	65	6 U
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	9.6 J	2.1 J	15	**970**	130	28	61	140	2.7 J
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	13 J	1.6 J	16	**1000**	46	7.2	15	54	6 U
benzo(g,h,i)perylene	—	—	—	—	µg/kg	14 J	2.1 J	28	1100	120	30	46	95 J	3.3 J
benzo(a)pyrene	62[c]	—	—	—	µg/kg	16 J	2.3 J	22	**1700**	**130**	23	41	**95**	11
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	12 J	1.8 J	17	1300	110	17	39	70	1.4 J
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	3.1 J	0.37 J	5.6 U	**130**	15	5.1 U	5.2 U	5.2 UJ	6 UJ
fluoranthene	2,300,000	—	—	—	µg/kg	30	5.5 J	34	3900	220	27	50	98	2.4 J
fluorene	2,700,000	—	—	—	µg/kg	5.8 UJ	6.1 UJ	5.6 U	250	4.3 J	5.1 U	5.2 U	5.2 U	6 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	14 J	2.1 J	22	**1100**	110 J	24 J	38 J	96 J	8.1 J
2-methylnaphthalene	—	—	—	—	µg/kg	5.8 UJ	6.1 UJ	5.6 U	35	5.1 U	5.1 U	5.2 U	5.2 U	6 U
naphthalene	56,000[c]	1700[c]	—	—	µg/kg	0.84 J	6.1 UJ	5.6 U	60	3.8 J	5.1 U	1.7 J	2.7 J	6 U
phenanthrene	—	—	—	—	µg/kg	18	5.5 J	18	4000	150 J	8.4 J	20 J	18	6 U
pyrene	2,300,000	—	—	—	µg/kg	38	6.6	46	4600	270	33	57	96	4.4 J
Pesticides/PCBs														
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals														
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: H27 / Sample: 0040-WHA-3523 / [a]Depth Interval: 4 - 8 / Collection Date: 17-Jul-03	H27 / 0040-WHA-3524 (FD) / 4 - 8 / 17-Jul-03	H28 / 0040-WHA-3525 / 0 - 0.5 / 17-Jul-03	H28 / 0040-WHA-3526 / 0.5 - 2 / 17-Jul-03	H28 / 0040-WHA-3527 / 2 - 4 / 17-Jul-03	H28 / 0040-WHA-3528 / 4 - 8 / 17-Jul-03	H29 / 0040-WHA-3529 / 0 - 0.5 / 17-Jul-03	H29 / 0040-WHA-3530 / 0.5 - 2 / 17-Jul-03
VOCs													
tetrachloroethene	480	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthene	3,700,000	—	—	—	µg/kg	6.4 UJ	6 U	1.8 J	5.1 U	5.7 U	5.9 U	2.2 J	5.1 U
acenaphthylene	—	—	—	—	µg/kg	5.2 UJ	6 U	3.5 J	1.8 J	4.4 J	5.9 U	6.1	4 J
anthracene	22,000,000	—	—	—	µg/kg	6.4 UJ	6 U	7.8	1.6 J	5.7 U	5.9 U	12	6.4
benz(a)anthracene	620[c]	—	—	—	µg/kg	3.3 J	9.3	54	19	3.1 J	5.9 U	80	46
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	9.4 J	18	99	37	5.3 J	6.7	120	63
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	3.2 J	12 J	40	12	2.3 J	5.9 U	48	25
benzo(g,h,i)perylene	—	—	—	—	µg/kg	8.5 J	15	96	42	3.8 J	2 J	120	56
benzo(a)pyrene	62[c]	—	—	—	µg/kg	16 J	16	75	29	10	8.4 J	**100**	59
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	3.3 J	11	68	23	3 J	5.9 U	92	48
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	6.4 UJ	5.9 J	22	5.1 U	5.7 U	5.9 U	24	5.1 U
fluoranthene	2,300,000	—	—	—	µg/kg	5.1 J	19	90	39	3.4 J	5.9 UJ	140	80
fluorene	2,700,000	—	—	—	µg/kg	6.4 UJ	6 U	1.8 J	5.1 U	5.7 U	5.9 U	2.6 J	5.1 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	12 J	13	87	40	8.8	8.4	110	55
2-methylnaphthalene	—	—	—	—	µg/kg	6.4 UJ	6 U	5.2 U	5.1 U	5.7 UJ	5.9 U	5.6 U	5.1 U
naphthalene	56,000[c]	1700[c]	—	—	µg/kg	6.4 UJ	6 U	2.4 J	2.1 J	5.7 U	5.9 U	3.2 J	1.8 J
phenanthrene	—	—	—	—	µg/kg	6.4 UJ	6.3	42	9.6	5.7 U	5.9 U	57	28
pyrene	2,300,000	—	—	—	µg/kg	9.6 J	21	86	45	4.6 J	1.8 J	140	86
Pesticides/PCBs													
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	H29 0040-WHA-3531 2 - 4 17-Jul-03	H29 0040-WHA-3532 4 - 8 17-Jul-03	H30 0040-WHA-3533 0 - 0.5 17-Jul-03	H30 0040-WHA-3534 0.5 - 2 17-Jul-03	H30 0040-WHA-3535 2 - 4 17-Jul-03	H30 0040-WHA-3536 4 - 8 17-Jul-03	H30 0040-WHA-3537 (FD) 0.5 - 2 17-Jul-03	H31 0040-WHA-3540 2 - 4 17-Jul-03
VOCs													
tetrachloroethene	480	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthene	3,700,000	—	—	—	µg/kg	4.6 J	9.3 J	1.8 J	5.1 U	5.4 U	110 U	5.2 U	99 J
acenaphthylene	—	—	—	—	µg/kg	20	36 J	3 J	1.6 J	1.3 J	150	5.2 U	760
anthracene	22,000,000	—	—	—	µg/kg	38	41 J	5.1 J	5.1 U	5.4 U	160	2.1 J	920
benz(a)anthracene	620[c]	—	—	—	µg/kg	96	620 J	29	16	9	**1100**	12	**3000**
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	110	**910 J**	57	28	20	**1400**	27	**3200**
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	38	360 J	21	8.5	5.9	**1100**	7.5	**1200**
benzo(g,h,i)perylene	—	—	—	—	µg/kg	68	870 J	52	37	16	1300	26	2100
benzo(a)pyrene	62[c]	—	—	—	µg/kg	**96 J**	**910 J**	49	29	22 J	**2000**	24	**3300 J**
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	100	610 J	36	17	10	1200	14	2600
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	8.2	**64 J**	5.6 U	5.1 U	5.4 U	56 J	5.2 U	**320**
fluoranthene	2,300,000	—	—	—	µg/kg	230 J	990 J	64	26	16 J	2900	24	6200 J
fluorene	2,700,000	—	—	—	µg/kg	9.9	42 UJ	1.9 J	5.1 U	5.4 U	110 U	5.2 U	230 J
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	53	570 J	50	33	16	**1100**	26	**1600**
2-methylnaphthalene	—	—	—	—	µg/kg	5.6 U	42 UJ	5.6 U	5.1 U	5.4 U	110 U	5.2 U	240 U
naphthalene	56,000[c]	1700[c]	—	—	µg/kg	6.2	32 J	3.3 J	1.9 J	5.4 U	71 J	5.2 U	66 J
phenanthrene	—	—	—	—	µg/kg	240	120 J	28	7.7	5.5	560	8.8	4800
pyrene	2,300,000	—	—	—	µg/kg	340	2300 J	67	34	34	4400	30	12000
Pesticides/PCBs													
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: H31 / Sample: 0040-WHA-3541 / [a]Depth Interval: 4 - 8 / Collection Date: 17-Jul-03	H31 / 0040-WHA-5084 / 0 - 0.5 / 11-Aug-03	H31 / 0040-WHA-5085 / 0 - 0.5 / 11-Aug-03	H31 / 0040-WHA-6111 / 0.5 - 2 / 18-Aug-03	H31 / 0040-WHA-6112 / 0.5 - 2 / 18-Aug-03	H32 / 0040-WHA-3542 / 0 - 0.5 / 17-Jul-03	H32 / 0040-WHA-3543 / 0.5 - 2 / 17-Jul-03	H32 / 0040-WHA-3544 / 2 - 4 / 17-Jul-03
VOCs													
tetrachloroethene	480	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthene	3,700,000	—	—	—	µg/kg	810 U	110 U	110 U	110 U	110 U	3.6 J	2 J	2.7 J
acenaphthylene	—	—	—	—	µg/kg	880	53 U	53 U	53 U	53 U	12	11	18
anthracene	22,000,000	—	—	—	µg/kg	1600	2.1 U	2.1 U	2.1 U	2.1 U	10	7.8	16
benz(a)anthracene	620[c]	—	—	—	µg/kg	**1800**	5.3 U	5.3 U	5.3 U	5.3 U	93 J	70 J	75
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	**1800**	2.1 U	2.1 U	2 J	0.9 J	120	87	81
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	**1500**	2.1 U	2.1 U	1 J	2.1 U	34	24	73
benzo(g,h,i)perylene	—	—	—	—	µg/kg	1700	7.5 U	7.4 U	7.4 U	7.4 U	73	57	75
benzo(a)pyrene	62[c]	—	—	—	µg/kg	**2700 J**	5.3 U	5.3 U	5.3 U	5.3 U	**92**	**73**	**110**
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	2200	5.3 U	5.3 U	5.3 U	5.3 U	110 J	76 J	97
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	**810 U**[e]	18 U	18 U	18 U	18 U	5.3 U	5.1 U	4.1 J
fluoranthene	2,300,000	—	—	—	µg/kg	5100 J	5.3 U	5.3 U	7	5.3 U	150	110	160
fluorene	2,700,000	—	—	—	µg/kg	520 J	11 U	11 U	11 U	11 U	4 J	2.7 J	3.8 J
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	**1300**	5.3 U	5.3 U	5.3 U	5.3 U	67	53	64
2-methylnaphthalene	—	—	—	—	µg/kg	810 U	NA	NA	NA	NA	5.3 U	5.1 U	5.8 U
naphthalene	56,000[c]	1700[c]	—	—	µg/kg	360 J	53 U	53 U	53 U	53 U	3.1 J	2 J	3.6 J
phenanthrene	—	—	—	—	µg/kg	5900	4.3 U	4.2 U	2 J	4.2 U	70	53	76
pyrene	2,300,000	—	—	—	µg/kg	7700	11 U	11 U	11 U	11 U	180	140	210
Pesticides/PCBs													
Aroclor 1260	220	—	—	—	µg/kg	NA	35 U	35 U	35 U	35 U	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	**2**	**1.5**	**4.7**	**5.4**	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	H32 0040-WHA-3545 4 - 8 17-Jul-03	H32 0040-WHA-3546 (FD) 0 - 0.5 17-Jul-03	H33 0040-WHA-3547 0 - 0.5 17-Jul-03	H33 0040-WHA-3548 0.5 - 2 17-Jul-03	H33 0040-WHA-3549 2 - 4 17-Jul-03	H33 0040-WHA-3550 4 - 8 17-Jul-03	I18 0040-WHA-3434 0 - 0.5 16-Jul-03	I18 0040-WHA-3435 0.5 - 2 16-Jul-03
VOCs													
tetrachloroethene	480	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthene	3,700,000	—	—	—	µg/kg	53	2.4 J	5.1 U	5.1 U	140 U	22 J	1.7 J	5.1 U
acenaphthylene	—	—	—	—	µg/kg	41	13	3.7 J	4.5 J	78 J	48	2.6 J	1.9 J
anthracene	22,000,000	—	—	—	µg/kg	120	8.2	4.8 J	3.8 J	74 J	75	3 J	5.1 U
benz(a)anthracene	620[c]	—	—	—	µg/kg	470	97 J	27 J	27 J	360	**730**	20	8.3
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	**640**	130	47	35	380	**1400**	40	12
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	330	44	16	13	270	**610**	13	5.8
benzo(g,h,i)perylene	—	—	—	—	µg/kg	640	94	39 J	29 J	340	1500	30	11
benzo(a)pyrene	62[c]	—	—	—	µg/kg	**760 J**	**110**	39	31	**510 J**	**1000**	27	11
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	550	120 J	36	31	390	1100	30	9.4
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	24	5.3 U	5.1 U	5.1 U	**140 U**[c]	34	9	5.1 U
fluoranthene	2,300,000	—	—	—	µg/kg	1000 J	150	57	51	800 J	1700	39	17
fluorene	2,700,000	—	—	—	µg/kg	32	3 J	5.1 U	5.1 U	140 U	14	1.7 J	5.1 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	360	82	34	25	280	**980**	27	9.3
2-methylnaphthalene	—	—	—	—	µg/kg	4.2 J	5.3 U	5.1 U	5.1 U	140 U	5.4 J	5.1 U	5.1 U
naphthalene	56,000[c]	1700[c]	—	—	µg/kg	15	2.7 J	5.1 U	5.1 U	140 U	32	5.1 U	5.1 U
phenanthrene	—	—	—	—	µg/kg	450	55	28	21	430	290	17	8.1
pyrene	2,300,000	—	—	—	µg/kg	1500	180	66	61	1300	2000	42	21
Pesticides/PCBs													
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	I18 0040-WHA-3436 2 - 4 16-Jul-03	I18 0040-WHA-3437 4 - 8 16-Jul-03	I18 0040-WHA-3438 (FD) 4 - 8 16-Jul-03	I19 0040-WHA-3456 0 - 0.5 16-Jul-03	I19 0040-WHA-3457 0.5 - 2 16-Jul-03	I19 0040-WHA-3458 2 - 4 16-Jul-03	I19 0040-WHA-3459 4 - 8 16-Jul-03	I20 0040-WHA-3460 0 - 0.5 16-Jul-03
VOCs													
tetrachloroethene	480	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthene	3,700,000	—	—	—	µg/kg	11 J	30 J	30 J	5.1 U	5.1 U	27 J	29 J	1.9 J
acenaphthylene	—	—	—	—	µg/kg	2.5 J	6.1 J	30 U	4.3 J	5.1 U	27 UJ	29 UJ	5.8
anthracene	22,000,000	—	—	—	µg/kg	3.9 J	12 J	30 U	5.1	5.1 U	27 UJ	29 UJ	11
benz(a)anthracene	620[c]	—	—	—	µg/kg	22	86 J	48 J	26	5 J	33 J	14 J	61
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	36	120 J	67 J	59	14	58 J	26 J	130
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	35	110 J	67 J	20	4 J	40 J	20 J	48
benzo(g,h,i)perylene	—	—	—	—	µg/kg	75	190 J	110 J	76 J	17 J	100 J	34 J	110 J
benzo(a)pyrene	62[c]	—	—	—	µg/kg	54 J	**160 J**	**87 J**	53	14	**69 J**	20 J	**100**
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	31	110 J	58 J	35	5.3	49 J	17 J	75
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	11 J	31 J	17 J	5.1 UJ	5.1 UJ	17 J	29 UJ	21 J
fluoranthene	2,300,000	—	—	—	µg/kg	58 J	210 J	120 J	61	12	92 J	23 J	140
fluorene	2,700,000	—	—	—	µg/kg	11 U	30 UJ	30 UJ	1.6 J	5.1 U	27 UJ	29 UJ	1.9 J
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	56	150 J	86 J	65 J	16 J	77 J	27 J	100 J
2-methylnaphthalene	—	—	—	—	µg/kg	11 U	30 UJ	30 UJ	5.1 U	5.1 U	27 UJ	29 UJ	2.2 J
naphthalene	56,000[c]	1700[c]	—	—	µg/kg	2.3 J	6.1 J	3.2 J	3.3 J	5.1 U	3 J	29 UJ	3.8 J
phenanthrene	—	—	—	—	µg/kg	12	25 J	17 J	20	5 J	14 J	7 J	50
pyrene	2,300,000	—	—	—	µg/kg	65 J	320 J	200 J	67	15	100 J	33 J	140
Pesticides/PCBs													
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: I20 / Sample: 0040-WHA-3461 / [a]Depth Interval: 0.5 - 2 / Collection Date: 16-Jul-03	Station ID: I20 / Sample: 0040-WHA-3462 / [a]Depth Interval: 2 - 4 / Collection Date: 16-Jul-03	Station ID: I20 / Sample: 0040-WHA-3463 / [a]Depth Interval: 4 - 8 / Collection Date: 16-Jul-03	Station ID: I20 / Sample: 0040-WHA-3464 (FD) / [a]Depth Interval: 2 - 4 / Collection Date: 16-Jul-03	Station ID: I21 / Sample: 0040-WHA-3469 / [a]Depth Interval: 0 - 0.5 / Collection Date: 16-Jul-03	Station ID: I21 / Sample: 0040-WHA-3470 / [a]Depth Interval: 0.5 - 2 / Collection Date: 16-Jul-03	Station ID: I21 / Sample: 0040-WHA-3471 / [a]Depth Interval: 2 - 4 / Collection Date: 16-Jul-03	Station ID: I21 / Sample: 0040-WHA-3472 / [a]Depth Interval: 4 - 8 / Collection Date: 16-Jul-03
VOCs													
tetrachloroethene	480	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthene	3,700,000	—	—	—	µg/kg	5.1 U	5.4 J	3.1 J	5.3 J	1.9 J	13	1.2 J	5.9 UJ
acenaphthylene	—	—	—	—	µg/kg	3.1 J	1.1 J	5.9 J	1.4 J	5.4	13	3.8 J	1.4 J
anthracene	22,000,000	—	—	—	µg/kg	4 J	1.3 J	9.1 J	1.7 J	5.8	84	6.1	5.9 UJ
benz(a)anthracene	620[c]	—	—	—	µg/kg	23	8.6	69 J	10	28	410	39	7.1 J
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	45	15	110 J	18	65	460	63	9.6 J
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	16	11	81 J	14	23	170	47 J	8.6 J
benzo(g,h,i)perylene	—	—	—	—	µg/kg	46 J	15	150 J	20	70 J	190 J	98	12 J
benzo(a)pyrene	62[c]	—	—	—	µg/kg	41	18 J	**110 J**	21 J	56	**300**	**73**	14 J
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	26 J	11	81 J	13	36 J	400 J	47	8.6 J
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	12 J	3.1 J	17 J	3.6 J	17 J	**78 J**	10 J	2.2 J
fluoranthene	2,300,000	—	—	—	µg/kg	38 J	22 J	170 J	27 J	67 J	740 J	120	15 J
fluorene	2,700,000	—	—	—	µg/kg	1.6 J	5.4 U	1.5 J	5.3 U	2.5 J	13	5.3 U	5.9 UJ
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	45 J	13	110 J	16	65 J	190 J	55 J	9.5 J
2-methylnaphthalene	—	—	—	—	µg/kg	5.1 U	5.4 U	6.1 U	5.3 U	5.1 U	5.1 U	5.3 U	5.9 UJ
naphthalene	56,000[c]	1700[c]	—	—	µg/kg	1.8 J	0.91 J	6.7 J	1.1 J	3.8 J	4.5 J	2.9 J	1 J
phenanthrene	—	—	—	—	µg/kg	17	5.4	40 J	6.6	30	280	26	5.3 J
pyrene	2,300,000	—	—	—	µg/kg	44	25 J	170 J	29 J	79	650	120 J	18 J
Pesticides/PCBs													
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: I22 / Sample: 0040-WHA-3478 / [a] Depth Interval: 0 - 0.5 / Collection Date: 16-Jul-03	I22 / 0040-WHA-3479 / 0.5 - 2 / 16-Jul-03	I22 / 0040-WHA-3480 / 2 - 4 / 16-Jul-03	I22 / 0040-WHA-3481 / 4 - 8 / 16-Jul-03	I23 / 0040-WHA-3482 / 0 - 0.5 / 16-Jul-03	I23 / 0040-WHA-3483 / 0.5 - 2 / 16-Jul-03	I23 / 0040-WHA-3484 / 2 - 4 / 16-Jul-03	I23 / 0040-WHA-3485 / 4 - 8 / 16-Jul-03
VOCs													
tetrachloroethene	480	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthene	3,700,000	—	—	—	µg/kg	2.4 J	5.1 U	5.5 UJ	6.3 U	1.8 J	3.3 J	5.4 U	6.3 UJ
acenaphthylene	—	—	—	—	µg/kg	9.2	2.1 J	2.2 J	6.3 U	7.1	17	3.4 J	1.1 J
anthracene	22,000,000	—	—	—	µg/kg	16	2 J	15 J	6.3 U	8.2	34	5.5	1.7 J
benz(a)anthracene	620[c]	—	—	—	µg/kg	110	12	20 J	4.2 J	51	110	20	6.9 J
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	190	25	33 J	4.4 J	120	150	25	8.5 J
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	64	8.6	25 J	7.2 J	41	53	22	7.8 J
benzo(g,h,i)perylene	—	—	—	—	µg/kg	190	28	42 J	6.3 UJ	140	140	26	8.7 J
benzo(a)pyrene	62[c]	—	—	—	µg/kg	**180**	25	38 J	5 J	**110**	**160**	34	11 J
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	130	11	26 J	6.4 J	62	110	23	8.5 J
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	29	5.1 U	6 J	6.7 J	20	21	4.2 J	1.9 J
fluoranthene	2,300,000	—	—	—	µg/kg	250 J	24 J	56 J	11	93 J	280 J	55	14 J
fluorene	2,700,000	—	—	—	µg/kg	2.8 J	5.1 U	5.5 UJ	6.3 U	1.9 J	9.9	5.4 U	6.3 UJ
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	180	26	34 J	6.3 UJ	130	140	20	7 J
2-methylnaphthalene	—	—	—	—	µg/kg	2.4 J	5.1 U	5.5 UJ	6.3 U	5.1 U	5.1 U	5.4 U	6.3 UJ
naphthalene	56,000[c]	1700[c]	—	—	µg/kg	8.2	2.7 J	1.6 J	6.3 U	6	5.8	1.8 J	0.71 J
phenanthrene	—	—	—	—	µg/kg	75	8.3	14 J	5.1 J	29	150	18	6 J
pyrene	2,300,000	—	—	—	µg/kg	290	33	59 J	13	120	340	67	16 J
Pesticides/PCBs													
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Result Units	Station ID: I23 / Sample: 0040-WHA-3486 (FD) / [a] Depth Interval: 0 - 0.5 / Collection Date: 16-Jul-03	Station ID: I24 / Sample: 0040-WHA-3495 / Depth Interval: 0 - 0.5 / Collection Date: 16-Jul-03	Station ID: I24 / Sample: 0040-WHA-3496 / Depth Interval: 0.5 - 2 / Collection Date: 16-Jul-03	Station ID: I24 / Sample: 0040-WHA-3497 / Depth Interval: 2 - 4 / Collection Date: 16-Jul-03	Station ID: I24 / Sample: 0040-WHA-3498 / Depth Interval: 4 - 8 / Collection Date: 16-Jul-03	Station ID: I25 / Sample: 0040-WHA-3505 / Depth Interval: 0 - 0.5 / Collection Date: 17-Jul-03	Station ID: I25 / Sample: 0040-WHA-3506 / Depth Interval: 0.5 - 2 / Collection Date: 17-Jul-03	Station ID: I25 / Sample: 0040-WHA-3507 / Depth Interval: 2 - 4 / Collection Date: 17-Jul-03
VOCs													
tetrachloroethene	480	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthene	3,700,000	—	—	—	µg/kg	2.3 J	3.5 J	5.1 U	5.4 U	6.3 UJ	1.6 J	5.1 U	5.3 U
acenaphthylene	—	—	—	—	µg/kg	8.7	21	4.8 J	2.8 J	6.3 UJ	5.5	5.1 U	3.6 J
anthracene	22,000,000	—	—	—	µg/kg	11	30	6	4.9 J	6.3 UJ	10 J	5.1 UJ	3.9 J
benz(a)anthracene	620[c]	—	—	—	µg/kg	65	140	30	14	2.3 J	60	5.1 U	22
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	140	250	55	15	6.3 UJ	98	4.3 J	38
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	50	84	19	18	6.3 UJ	25	5.1 U	11
benzo(g,h,i)perylene	—	—	—	—	µg/kg	170	280	65	23	3.1 J	78	5.5	36
benzo(a)pyrene	62[c]	—	—	—	µg/kg	**130**	**240**	54	25	3.2 J	**79**	4.2 J	37 J
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	73	150	31	18	2.5 J	73	1.8 J	23
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	23	38	5.1 U	3.7 J	6.3 UJ	5.1 U	5.1 U	6.7
fluoranthene	2,300,000	—	—	—	µg/kg	120 J	290 J	56 J	38	3.8 J	120	4.2 J	46 J
fluorene	2,700,000	—	—	—	µg/kg	2.6 J	5.1 J	1.9 J	1.4 J	6.3 UJ	1.7 J	5.1 U	5.3 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	150	260	56	17	6.3 UJ	68 J	4.5 J	28
2-methylnaphthalene	—	—	—	—	µg/kg	1.9 J	3.4 J	5.1 U	5.4 U	6.3 UJ	5.1 U	5.1 U	5.3 U
naphthalene	56,000[c]	1700[c]	—	—	µg/kg	7.3	13	4.1 J	1.4 J	6.3 UJ	2.2 J	5.1 U	2.1 J
phenanthrene	—	—	—	—	µg/kg	40	120	22	20	2.2 J	60 J	1.6 J	18
pyrene	2,300,000	—	—	—	µg/kg	160	340	75	59	5.1 J	150	5.8	58
Pesticides/PCBs													
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	I25 0040-WHA-3508 4 - 8 17-Jul-03	I26 0040-WHA-3513 0 - 0.5 17-Jul-03	I26 0040-WHA-3514 0.5 - 2 17-Jul-03	I26 0040-WHA-3515 2 - 4 17-Jul-03	I26 0040-WHA-3516 4 - 8 17-Jul-03	I26 0040-WHA-3517 (FD) 0.5 - 2 17-Jul-03	I27 0040-WHA-0083 0.5 - 1 23-Apr-03	I28 0040-WHA-0082 0.5 - 1.5 23-Apr-03
VOCs													
tetrachloroethene	480	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthene	3,700,000	—	—	—	µg/kg	4 J	4.6 J	6.5	22 J	140 UJ	11	97 U	94 U
acenaphthylene	—	—	—	—	µg/kg	20 J	33	39	67 J	49 UJ	48	49 U	47 U
anthracene	22,000,000	—	—	—	µg/kg	19 J	52 J	49 J	73 J	79 J	67 J	2.3	2.8
benz(a)anthracene	620[c]	—	—	—	µg/kg	66 J	230	270	410 J	**1000 J**	310	13	20
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	79 J	370	390	540 J	**1500 J**	460	26	36
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	28 J	100	110	210 J	**860 J**	120	8.4	13
benzo(g,h,i)perylene	—	—	—	—	µg/kg	42 J	380	380	400 J	1500 J	450	43	62
benzo(a)pyrene	62[c]	—	—	—	µg/kg	**67 J**	**340**	**380**	**480 J**	**1800 J**	**440**	23	41
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	62 J	250	270	390 J	810 J	320	15	22
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	2 J	43	45	27 J	**120 J**	51	19 U	19 U
fluoranthene	2,300,000	—	—	—	µg/kg	150 J	500	530	880 J	2300 J	660	39	57
fluorene	2,700,000	—	—	—	µg/kg	7.5 J	8.4	9	19 J	140 UJ	12	9.7 U	9.4 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	36 J	320 J	330 J	320 J	**1100 J**	380 J	23	39
2-methylnaphthalene	—	—	—	—	µg/kg	6.3 UJ	1.6 J	1.6 J	29 UJ	140 UJ	2.7 J	NA	NA
naphthalene	56,000[c]	1700[c]	—	—	µg/kg	5 J	6	9	15 J	71 J	13	49 U	47 U
phenanthrene	—	—	—	—	µg/kg	100 J	240 J	250 J	470 J	180 J	370 J	9.7	12
pyrene	2,300,000	—	—	—	µg/kg	210 J	600	660	1300 J	3600 J	790	43	63
Pesticides/PCBs													
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Result Units	Station ID: I29	I30	I31	J18	J18	J18	J18	J19
Sample:						0040-WHA-0079	0040-WHA-0080	0040-WHA-0081	0040-WHA-3443	0040-WHA-3444	0040-WHA-3445	0040-WHA-3446	0040-WHA-3447
[a] Depth Interval:						1 - 1.5	0.5 - 1	1 - 1.5	0 - 0.5	0.5 - 2	2 - 4	4 - 8	0 - 0.5
Collection Date:						23-Apr-03	23-Apr-03	23-Apr-03	16-Jul-03	16-Jul-03	16-Jul-03	16-Jul-03	16-Jul-03
VOCs													
tetrachloroethene	480	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthene	3,700,000	—	—	—	µg/kg	90 U	99 U	100 U	5.2 U	5.2 U	59 J	32 J	2.1 J
acenaphthylene	—	—	—	—	µg/kg	45 U	49 U	50 U	4.5 J	5.5	10 J	11 J	4.4 J
anthracene	22,000,000	—	—	—	µg/kg	1.8 U	2.4	2 U	5.6	8.4	22 J	32 UJ	6.4
benz(a)anthracene	620[c]	—	—	—	µg/kg	8.2	15	8.5	31	44	81 J	22 J	29
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	12	21	13	72	87	74 J	37 J	62
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	4.5	8.8	5	22	29	130 J	28 J	23
benzo(g,h,i)perylene	—	—	—	—	µg/kg	20	24	17	70 J	120 J	190 J	51 J	72 J
benzo(a)pyrene	62[c]	—	—	—	µg/kg	14	23	15	62	**77**	**140 J**	35 J	53
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	8.5	15	9	38	54	110 J	40 J	42
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	18 U	20 U	20 U	5.2 U	5.2 U	34 J	9.3 J	5.1 U
fluoranthene	2,300,000	—	—	—	µg/kg	28	34	25	72	85	220 J	52 J	60
fluorene	2,700,000	—	—	—	µg/kg	9 U	9.9 U	10 U	5.2 UJ	2.2 J	59 UJ	32 UJ	2.4 J
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	11	15	11	66 J	96 J	150 J	39 J	58 J
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	2.5 J	2 J	59 UJ	32 UJ	2.1 J
naphthalene	56,000[c]	1700[c]	—	—	µg/kg	45 U	49 U	50 U	4.3 J	4.5 J	5.5 J	32 UJ	4.7 J
phenanthrene	—	—	—	—	µg/kg	9.2	12	8.1	26	31	65 J	11 J	23
pyrene	2,300,000	—	—	—	µg/kg	29	39	27	79	97	250 J	66 J	67
Pesticides/PCBs													
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	J19 0040-WHA-3448 0.5 - 2 16-Jul-03	J19 0040-WHA-3449 2 - 4 16-Jul-03	J19 0040-WHA-3450 4 - 8 16-Jul-03	J20 0040-WHA-3451 0 - 0.5 16-Jul-03	J20 0040-WHA-3452 0.5 - 2 16-Jul-03	J20 0040-WHA-3453 2 - 4 16-Jul-03	J20 0040-WHA-3454 4 - 8 16-Jul-03	J20 0040-WHA-3455 (FD) 0.5 - 2 16-Jul-03
VOCs													
tetrachloroethene	480	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthene	3,700,000	—	—	—	µg/kg	4.9 J	5.8 J	6.3 J	5.2 U	5.2 U	5.8 J	6 J	5.2 U
acenaphthylene	—	—	—	—	µg/kg	6.8	1.2 J	6.3 UJ	2.7 J	2.5 J	0.96 J	1.8 J	2.1 J
anthracene	22,000,000	—	—	—	µg/kg	14	5.8 U	6.3 UJ	3.6 J	2.2 J	5.8 U	2.5 J	5.5
benz(a)anthracene	620[c]	—	—	—	µg/kg	43	7.7	6.2 J	9.4	16	6.9	8.6	16
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	69	13	10 J	25	36	10	10	31
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	23	11	9.1 J	8.2	9.8	7.9	11	11
benzo(g,h,i)perylene	—	—	—	—	µg/kg	73 J	14	17 J	30 J	44 J	12	13	37 J
benzo(a)pyrene	62[c]	—	—	—	µg/kg	**66**	16 J	12 J	23	32	12 J	15 J	29
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	46	10	9.4 J	13	30	16	10	23
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	5.1 U	2.5 J	2.7 J	5.2 U	5.2 U	3.4 J	2.7 J	5.2 U
fluoranthene	2,300,000	—	—	—	µg/kg	110	20 J	15 J	25	35	13 J	23 J	35
fluorene	2,700,000	—	—	—	µg/kg	2.7 J	5.8 U	6.3 UJ	1.8 J	5.2 UJ	5.8 U	6 U	5.2 UJ
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	63 J	11	13 J	27 J	38 J	8	11	34 J
2-methylnaphthalene	—	—	—	—	µg/kg	5.1 U	5.8 U	6.3 UJ	5.2 U	5.2 U	5.8 U	6 U	5.2 U
naphthalene	56,000[c]	1700[c]	—	—	µg/kg	3.6 J	0.93 J	0.79 J	4 J	2.7 J	0.77 J	0.71 J	5.2 U
phenanthrene	—	—	—	—	µg/kg	68	5.8 J	3.6 J	9.5	11	5.6 J	12	16
pyrene	2,300,000	—	—	—	µg/kg	140	23 J	18 J	28	41	16 J	26 J	42
Pesticides/PCBs													
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	J21 0040-WHA-3465 0 - 0.5 16-Jul-03	J21 0040-WHA-3466 0.5 - 2 16-Jul-03	J21 0040-WHA-3467 2 - 4 16-Jul-03	J21 0040-WHA-3468 4 - 8 16-Jul-03	J22 0040-WHA-3473 0 - 0.5 16-Jul-03	J22 0040-WHA-3474 0.5 - 2 16-Jul-03	J22 0040-WHA-3475 2 - 4 16-Jul-03	J22 0040-WHA-3476 4 - 8 16-Jul-03
VOCs													
tetrachloroethene	480	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthene	3,700,000	—	—	—	µg/kg	2.4 J	14	6 J	34 J	2.1 J	5.2 U	5.9 U	7.3 UJ
acenaphthylene	—	—	—	—	µg/kg	4 J	41	1.4 J	10 J	3.4 J	2.1 J	5.9 U	7.3 UJ
anthracene	22,000,000	—	—	—	µg/kg	5.9	76	1.6 J	21 J	8.7	2.5 J	5.9 U	7.3 UJ
benz(a)anthracene	620[c]	—	—	—	µg/kg	57	180	7.6 J	140 J	58	18	4.3 J	7 J
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	100	250	16 J	230 J	100	40	4.7 J	12 J
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	39	96	10 J	200 J	38	15	4.6 J	10 J
benzo(g,h,i)perylene	—	—	—	—	µg/kg	88 J	180 J	15 J	200 J	78 J	45 J	4.7 J	15 J
benzo(a)pyrene	62[c]	—	—	—	µg/kg	**88**	**220**	16 J	**200 J**	**83**	36	6.3	14 J
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	64 J	200 J	9.4 J	170 J	66 J	22 J	4.9 J	8.4 J
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	23 J	37 J	4.1 J	34 J	19 J	5.2 UJ	5.9 U	2.2 J
fluoranthene	2,300,000	—	—	—	µg/kg	94 J	410 J	19 J	350 J	110 J	36 J	9.3	12 J
fluorene	2,700,000	—	—	—	µg/kg	2.3 J	24	6 UJ	34 UJ	2.1 J	5.2 U	5.9 U	7.3 UJ
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	86 J	180 J	12 J	180 J	74 J	42 J	4 J	11 J
2-methylnaphthalene	—	—	—	—	µg/kg	5.3 U	4.8 J	6 UJ	34 UJ	5.3 U	5.2 U	5.9 U	7.3 UJ
naphthalene	56,000[c]	1700[c]	—	—	µg/kg	3.5 J	21	0.68 J	9.7 J	3.1 J	2.3 J	5.9 U	0.79 J
phenanthrene	—	—	—	—	µg/kg	28	310	5 J	84 J	38	12	5.6 J	3.5 J
pyrene	2,300,000	—	—	—	µg/kg	100	440	22 J	380 J	120	41	14 J	13 J
Pesticides/PCBs													
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	J22 0040-WHA-3477 (FD) 0 - 0.5 16-Jul-03	J23 0040-WHA-3487 0 - 0.5 16-Jul-03	J23 0040-WHA-3488 0.5 - 2 16-Jul-03	J23 0040-WHA-3489 2 - 4 16-Jul-03	J23 0040-WHA-3490 4 - 8 16-Jul-03	J24 0040-WHA-3491 0 - 0.5 16-Jul-03	J24 0040-WHA-3492 0.5 - 2 16-Jul-03	J24 0040-WHA-3493 2 - 4 16-Jul-03
VOCs													
tetrachloroethene	480	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthene	3,700,000	—	—	—	µg/kg	3.5 J	5.1 U	5.2 U	1.4 J	6.9 UJ	2 J	5.2 U	5.8 U
acenaphthylene	—	—	—	—	µg/kg	4.6 J	4.5 J	3.2 J	5.1 J	6.9 UJ	8.5	4.8 J	5.8 U
anthracene	22,000,000	—	—	—	µg/kg	19	4.8 J	3.3 J	6.5	6.9 UJ	9.6	5.4	5.8 U
benz(a)anthracene	620[c]	—	—	—	µg/kg	120	32	23	26	6.9 UJ	52	40	1.9 J
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	170	71	53	29	6.9 UJ	93	80	5.8 U
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	59	20	19	29	6.9 UJ	33	28	5.8 U
benzo(g,h,i)perylene	—	—	—	—	µg/kg	110	70	68	30	6.9 UJ	100	94	5.8 U
benzo(a)pyrene	62[c]	—	—	—	µg/kg	**140**	60	52	45	6.9 UJ	**88**	**77**	2.9 J
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	110	40	26	28	6.9 UJ	57	43	1.8 J
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	26	5.1 U	5.2 U	5.8	6.9 UJ	5.2 U	5.2 U	5.8 U
fluoranthene	2,300,000	—	—	—	µg/kg	210 J	72 J	57 J	79	3.5 J	110 J	100 J	3.2 J
fluorene	2,700,000	—	—	—	µg/kg	4 J	5.1 U	5.2 U	1.9 J	6.9 UJ	2 J	5.2 U	5.8 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	110	65	62	25	6.9 UJ	91	86	5.8 U
2-methylnaphthalene	—	—	—	—	µg/kg	5.1 U	5.1 U	5.2 U	5.8 U	6.9 UJ	1.6 J	5.2 U	5.8 U
naphthalene	56,000[c]	1700[c]	—	—	µg/kg	3.8 J	3.5 J	3.2 J	1.5 J	6.9 UJ	4.5 J	3.6 J	5.8 U
phenanthrene	—	—	—	—	µg/kg	76	24	16	40	2 J	47	25	5.8 U
pyrene	2,300,000	—	—	—	µg/kg	220	80	66	95	4 J	130	120	4.3 J
Pesticides/PCBs													
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	J24 0040-WHA-3494 4 - 8 16-Jul-03	J25 0040-WHA-3499 0 - 0.5 16-Jul-03	J25 0040-WHA-3500 0.5 - 2 16-Jul-03	J25 0040-WHA-3501 2 - 4 16-Jul-03	J25 0040-WHA-3502 4 - 8 16-Jul-03	J25 0040-WHA-3503 (FD) 0.5 - 2 16-Jul-03	J26 0040-WHA-3509 0 - 0.5 17-Jul-03	J26 0040-WHA-3510 0.5 - 2 17-Jul-03
VOCs													
tetrachloroethene	480	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthene	3,700,000	—	—	—	µg/kg	5.9 U	10	13	38 J	6.6 UJ	8.5	5.2 U	7.1 J
acenaphthylene	—	—	—	—	µg/kg	5.9 U	61	61	230	6.6 UJ	43	2.1 J	10 U
anthracene	22,000,000	—	—	—	µg/kg	5.9 U	90	92	420	6.6 UJ	74	5.5 J	20 J
benz(a)anthracene	620[c]	—	—	—	µg/kg	1.9 J	270	280	**710**	6.6 UJ	230	54	160
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	5.9 U	400	430	620	6.6 UJ	360	69	180
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	5.9 U	140	150	**810**	6.6 UJ	130	25	61
benzo(g,h,i)perylene	—	—	—	—	µg/kg	2.9 J	360	420 J	700	6.6 UJ	380 J	49	85
benzo(a)pyrene	62[c]	—	—	—	µg/kg	3.4 J	**400**	**440**	**990**	6.6 UJ	**370**	57	**140**
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	2.2 J	270	260	850	6.6 UJ	230	55	170
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	5.9 U	51	57 J	**140**	6.6 UJ	56 J	5.2 U	21
fluoranthene	2,300,000	—	—	—	µg/kg	3.6 J	660 J	730	2200	6.6 J	600	82	230
fluorene	2,700,000	—	—	—	µg/kg	5.9 U	19	25	130	6.6 UJ	15	5.2 U	4.1 J
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	5.9 U	350	410 J	590	6.6 UJ	370 J	44 J	85 J
2-methylnaphthalene	—	—	—	—	µg/kg	5.9 U	3.3 J	3.7 J	56 U	6.6 UJ	2.2 J	5.2 U	10 U
naphthalene	56,000[c]	1700[c]	—	—	µg/kg	5.9 U	13	12	28 J	6.6 UJ	12	5.2 U	10 U
phenanthrene	—	—	—	—	µg/kg	5.9 U	350	480	1800	6.6 UJ	350	30 J	110 J
pyrene	2,300,000	—	—	—	µg/kg	4.4 J	770	860	2700	6.6 J	690	96	230
Pesticides/PCBs													
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	J26 0040-WHA-3511 2 - 4 17-Jul-03	J26 0040-WHA-3512 4 - 8 17-Jul-03	J27 0040-WHA-0084 0.5 - 1 23-Apr-03	J30 0040-WHA-555 0.5 - 1 23-May-03	J31 0040-WHA-554 0.5 - 1 23-May-03	J32 0040-WHA-553 1.5 - 2 23-May-03	K27 0040-WHA-0085 1.5 - 2 23-Apr-03	K28 0040-WHA-0086 1 - 1.5 23-Apr-03	K29 0040-WHA-0087 0.5 - 1 23-Apr-03
VOCs														
tetrachloroethene	480	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons														
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs														
acenaphthene	3,700,000	—	—	—	µg/kg	2.2 J	110 U	96 U	110 U	120 U	110 U	93 U	90 U	110 U
acenaphthylene	—	—	—	—	µg/kg	11 U	71 U	48 U	54 U	59 U	54 U	47 U	45 U	53 U
anthracene	22,000,000	—	—	—	µg/kg	7.2	130	1.9 U	8.5	8.4	1 J	1.9 U	5.8	8.2
benz(a)anthracene	620[c]	—	—	—	µg/kg	35	**880**	5.2	26	20	7	4.7 U	33	45
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	44 J	**1500**	8.3	25	20	10	3.9	47	65
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	15	**720 J**	2.8	12	11	6.1	1.9	18	25
benzo(g,h,i)perylene	—	—	—	—	µg/kg	23	1500	25	22	20	32	7.5 U	71	97
benzo(a)pyrene	62[c]	—	—	—	µg/kg	40	**1900**	7.5	40	24	23	4.7 U	55	**76**
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	33	1000	5.7	29	29	11	4.7 U	33	46
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	5.8 U	**110**	19 U	14 J	44	5 J	19 U	18 U	21 U
fluoranthene	2,300,000	—	—	—	µg/kg	75	2900	12	71	65	23	9.8	100	140
fluorene	2,700,000	—	—	—	µg/kg	2.4 J	110 U	9.6 U	11 U	12 U	11 U	9.3 U	9 U	11 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	23	**1100**	4.8 U	29	16	11	4.7 U	46	67
2-methylnaphthalene	—	—	—	—	µg/kg	5.8 U	110 U	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1700[c]	—	—	µg/kg	1.7 J	78 J	48 U	54 U	59 U	54 U	47 U	45 U	53 U
phenanthrene	—	—	—	—	µg/kg	40	330	5.7	30	25	7	3.7 U	33	42
pyrene	2,300,000	—	—	—	µg/kg	110	3400	14	83	68	32	11	100	150
Pesticides/PCBs														
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals														
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	K30 0040-WHA-0088 0.5 - 1 23-Apr-03	K31 0040-WHA-551 1 - 1.5 23-May-03	K32 0040-WHA-552 1 - 1.5 23-May-03	L29 0040-WHA-0090 0.5 - 1 23-Apr-03	L30 0040-WHA-0089 0.5 - 1 23-Apr-03	L31 0040-WHA-587 0.5 - 1 29-May-03	L31RA 0040-WHA-559 1.5 - 2 28-May-03	M30 0040-WHA-0178 1.5 - 2 25-Apr-03	M31 0040-WHA-5038 0 - 0.5 27-Jun-03
VOCs														
tetrachloroethene	480	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons														
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs														
acenaphthene	3,700,000	—	—	—	µg/kg	910 U	100 U	110 U	94 U	97 U	100 U	24 J	97 U	110 U
acenaphthylene	—	—	—	—	µg/kg	460 U	51 U	53 U	47 U	48 U	51 U	55 U	48 U	57 U
anthracene	22,000,000	—	—	—	µg/kg	18 U	2.1 U	2.1 U	4	8.4	0.6 J	44	4.7	2.3 U
benz(a)anthracene	620[c]	—	—	—	µg/kg	46 U	1 J	5.3 U	19	4.8 U	7	110	18	5.7 U
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	18 U	1 J	2 J	28	15	11	92	23	2.3 U
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	18 U	0.8 J	0.9 J	10	4.9	4.2	41	10	2.3 U
benzo(g,h,i)perylene	—	—	—	—	µg/kg	160	7.2 U	7.4 U	49	18	10	140	29	8 U
benzo(a)pyrene	62[c]	—	—	—	µg/kg	46 U	4 J	4 J	34	15	15	**150**	27	5.7 U
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	46 U	5.1 U	5.3 U	18	10	10	143	21	5.7 U
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	**180 U**[e]	17 U	18 U	19 U	19 U	9 J	**80**	19 U	19 U
fluoranthene	2,300,000	—	—	—	µg/kg	46 U	3 J	4 J	60	21	24	332	62	5.7 U
fluorene	2,700,000	—	—	—	µg/kg	91 U	10 U	11 U	9.4 U	9.7 U	10 U	11 J	9.7 U	11 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	74	5.1 U	5.3 U	27	11	11	96	19	5.7 U
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1700[c]	—	—	µg/kg	460 U	51 U	53 U	47 U	48 U	51 U	55 U	48 U	57 U
phenanthrene	—	—	—	—	µg/kg	36 U	4.1 U	1 J	21	8	11	212	29	4.6 U
pyrene	2,300,000	—	—	—	µg/kg	91 U	2 J	2 J	60	23	26	391	67	11 U
Pesticides/PCBs														
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	8 J
Metals														
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	**1.8**
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	M31 0040-WHA-5039 0 - 0.5 27-Jun-03	M31 0040-WHA-6042 0.5 - 2 27-Jun-03	MBG-1 M-BG1-000 0.3 - 0.5 27-May-92	MBG-1 M-BG1-002 2 - 2.5 27-May-92	MBG-1 M-BG1-003 3 - 3.5 27-May-92	MBG-1 M-BG1-004 5 - 5.5 27-May-92
VOCs											
tetrachloroethene	480	—[b]	—	—	µg/kg	NA	NA	5.5	6.4 U	7.8 U	6.3 U
Petroleum Hydrocarbons											
TRPH	—	—	—	—	µg/kg	NA	NA	43600	36300 U	43800 U	36100 U
SVOCs											
acenaphthene	3,700,000	—	—	—	µg/kg	120 U	120 U	NA	NA	NA	NA
acenaphthylene	—	—	—	—	µg/kg	59 U	60 U	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	2.3 U	2.4 U	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	5.9 U	6 U	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	2.3 U	2 J	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	2.3 U	2.4 U	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	8.2 U	8.4 U	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	5.9 U	4 J	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	5.9 U	2 J	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	20 U	20 U	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	5.9 U	5 J	NA	NA	NA	NA
fluorene	2,700,000	—	—	—	µg/kg	12 U	12 U	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	5.9 U	6 U	NA	NA	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1700[c]	—	—	µg/kg	59 U	60 U	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg	4.7 U	2 J	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	12 U	7 J	NA	NA	NA	NA
Pesticides/PCBs											
Aroclor 1260	220	—	—	—	µg/kg	9 J	9 J	35 U	43 U	52 U	42 U
Metals											
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	10600	8510	*19000*[f]	6180
arsenic	0.39	0.062	—	9.14	mg/kg	**1.8**	**4.6**	**1.48**	**2.11**	**3.7**	**1.74**
barium	5,400	—	—	93.68	mg/kg	NA	NA	54.5	46.3	49.2	33.9
beryllium	150	—	—	1.27	mg/kg	NA	NA	0.591	0.792	0.763 U	0.632 U
calcium	—	—	—	16,800	mg/kg	NA	NA	4310	2940	5210	2290
chromium	210	—	—	54.84	mg/kg	NA	NA	26.7	42.8	*66.7*	29.2
cobalt	900	—	—	14.30	mg/kg	NA	NA	5.81	6.26	9.62	4.35 U
copper	3,100	—	—	39.14	mg/kg	NA	NA	14.3	10	25.7	5.6
iron	23,000	—	—	22,280	mg/kg	NA	NA	18800	13800	***27900***	9270
lead	400	150	—	37.66	mg/kg	NA	NA	20	19.8	6.51	3.39
magnesium	—	—	—	7,304	mg/kg	NA	NA	5890	3480	*8800*	2240
manganese	1,800	—	—	383.0	mg/kg	NA	NA	330	179	268	99.5
nickel	1,600	—	—	55.72	mg/kg	NA	NA	19	43	53.5	24.6
potassium	—	—	—	1,232	mg/kg	NA	NA	979	947	*2480*	850
sodium	—	—	—	1,230	mg/kg	NA	NA	433	520	*1430*	615
vanadium	78	—	—	47.34	mg/kg	NA	NA	40.2	28.6	*51.1*	20.3
zinc	23,000	—	—	67.48	mg/kg	NA	NA	54.3	34.4	61.8	20.7

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[d] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL
[e] detection limit is above criteria
[f] italicized font indicates result above background

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
TRPH – total recoverable petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 4-4
Groundwater Sampling Results, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	Groundwater TPH ESL	Background	Result Units	Station ID: / Sample: / [a]Depth Interval: / Collection Date: MBG-1 108-SBG-005 5 - 15 11-Feb-98	MBG-1 108-SBG-009 5 - 15 14-May-98	MBG-1 108-SBG-013 5 - 15 10-Aug-98
VOCs						NA	NA	ND
Petroleum Hydrocarbons						NA	NA	ND
SVOCs								
pyrene	—[b]	—	—	—	µg/L	NA	NA	2 J
Pesticides/PCBs						NA	NA	ND
Metals								
aluminum	1,000	1,000	—	1,070	µg/L	54.4 UJ	888 J	93.3 UJ
arsenic	10	50	—	20.72	µg/L	**10.5**[c]	**11.3**	**12.4 UJ**[d]
barium	2,000	1,000	—	569.5	µg/L	416	*735*[e]	531
cadmium	5	5	—	—	µg/L	0.2 U	0.48 J	0.3 U
calcium	—	—	—	—	µg/L	151,000	135,000	120,000
chromium	100	50	—	12.45	µg/L	0.2 U	1.8 J	0.8 UJ
cobalt	—	—	—	—	µg/L	1.5 UJ	1.8 J	3.1 J
copper	—	—	—	24.03	µg/L	0.35 U	2.1 J	1.9 UJ
iron	—	—	—	6,586	µg/L	6,570	*7,070 J*	6,030
magnesium	—	—	—	—	µg/L	319,000	351,000	373,000
manganese	—	—	—	1,741	µg/L	*1,970*	1,740	1,470
mercury	2	2	—	—	µg/L	0.1 U	0.1 U	0.14 J
nickel	—	100	—	—	µg/L	1.6 UJ	4.8 J	3.1 UJ
potassium	—	—	—	—	µg/L	177,000 J	218,000 J	214,000 J
sodium	—	—	—	—	µg/L	2,690,000 J	3,110,000	3,370,000 J
zinc	—	—	—	36.39	µg/L	2.8 UJ	*113*	12 J

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

[c] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL

[d] detection limit is above criteria

[e] italicized font indicates result above background

Table 4-4
Groundwater Sampling Results, AOC 4

Acronyms/Abbreviations:
- AOC – area of concern
- Cal – California
- ESL – environmental screening level
  (San Francisco Bay Regional Water Quality Control Board)
- Fed – federal
- µg/L – micrograms per liter
- MCL – maximum contaminant level
- NA – not analyzed
- ND – not detected
- PCB – polychlorinated biphenyl
- SVOC – semivolatile organic compound
- TPH – total petroleum hydrocarbons
- VOC – volatile organic compound

Review Qualifiers:
- J – indicates an estimated value
- U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
- UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 4-5
Groundwater Sampling Results Compared to
Surface Water Preliminary Screening Criteria, AOC 4

Analyte	PRELIMINARY SCREENING CRITERIA SW TPH ESL	CTR CCC	CTR HHCO	NRWQC CCC	NRWQC HHCO	Back-ground	Result Units	Station ID: MBG-1 Sample: 108-SBG-005 [a] Depth Interval: 5 - 15 Collection Date: 11-Feb-98	MBG-1 108-SBG-009 5 - 15 14-May-98	MBG-1 108-SBG-013 5 - 15 10-Aug-98
VOCs								NA	NA	ND
Petroleum Hydrocarbons								NA	NA	ND
SVOCs										
pyrene	—[b]	—	11,000	—	4,000	—	µg/L	NA	NA	2 J
Pesticides/PCBs								NA	NA	ND
Metals										
aluminum	—	—	—	—	—	1,070	µg/L	54.4 UJ	888 J	93.3 UJ
arsenic	—	36	—	36	0.14	20.72	µg/L	**10.5** [c]	**11.3**	**12.4 UJ** [d]
barium	—	—	—	—	—	569.5	µg/L	416	*735* [e]	531
cadmium	—	9.3	—	8.8	—	—	µg/L	0.2 U	0.48 J	0.3 U
calcium	—	—	—	—	—	—	µg/L	151,000	135,000	120,000
chromium	—	—	—	—	—	12.45	µg/L	0.2 U	1.8 J	0.8 UJ
cobalt	—	—	—	—	—	—	µg/L	1.5 UJ	1.8 J	3.1 J
copper	—	3.1	—	3.1	—	24.03	µg/L	0.35 U	2.1 J	1.9 UJ
iron	—	—	—	—	—	6,586	µg/L	6,570	*7,070 J*	6,030
magnesium	—	—	—	—	—	—	µg/L	319,000	351,000	373,000
manganese	—	—	—	—	—	1,741	µg/L	*1,970*	1,740	1,470
mercury	—	0.025	0.051	0.94	—	—	µg/L	**0.1 U** [d]	**0.1 U** [d]	**0.14 J**
nickel	—	8.2	4,600	8.2	4,600	—	µg/L	1.6 UJ	4.8 J	3.1 UJ
potassium	—	—	—	—	—	—	µg/L	177,000 J	218,000 J	214,000 J
sodium	—	—	—	—	—	—	µg/L	2,690,000 J	3,110,000	3,370,000 J
zinc	—	81	—	81	26,000	36.39	µg/L	2.8 UJ	*113*	12 J

Table 4-5
Groundwater Sampling Results Compared to
Surface Water Preliminary Screening Criteria, AOC 4

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

[c] bolded font indicates result above one of the following: TPH ESL, CTR CCC, CTR HHCO, NRWQC CCC, NRWQC HHCO

[d] detection limit is above criteria

[e] italicized font indicates result above background

Acronyms/Abbreviations:

AOC – area of concern
CCC – criterion continuous concentration
CTR – California Toxics Rule
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
HHCO – human-health consumption of organisms only
µg/L – micrograms per liter
NA – not analyzed
ND – not detected
NRWQC – National Recommended Water Quality Criteria
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
SW – surface water
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:

J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 5-1
Estimates of Mobility[a] for Mercury, AOC 4

Analyte	K_d[b] (L/kg)	Percent Sorbed[a]	R[c] (unitless)
mercury	52	98	116

Notes:
[a] mobility is proportional to percent sorbed; percent sorbed = $K_d / (1 + K_d) \times 100$ (Karickhoff et al. 1979)
[b] RAIS 2006
[c] retardation factor calculated as described in Section 5 of the main RI/FS Report

Acronyms/Abbreviations:
AOC – area of concern
K_d – soil water partition coefficient
L/kg – liters per kilogram
R – retardation factor

Table 6-1
Tier 1 Evaluation Results by Exposure Group, AOC 4

Exposure Group [a]	Cancer Risk	Hazard Index
1. All soil and groundwater exposure pathways		
Total [b]	2E-03	5
Without metals below background	5E-07	3
2. Exposure pathways for soil and vapors from VOCs in groundwater		
Total [b]	9E-05	2
Without metals below background	5E-07	2
3. Exposure pathways for residential use of groundwater		
Total [b]	2E-03	3
Without metals below background	4E-09	1

Notes:

[a] PAHs are not included

[b] includes all COPCs

Acronyms/Abbreviations:

AOC – area of concern

COPC – chemical of potential concern

PAH – polynuclear aromatic hydrocarbon

VOC – volatile organic compound

Table 6-2
Tier 1 Evaluation Results by Risk Driver, AOC 4

Study Area	Analyte Name	TOTAL		WITHOUT BACKGROUND	
		Hazard Quotient	Cancer Risk	Hazard Quotient	Cancer Risk
AOC 4					
Soil					
	arsenic	—*	9E-05	—	—
	iron	1	—	1	—
	vanadium	0.7	—	0.7	—
	Total for soil	**2**	**9E-05**	**2**	**5E-07**
Groundwater					
	arsenic	—	2E-03	—	—
	iron	0.6	—	0.6	—
	manganese	2	—	—	—
	Total for groundwater	**3**	**2E-03**	**1**	**4E-09**
	Total for soil and groundwater	**5**	**2E-03**	**3**	**5E-07**

Note:
* dash indicates not applicable

Acronym/Abbreviation:
AOC – area of concern

Table 7-1
Summary of RI Results and Recommendations, AOC 4

DQO Problem	DQO Decision Questions	Nature and Extent	Tier 1 Risk Evaluation	Recommendation
AOC 4 addresses PAHs in soil and metals in soil and groundwater. No sampling was conducted during the RI at AOC 4 because the Navy and regulatory agencies agreed that there are sufficient existing analytical results.	Have the nature and extent of contamination been defined?	Definition is adequate. The Navy and agencies agreed that previous sampling was adequate to support the risk evaluation and decisions on the necessity for remedial action.	NA	No further action. PAHs will be addressed as part of the PAH Areas (Attachment W).
	Are contaminants present in soil or groundwater at concentrations that pose unacceptable risk to potential future residents?	NA	Total cancer risk without metals below background is 5×10^{-7} (below the risk management range) with an HI of 3, due to the presence of iron and vanadium in soil and iron in groundwater. Iron and vanadium at AOC 4 are believed to be naturally occurring and not from releases due to Navy activities.	No further action.
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?	No. It is considered unlikely that that mercury (reported at 0.14 µg/L) would migrate 400 feet in groundwater and result in a surface water concentration above the PSC. Zinc was not consistently reported in groundwater samples above the background 95th percentile or the surface water PSC.	NA	No further action.

Acronyms/Abbreviations:

AOC – area of concern
DQO – data quality objective
HI – hazard index
µg/L – micrograms per liter
NA – not applicable
PAH – polynuclear aromatic hydrocarbon
PSC – preliminary screening criterion
RI – remedial investigation

ATTACHMENT E

AREA OF CONCERN 5

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT ATTACHMENT E, AREA OF CONCERN 5 IR SITE 35, TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 5. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station Alameda), Alameda, California (Figure 1-1).

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

AOC 5 is an approximately 0.2-acre area along the northeastern boundary of Environmental Baseline Survey (EBS) Parcel 98, which is also the northeastern boundary of Transfer Parcel Economic Development Conveyance (EDC)-5. AOC 5 comprises the area surrounding a former sewage lift station located immediately south of the intersection of Ferry and Main Streets. The foundation of Building 493, which formerly housed the sewage lift station, is present, with the remainder of AOC 5 being landscaped open space (Photographs 1-1 and 1-2).

1.2 HISTORICAL USE

The portion of EBS Parcel 98 located in AOC 5 was historically used for residences and as open space and is part of the West Housing Area. Building 493 housed the sewage lift station (Lift Station #3), which was used to receive the gravity-fed inflow and lift (pump) it to a gravity-fed outflow pipeline at a higher elevation. Lift station pipelines were not pressurized and were reported to have been repaired by the City of Alameda in the past (Delong, pers. com. 2007).

1.3 PRELIMINARY SCREENING CRITERIA AND BACKGROUND METALS

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 4.3 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this AOC are the following:

- Soil
  - residential preliminary remediation goals (PRGs) (U.S. EPA 2004b), except polynuclear aromatic hydrocarbons (PAHs) classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (µg/kg) (DON 2001a)
  - environmental screening levels (ESLs) for total petroleum hydrocarbons (TPH) – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)
- Groundwater
  - maximum contaminant levels (MCLs) and advisory level for lead (U.S. EPA 2002, DHS 2006)
  - ESLs for TPH – water (RWQCB 2005)

Photograph 1-1
Former Location of Building 493
(Currently a Sewage Lift Station)
View to South

Photograph 1-2
Former Location of Building 493
(Currently a Sewage Lift Station)
View to North

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being assessed. For example, groundwater concentrations from all study areas were compared to MCLs, whether or not the groundwater was considered a potential drinking water source in that area. Chemicals of potential concern (COPCs) identified in the health risk evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs.

In addition to the above-listed PSCs, metals concentrations in soil and groundwater at AOC 5 were compared to the following Alameda Point background concentrations to help discriminate between site-related and naturally occurring metals:

- Alameda Point background soil concentrations (95th percentile of the pink data set; Appendix E of the final RI Report of Operable Unit [OU]-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)
- Alameda Point background groundwater concentrations (95th percentile; Appendix E of the final RI Report of OU-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)

For ease of discussion in this report, the Alameda Point 95th percentile concentrations for metals in soil (pink background data set) and groundwater are referred to as "background."

Section 4.3 of the main RI/FS Report provides further discussion on the occurrence and interpretation of metals concentrations in soil and groundwater at IR Site 35.

1.4 PREVIOUS INVESTIGATIONS

During two previous investigations, soil samples were collected at AOC 5, and the results are summarized below. Locations sampled in AOC 5 are shown on Figure 1-1. Analytical results for soil samples collected within AOC 5 are summarized in Appendix B.

1.4.1 2002 Polynuclear Aromatic Hydrocarbon Study

Soil samples collected in AOC 5 during the 2002 PAH study (BEI 2005a) had PAH concentrations above the screening criterion for B(a)P equivalent concentrations (620 µg/kg). However, these locations were excavated during the PAH time-critical removal action (TCRA) (FWEC 2004), which involved excavation and off-site disposal of the top 2 feet of soil in several areas. Therefore, these locations are not shown on Figure 1-1.

1.4.2 Polynuclear Aromatic Hydrocarbon Removal Action

The identification of PAH concentrations above the screening criterion in soil samples collected from Transfer Parcel EDC-5 during the 2002 PAH (BEI 2005a) study prompted the Navy to conduct a TCRA in portions of the West Housing Area (FWEC 2004). PAH TCRA soil removals in the West Housing Area were conducted using a grid pattern at several EBS parcels, including two adjacent grid areas in AOC 5. Soil was removed to a

depth of approximately 2 feet below ground surface (bgs) from certain grid areas to address elevated concentrations of PAHs. The excavations were backfilled using clean fill material. Locations of the removals at AOC 5 are shown on Figure 1-1. Only laboratory results for soil samples collected outside of or below the TCRA excavations were reviewed for this report.

Soil at locations K12 and L12 was not removed during the TCRA (Figure 1-1). Samples from K12 and L12 were analyzed for PAHs at depths between 0 and 2 feet bgs, and corresponding B(a)P equivalent concentrations were below the PSC. Soil at sample location L11 was removed during the TCRA (Figure 1-1). The TCRA excavation at AOC 5 was filled with imported backfill and topsoil, which was sampled and analyzed for arsenic. The results of the topsoil and backfill sampling are included in Table 4-3 for sampling location L11.

Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, geology, and potential groundwater beneficial use at AOC 5.

Topography at AOC 5 is relatively flat. The average ground elevation at AOC 5 is 8 feet above mean sea level (MSL), based on elevation data from the four borings (A05SB01 through A05SB04) advanced during the RI. Groundwater depths measured in temporary casings prior to groundwater sample collection in A05SB01 and A05SB02 were approximately 6 and 8 feet bgs, respectively. However, based on observations of slow groundwater recovery in borings during sampling, these groundwater depths may not represent static water levels. Total dissolved solids (TDS) were reported at concentrations of 3,240 and 13,700 milligrams per liter in the groundwater samples from these two borings.

The groundwater monitoring well nearest to AOC 5 is MBG-1, located approximately 1,000 feet west of AOC 5. A review of groundwater depths in this well over time (March 1995 through August 1998) shows depth to water from approximately 1 to 4 feet bgs. The deepest historical groundwater measured in this well is approximately 4 feet above MSL. This value, if subtracted from the ground elevation at AOC 5, would suggest that groundwater in the vicinity of this AOC is as deep as 4 feet bgs. This is shallower than RI observations.

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is north at AOC 5. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken during the basewide groundwater monitoring program and adjacent IR site investigations. Based on tidal studies performed at other Alameda Point sites, tidal influence would not be expected at AOC 5, located approximately 700 feet from Oakland Inner Harbor. Results of tidal studies performed at nearby IR Site 28 (discussed in Section 2 of the main RI/FS Report) indicated a minimal effect on groundwater elevations in the fill material at the inland well, located approximately 200 feet from Oakland Inner Harbor.

Fill material was encountered in the four RI borings from ground surface to about 5 to 7.5 feet. Fill material encountered in these borings generally consisted of sandy silt (or sandy silt with gravel) or silty sand. Coarse-grained bay sediment (silty sand and poorly graded sand with silt) was encountered below the fill material, which was underlain by fine-grained bay sediments (Young Bay Mud) in borings A05SB01 through A05SB03. Young Bay Mud was encountered at about 5 to 8 feet bgs to the total depth of these borings (see cross sections C-C′ on Figure 2-8 and I-I′ on Figure 2-9 in the main RI/FS Report). RI boring logs are presented in Appendix D. As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust is unlikely to be located beneath AOC 5.

AOC 5 is located east of Saratoga Street. However, TDS data and observations on groundwater yield during the RI suggest that groundwater beneath AOC 5 may meet exemption criteria for the municipal and domestic water supply designation. As mentioned, TDS measurements were relatively high. Yield at both borings was low; groundwater recharge at one boring was so slow that sufficient sample volume could not be obtained. It is unlikely that groundwater yield could be sustained at a sufficient rate to support municipal or domestic drinking water supply.

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Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for AOC 5. The RI was conducted in accordance with the sitewide data quality objectives (DQOs) for AOCs presented in Table 3-1 of the main RI/FS Report.

3.1 APPROACH

RI sampling at AOC 5 addressed possible releases from a sewage lift station formerly housed in Building 493, which is located in an area historically used for housing. Soil samples collected in AOC 5 during the 2002 PAH study had PAH concentrations above the PSC; soil from this area was removed as part of a PAH TCRA. Although PAH concentrations at AOC 5 have been mitigated, samples were not collected adjacent to the sewage lift station, and groundwater was not assessed. The regulatory agencies requested the collection of soil and groundwater samples at AOC 5 to assess whether soil and groundwater have been impacted by possible releases from the sewage lift station.

3.2 SCOPE

Soil samples were collected from four borings around the sewage lift station; groundwater samples were collected from two of the borings on the downgradient side of the lift station during the 2005 RI sampling. Soil samples and the groundwater sample collected from boring A05SB01 were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs), and metals. Groundwater collected from boring A05SB02 was analyzed only for VOCs and metals, due to insufficient yield. Groundwater was also analyzed for TDS. Table 3-1 presents a sampling summary for samples collected during the RI and previous investigations. Figure 1-1 shows sampling locations from all investigations.

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Section 4
NATURE AND EXTENT OF CONTAMINATION

This section presents the analytical results from previous investigations and from the RI, and describes the concentration ranges and spatial distributions of the analytes identified at AOC 5. Soil and groundwater samples were collected from seven locations during the PAH TCRA (FWEC 2004) and the RI (Table 3-1). Metals reported in soil and groundwater at concentrations above background are discussed in detail in Section 4.3.3 of the main RI/FS Report. Metals discussion in this section focuses primarily on concentrations above PSCs. Please note that regardless of concentration, all reported metals (except required human trace nutrients) were included in the risk evaluation (Section 6).

Results are illustrated on Figures 4-1 and 4-2. Statistical summaries of soil and groundwater results are presented in Tables 4-1 and 4-2, and soil and groundwater analytical results are summarized in Tables 4-3 and 4-4. Complete analytical results for historical and RI samples collected within AOC 5 are included in Appendices B and G, respectively.

4.1 SOIL SAMPLING RESULTS

Analytical soil sampling results are summarized below for each class of chemicals investigated at AOC 5 (Figure 4-1).

4.1.1 Volatile Organic Compounds

Carbon disulfide, 4-methyl-2-pentanone, and 2-butanone were the only VOCs reported in soil from one or more of borings A05SB01 through A05SB04. VOC concentrations were below PSCs.

4.1.2 Semivolatile Organic Compounds

Three non-PAH SVOCs were reported in soil: bis(2-ethylhexyl)phthalate in a sample from boring A05SB02, di-n-butyl phthalate in samples from borings A05SB01 through A05SB04, and butyl benzyl phthalate in a sample from boring A05SB04. Reported concentrations of these SVOCs were below PSCs.

Seventeen PAHs were reported in soil from borings K12, L12, and A05SB01 through A05SB04 at concentrations below PSCs. The B(a)P equivalent concentration (760 µg/kg) in the 3- to 4-foot-bgs soil sample from boring A05SB04 was above the PSC (620 µg/kg). The exceedance was incorporated into the PAH Areas (Attachment W). The B(a)P equivalent concentrations in the 7- to 8-foot-bgs soil sample from this location and from surrounding borings were below the PSC.

4.1.3 Pesticides and Polychlorinated Biphenyls

The pesticides alpha-chlordane, gamma-chlordane, and 4,4′-dichlorodiphenyldichloroethene (DDE) were reported in soil from boring A05SB02. The pesticides alpha-chlordane, gamma-chlordane, 4,4′-dichlorodiphenyldichloroethane (DDD), 4,4′-DDE, and 4,4′-dichlorodiphenyltrichloroethane (DDT) were reported in soil from boring

A05SB04. Pesticide concentrations were below PSCs. PCBs were not reported at concentrations above laboratory detection limits in the soil samples.

4.1.4 Metals

Twenty-one metals were reported in soil samples from one or more of borings A05SB01 through A05SB04 at concentrations below PSCs. Arsenic was reported in soil above the PSC (PRG of 0.062 milligrams per kilogram [mg/kg]) but below the background concentration of 9.14 mg/kg.

Iron and manganese were two other metals reported in soil above PSCs. Reported iron concentrations (38,200 and 26,100 mg/kg) in soil samples collected at 1 and 6.5 feet bgs, respectively, from borings A05SB02 and A05SB03 were above the PSC (residential PRG of 22,280 mg/kg). Manganese (3,780 mg/kg) was also reported at a concentration above the PSC (residential PRG of 1,800 mg/kg) and the background concentration (383.0 mg/kg) in the 6.5-foot-bgs soil sample from boring A05SB03. This concentration of manganese is substantially above the maximum in background (748 mg/kg) and was identified as an outlier in sitewide statistical evaluation (Section 4.3.1.2) of the main RI/FS Report, based on the correlation analysis between manganese and iron and aluminum. The next highest concentration of manganese in the 12 soil samples for AOC 5 (805 mg/kg) is also above the maximum concentration in background, but the remaining 10 samples are below the background concentration of 383.0 mg/kg.

The highest concentrations of iron and manganese at AOC 5 were from samples consisting of predominantly fine-grained sediments (containing a higher percentage of clay minerals and iron and aluminum oxides). The manganese concentration identified as an outlier was collected from the native Bay Sediment Unit (BSU). As discussed in Section 4.3 of the main RI/FS Report, these metals in soil are believed to be naturally occurring and not indicative of releases from Navy activities. The presence of common nutrients (calcium, magnesium, potassium, and sodium) at concentrations above background in the same samples provides further indication that the metals present at concentrations above background are naturally occurring.

4.2 GROUNDWATER SAMPLING RESULTS

This section presents the results of the groundwater samples collected and analyses conducted during RI sampling. Groundwater samples were not collected at AOC 5 during previous investigations. Analytical results are presented for each class of chemicals investigated at AOC 5 (Figure 4-2).

4.2.1 Volatile Organic Compounds

Acetone was reported in a groundwater sample from boring A05SB01. Acetone, carbon disulfide, toluene, and 2-butanone were reported in a groundwater sample from A05SB02. The reported toluene concentration was below the PSC. The three other reported VOCs do not have established PSCs.

4.2.2 Semivolatile Organic Compounds

SVOCs were not reported at concentrations above laboratory detection limits in the groundwater sample from boring A05SB01. Groundwater from A05SB02 was not collected and analyzed for SVOCs due to insufficient yield.

4.2.3 Pesticides and Polychlorinated Biphenyls

Pesticides and PCBs were not reported at concentrations above laboratory detection limits in the groundwater sample from boring A05SB01. Groundwater from boring A05SB02 was not collected due to insufficient yield.

4.2.4 Metals

Fifteen metals were reported in groundwater from borings A05SB01 and A05SB02. Arsenic was the only metal reported above its PSC and background in a groundwater sample from boring AOC 5. Arsenic was reported at concentrations of 31.2 and 29.1 micrograms per liter (µg/L) in the primary and field duplicate groundwater samples, respectively, from boring A05SB01. These concentrations were above the PSC (MCL of 10 µg/L) and the background concentration (20.72 µg/L).

Iron and manganese were reported above background in one of two samples. There are no PSCs for these metals; however, they are discussed because they are risk drivers in groundwater (Section 6). Iron was reported at concentrations of 28,500 µg/L (23,000 µg/L in a duplicate sample) and 60.3 µg/L in groundwater samples from A05SB01 and A05SB02, respectively. Manganese was reported at concentrations of 2,470 µg/L (1,910 µg/L in a duplicate sample) and 956 µg/L in groundwater samples from A05SB01 and A05SB02, respectively. The reported iron and manganese concentrations from boring A05SB01 were above the background concentrations of 6,586 and 1,741 µg/L, respectively. MCLs have not been established for these metals.

As discussed in Section 4.3 of the main RI/FS Report, arsenic, iron, and manganese are believed to result from dissolution of naturally occurring minerals in soil due to reducing conditions. The presence of arsenic, iron, and manganese at elevated concentrations is indicative of reducing conditions. A potential source of organic material that could result in reducing conditions would be a release from the domestic sewage lift station located near former Building 493, if one occurred. However, any potential for sewage leaks has been reduced or eliminated through retrofitting and refurbishing activities. Another possible source of the organic material is the natural geochemical environment of the Young Bay Mud.

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Section 5
CONCEPTUAL SITE MODEL

The conceptual site model for AOC 5 summarizes the AOC-specific geologic/hydrogeologic characteristics of the study area and the nature and extent of contaminants in the physical system. As discussed below, metals reported in soil and groundwater at AOC 5 are believed to be representative of naturally occurring conditions. Therefore, fate and transport of these naturally occurring metals is not discussed in this section but is presented in Sections 4.3 and 5 of the main RI/FS Report.

AOC 5 is located in the northeastern portion of Transfer Parcel EDC-5. The area is flat and grass surrounds the foundation of the former sewage lift station. The nearest surface water body is Oakland Inner Harbor, approximately 700 feet north of AOC 5.

Based on a review of borings logs for AOC 5, the subsurface lithology at AOC 5 consists of artificial fill material comprising sandy silt and silty sand. Fill material is underlain by bay sediments consisting of upper coarse-grained sediment (silty sand and poorly graded sand with silt) and lower fine-grained sediment (lean clay). Shallow groundwater of the first water-bearing zone beneath AOC 5 occurs near the bottom of the fill material or the top of the fine-grained bay sediments (Young Bay Mud). The underlying Young Bay Mud is expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. Tidal influence is expected to be negligible at AOC 5 because of its distance from Oakland Inner Harbor. Groundwater flow direction is approximately north, toward Oakland Inner Harbor, and the maximum depth to water observed during the RI was approximately 8 feet bgs. Based on expected yield and TDS, groundwater underlying AOC 5 would not be considered a drinking water source.

PAHs and metals (primarily arsenic, iron, and manganese) were reported at concentrations above PSCs at AOC 5. Iron and manganese were reported above PSCs in soil, and arsenic was reported above the PSC in groundwater and also above background. There are no groundwater PSCs for iron or manganese, but concentrations from one boring are above background and contribute to a hazard index (HI) above 1. Vanadium in soil also contributes to the HI.

As discussed in Section 4.3 of the main RI/FS Report, metals in soil and groundwater at AOC 5 are believed to be naturally occurring. The higher concentrations of dissolved metals in groundwater at one of the soil borings likely reflect reducing subsurface conditions. The low concentrations (relative to PSCs) of other chemicals in soil and groundwater do not indicate significant releases of contaminants. PAHs reported in soil at AOC 5 are evaluated sitewide and discussed in the PAH Areas (Attachment W).

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Section 6
TIER 1 EVALUATION

This section summarizes the Tier 1 risk evaluation results for AOC 5. In a Tier 1 evaluation, risk for a residential exposure scenario is assessed with the assumption that no remedial action would take place at the study area. This section also presents a qualitative uncertainty evaluation that identifies and characterizes the effects of uncertainties on the risk results.

A Tier 1 evaluation is a screening-level approach that calculates total cumulative risk values using published risk-based guidelines from the United States Environmental Protection Agency (U.S. EPA), California Environmental Protection Agency (Cal/EPA), and San Francisco Bay Regional Water Quality Control Board. The Tier 1 evaluation includes all chemicals identified in at least one sample except for PAHs in soil. PAHs in soil are not included because site-specific remediation goals for PAHs are being developed and are discussed as part of the PAH Areas (Attachment W). The approach used to estimate risk is described in Section 6 of the main RI/FS Report. Tier 1 information is provided in Appendix J.

Cancer risk and noncancer values for AOC 5 are shown in Table 6-1. Risk drivers for cancer and noncancer risk are presented in Table 6-2.

6.1 COPC IDENTIFICATION

The data selection and identification of COPCs are based on a compilation of all usable data for soil and groundwater. All chemicals reported in at least one sample collected during the RI and/or included in the historical data were included as Tier 1 COPCs, except calcium, magnesium, potassium, and sodium, which are known to be required human trace nutrients.

There are 28 Tier 1 COPCs in soil at AOC 5: 17 metals, 5 pesticides, 3 non-PAH SVOCs, and 3 VOCs. Twelve samples were analyzed for all analytes, and an additional four samples were analyzed only for arsenic.

There are 15 Tier 1 COPCs in groundwater at AOC 5: 11 metals based on three samples and 4 VOCs based on two samples.

6.2 RISK CHARACTERIZATION

The cancer risk and noncancer hazard values were calculated using the Tier 1 protocol from Cal/EPA (2005). The maximum concentration of each COPC in soil and groundwater was compared with a risk-based guideline to estimate cancer and noncancer risks. Two results are presented for three exposure groups, the total risk and a second value that does not include risk associated with metals concentrations that are below background.

For soil and groundwater data for the three exposure groups at AOC 5, the calculated cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 5×10^{-3} and 12

  Without metals below background: 4×10^{-3} and 10

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 1×10^{-4} and 6

  Without metals below background: 4×10^{-7} and 5

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 4×10^{-3} and 6

  Without metals below background: 4×10^{-3} and 6

For reasonable future use without metals below background, the Exposure Group 2 noncancer hazard value without iron and manganese is 1.

For residential use of groundwater without metals below background, the Exposure Group 3 noncancer HI is above 1 due to iron (hazard quotient [HQ] of 3) and manganese (HQ of 3).

6.3 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation are representative of any potential health concerns at AOC 5. The results are consistent with the site history and previous investigations. This approximately 0.2-acre site is adequately characterized, with three investigations and a Tier 1 evaluation based on 12 to 16 soil samples and 2 to 3 groundwater samples for metals and organic chemicals.

As noted in Section J1.2.4 of Appendix J, the health effects of iron are not considered additive with other chemicals.

The contribution of vapors from the four VOCs identified in groundwater to indoor air is negligible. The noncancer HIs based on the tap water PRGs are well below 1, and PRGs are higher than ESLs protective of indoor air. The uncertainty associated with the omission of the dermal pathway for groundwater is low because exposure from the dermal pathway for the Tier 1 COPCs would not result in an increase in the cancer risk or HI for residential use of groundwater (Exposure Groups 1 and 3). Cancer risk and hazard values are reported in one significant figure, so small changes will not necessarily result in an overall increase. This finding is based on the ratio of dermal exposure to ingestion for each Tier 1 COPC.

6.4 CONCLUSIONS

For all three exposure groups, the total cancer risks are at (10^{-4}) or above the risk management range and the noncancer hazard values are above 1.

For exposure pathways for soil and VOCs in groundwater (Exposure Group 2), the cancer risk without metals below background is below the de minimis level of 10^{-6} while the exposure pathways that include residential use of groundwater have cancer risks above the risk management range, due to arsenic in groundwater.

The noncancer HI values above 1 are a result of the cumulative HQs for iron and manganese in soil and groundwater. Also, as noted in Section J1.2.4 of Appendix J, the health effects of iron are not considered additive with other chemicals.

The noncancer HI based on the maximum concentration of manganese likely overestimates the hazard. The maximum soil concentration of manganese of 3,780 mg/kg was reported in 1 of 12 samples at a 6.5-foot-bgs depth, which is in the native clay below the fill material. The next highest concentration of manganese of 805 mg/kg was reported at a 1-foot-bgs depth, and is well below the PRG of 1,762 mg/kg.

In groundwater, the maximum concentration of arsenic of 31.2 µg/L is above the background concentration of 20.72 µg/L but below the maximum concentration of 40.7 µg/L. There is a possibility that arsenic concentrations in groundwater are consistent with background concentrations, but there are not sufficient data to conduct a more rigorous statistical comparison.

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Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at AOC 5, including the nature and extent of contamination and results of the Tier 1 risk evaluation. RI results form the basis of responses to the DQO decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendations presented below.

7.1 SUMMARY

RI sampling was performed at AOC 5 to assess whether possible releases from a sewage lift station have impacted soil and groundwater quality.

PAHs and metals (primarily arsenic, iron, and manganese) were reported at concentrations above PSCs at AOC 5. PAH exceedances are addressed in the PAH Areas (Attachment W). Metals reported in soil and groundwater are believed to be naturally occurring. Iron and manganese in soil were reported at concentrations above PSCs and background in two soil samples from A05SB02 and A05SB03, respectively. The highest concentrations of iron and manganese at AOC 5 were from samples consisting of predominantly fine-grained sediments (containing a higher percentage of clay minerals and iron and aluminum oxides); furthermore, one of these samples was collected from the native BSU (Young Bay Mud). The manganese concentration in the sample collected from the native BSU was identified as an outlier in the sitewide statistical evaluation (Section 4.3.1.2 of the main RI/FS Report) based on the correlation analysis between manganese and iron and aluminum.

TDS and observations of low groundwater yield during the RI suggest that groundwater beneath AOC 5 may meet exemption criteria for the municipal and domestic water supply designation.

Results of the Tier 1 risk evaluation show a total cancer risk of 5×10^{-3} (above the risk management range) due to arsenic in soil and groundwater (arsenic in soil is present at concentrations consistent with background). The HI is 12 due largely to iron and manganese in soil and groundwater. Without metals below Alameda Point background, the cancer risk of 4×10^{-3} is due to arsenic concentrations in groundwater. The HI of 10 is due to iron and manganese in soil and groundwater. Without metals below background and without residential groundwater use, the cancer risk is 4×10^{-7} with an HI of 5, also due to iron and manganese in soil.

Based on statistical analysis (Section 4.3 of the main RI/FS Report), iron and manganese identified in soil are believed to be naturally occurring rather than due to releases from Navy activities. Metals in groundwater are believed to result from dissolution of naturally occurring metals in soil into groundwater due to reducing conditions. Arsenic was the only metal reported above its PSC and above background in a groundwater sample from boring A05SB01. Iron and manganese are risk drivers in groundwater, but were above background in only one of two samples. The presence of concentrations of arsenic, iron, and manganese at elevated concentrations is indicative of reducing conditions. A potential source of organic material that could result in reducing conditions would be a release from the domestic sewage lift station located near former Building 493,

if one occurred. However, any potential for sewage leaks has been reduced or eliminated through retrofitting and refurbishing activities. Another possible source of the organic material is natural conditions associated with the presence of BSU sediment in the interval from which groundwater was collected, as discussed in Section 4.3.2.2 of the main RI/FS Report.

7.2 AOC 5 CONCLUSIONS AND RECOMMENDATIONS

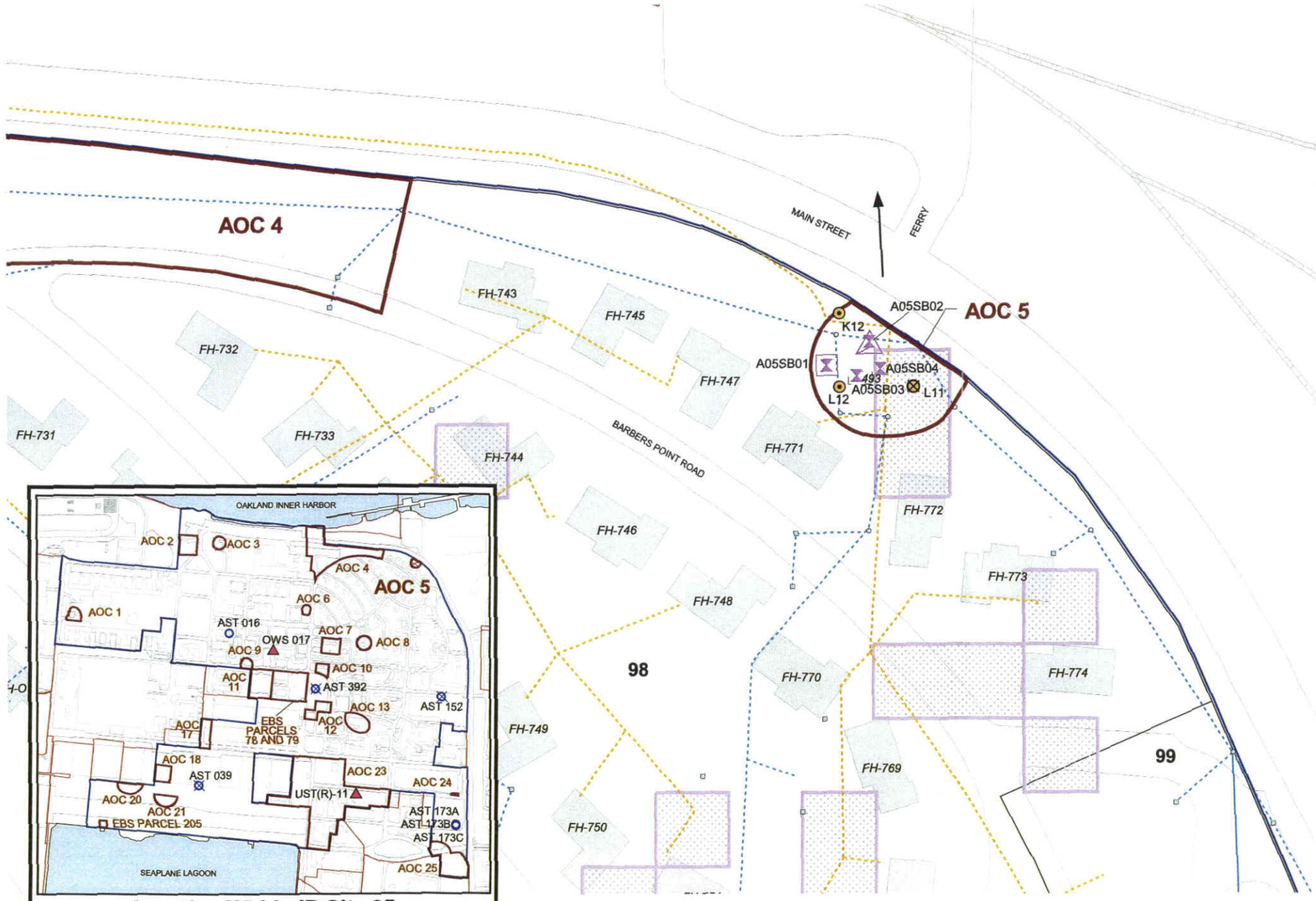
The RI was conducted using the seven-step U.S. EPA DQO process (U.S. EPA 2000); DQOs were developed for AOC 5 in the Work Plan (BEI 2006). The RI has addressed these DQOs, as summarized in Table 7-1.

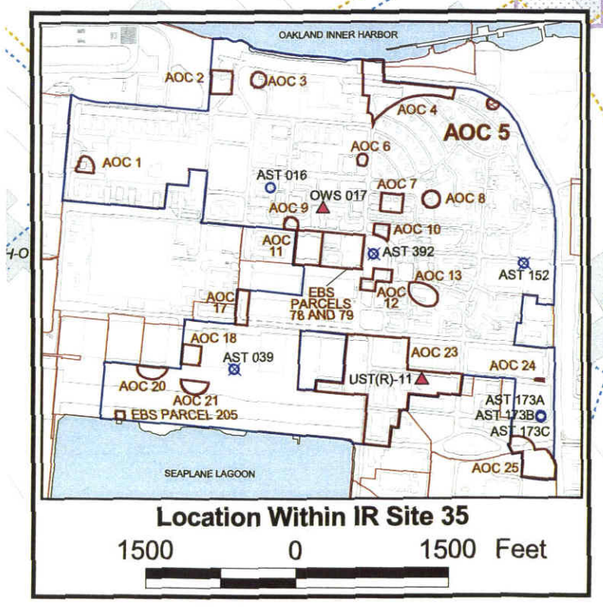
The data collected during previous investigations and the RI were sufficient to perform a Tier 1 risk evaluation and support decisions on the necessity for remedial actions at AOC 5. Significant concentrations of contaminants do not appear to have been released from the former sewage lift station to soil or groundwater at AOC 5.

No further action is recommended at AOC 5. Further evaluation of the extent of metals in soil and groundwater and PAHs in soil is not recommended for the following reasons.

- The cancer risks above the risk management range and above background are due to arsenic in groundwater, and the HI values above 1 are due to iron and manganese in soil and groundwater.
- The iron and manganese concentrations in soil are considered to be naturally occurring. The iron and manganese concentrations in groundwater are indicative of reducing conditions. Arsenic was also reported at concentrations above background in the same groundwater samples and is likely associated with these reducing conditions. Naturally occurring arsenic is often associated with iron in minerals. When iron becomes soluble through the reduction process, trace metals such as arsenic can also be released from soil into groundwater (Zheng et al. 2002).
- There is evidence of elevated metals associated with reducing conditions. The source of reducing conditions could be natural or anthropogenic. Potential sources of anthropogenic releases have been corrected.
- PAHs are addressed as part of the PAH Areas (Attachment W).

FIGURES





Location Within IR Site 35

1500 0 1500 Feet

LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 493 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

PAH REMOVAL ACTION SOIL SAMPLING LOCATION WITH STATION ID
- METALS ANALYSIS ONLY
- SVOCs ANALYSIS ONLY

RI SOIL SAMPLING LOCATION WITH STATION ID
- VOCs, SVOCs, PESTICIDES/PCBs, AND METALS ANALYSES ONLY

RI GROUNDWATER SAMPLING LOCATION WITH STATION ID
- VOCs AND METALS ANALYSES ONLY
- VOCs, SVOCs, PESTICIDES/PCBs, AND METALS ANALYSES ONLY

N

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOCs – VOLATILE ORGANIC COMPOUNDS

100 0 100 Feet

RI/FS Report for IR Site 35

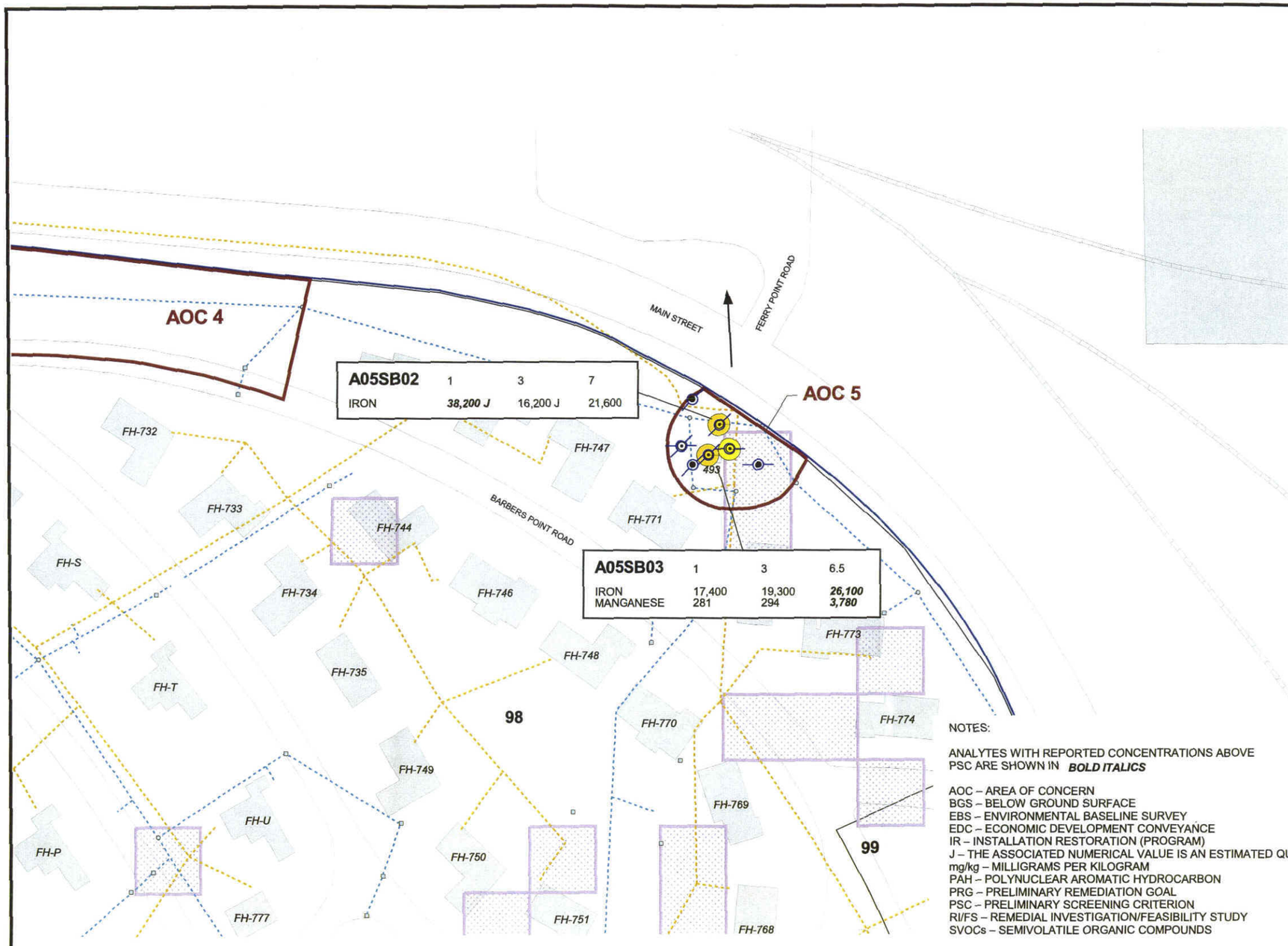
Figure 1-1

Study Area and Sampling Locations
Area of Concern 5

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/30/06
File No.: 077L14447
Job No.: 23818-077
Rev No.: C



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 493 BUILDING OR STRUCTURE (FORMER) AND ID
- WATER
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL SOIL SAMPLING LOCATION
- RI SOIL SAMPLING LOCATION

SOIL SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC FOR :

- METALS
- BENZO(A)PYRENE EQUIVALENT (SEE ATTACHMENT W, PAH AREAS, FOR ADDITIONAL INFORMATION AND CONCENTRATIONS)

SOIL SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :

- METALS
- SVOCs

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

A05SB02	1	3	7
IRON	***38,200 J***	16,200 J	21,600

ANALYTE — REVIEW QUALIFIER — CONCENTRATION in mg/kg

N

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
mg/kg – MILLIGRAMS PER KILOGRAM
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PRG – PRELIMINARY REMEDIATION GOAL
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS

Analyte	PSC
IRON	23,000 mg/kg (Federal Residential PRG)
MANGANESE	1,800 mg/kg (Federal Residential PRG)

RI/FS Report for IR Site 35

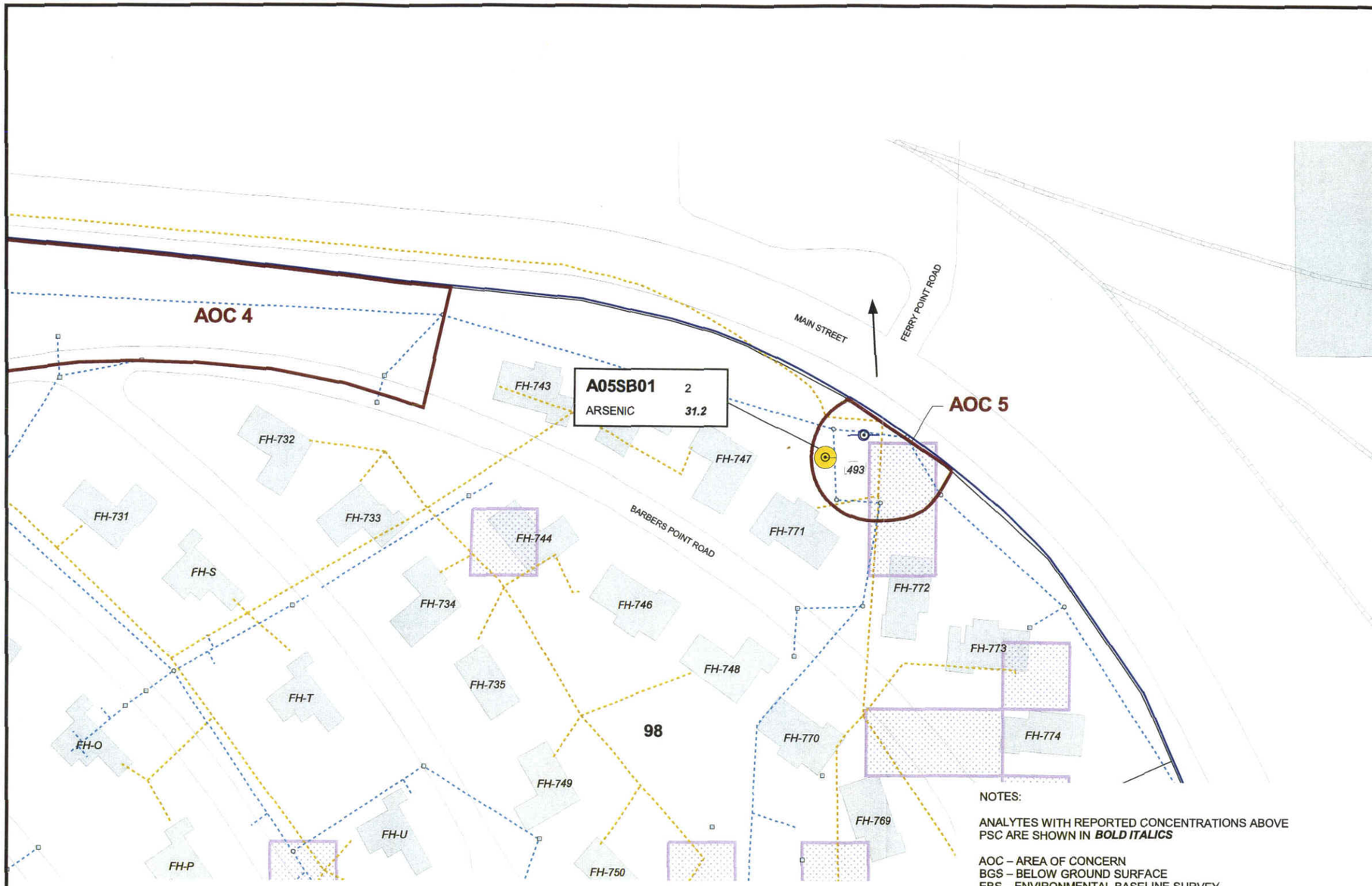
Figure 4-1

Soil Sampling Results for Analytes Above PSC – Area of Concern 5

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/30/06
File No.: 077L14482
Job No.: 23818-077
Rev No.: C



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- WATER
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- RI GROUNDWATER SAMPLING LOCATION

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC AND GREATER THAN BACKGROUND FOR :

- METALS

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :

- METALS

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

A05SB01 2
ARSENIC ***31.2***

ANALYTE — CONCENTRATION in µg/L

N

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
MCL – MAXIMUM CONTAMINAT LEVEL
µg/L – MICROGRAMS PER LITER
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

Analyte	PSC	Background 95th Percentile
ARSENIC	10 µg/L (Federal MCL)	20.72 µg/L

RI/FS Report for IR Site 35

Figure 4-2

Groundwater Sampling Results for Analytes Above PSC – Area of Concern 5

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/26/07
File No.: 077L14483
Job No.: 23818-077
Rev No.: D

TABLES

Table 3-1
Sample Analysis Summary, AOC 5

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE						
				VOCs	SVOCs	PAHs	Pest/PCBs	Metals	Arsenic	TDS
Soil										
K12	0040-WHA-0442	PAH TCRA	1.5–2			X				
L11	0040-WHA-5048	PAH TCRA	0–0.5						X	
L11	0040-WHA-5049 (FD)	PAH TCRA	0–0.5						X	
L11	0040-WHA-6051	PAH TCRA	0.5–2						X	
L11	0040-WHA-6052 (FD)	PAH TCRA	0.5–2						X	
L12	0040-WHA-0441	PAH TCRA	0.5–1			X				
A05SB01	C077S071	Site 35 RI	1–2	X	X	X	X	X		
A05SB01	C077S072	Site 35 RI	3–4	X	X	X	X	X		
A05SB01	C077S073	Site 35 RI	7–8	X	X	X	X	X		
A05SB02	C077S074	Site 35 RI	1–2	X	X	X	X	X		
A05SB02	C077S075	Site 35 RI	3–4	X	X	X	X	X		
A05SB02	C077S076	Site 35 RI	7–8	X	X	X	X	X		
A05SB03	C077S077	Site 35 RI	1–2	X	X	X	X	X		
A05SB03	C077S078	Site 35 RI	3–4	X	X	X	X	X		
A05SB03	C077S079	Site 35 RI	6.5–8	X	X	X	X	X		
A05SB04	C077S080	Site 35 RI	0.5–2	X	X	X	X	X		
A05SB04	C077S081	Site 35 RI	3–4	X	X	X	X	X		
A05SB04	C077S082	Site 35 RI	7–8	X	X	X	X	X		
Groundwater										
A05SB01	C077G031	Site 35 RI	2–12	X	X		X	X		X
A05SB01	C077G032 (FD)	Site 35 RI	2–12					X		
A05SB02	C077G033	Site 35 RI	2–12	X				X		X

Reference: PAH TCRA (FWEC 2004)

Acronyms/Abbreviations:

AOC – area of concern
bgs – below ground surface
FD – field duplicate
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
Pest – pesticides
RI – remedial investigation
SVOC – semivolatile organic compound
TCRA – time-critical removal action
TDS – total dissolved solids
VOC – volatile organic compound

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Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 5

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	Background (95th Percentile)
Volatile Organic Compounds (µg/kg)									
2-butanone	12	7	58	0	1.2	2.2	4.3	22,000,000	—[c]
carbon disulfide	12	7	58	0	1.4	4.9	12	360,000	—
4-methyl-2-pentanone	12	2	17	0	2.5	2.8	3	5,300,000	—
Semivolatile Organic Compounds (µg/kg)									
acenaphthene	14	8	57	0	3.2	9	20	3,700,000	—
acenaphthylene	14	8	57	No PSC	3.9	18	43	—	—
anthracene	14	11	79	0	1.6	36	91	22,000,000	—
benz(a)anthracene	14	11	79	0	30	230	650	620	—
benzo(b)fluoranthene	14	12	86	0	26	280	740	620	—
benzo(k)fluoranthene	14	12	86	0	12	150	590	380 [d]	—
benzo(g,h,i)perylene	14	12	86	No PSC	8.4	92	200	—	—
benzo(a)pyrene	14	12	86	0	17	200	550	62	—
bis(2-ethylhexyl)phthalate	12	1	8.3	0	72	72	72	35,000	—
butyl benzyl phthalate	12	1	8.3	0	150	150	150	12,000,000	—
chrysene	14	11	79	0	11	200	540	3,800 [d]	—
dibenz(a,h)anthracene	14	8	57	0	12	26	59	62	—
di-n-butyl phthalate	12	8	67	0	100	250	490	6,100,000	—
fluoranthene	14	12	86	0	16	300	790	2,300,000	—
fluorene	14	8	57	0	3	12	36	2,700,000	—
indeno(1,2,3-cd)pyrene	14	11	79	0	12	55	100	620	—
2-methylnaphthalene	12	10	83	No PSC	7.4	14	33	—	—
naphthalene	14	10	71	0	2.1	13	32	1,700 [d]	—
phenanthrene	14	12	86	No PSC	6.1	160	490	—	—
pyrene	14	13	93	0	2.3	350	890	2,300,000	—
Pesticides and Polychlorinated Biphenyls (µg/kg)									
alpha-chlordane	12	3	25	0	1.5	3	5.2	1,600	—
gamma-chlordane	12	4	33	0	1.5	2.6	4.5	1,600	—
4,4'-DDD	12	2	17	0	8	8.7	9.3	2,400	—
4,4'-DDE	12	3	25	0	1.5	4.4	10	1,700	—
4,4'-DDT	12	1	8.3	0	1.8	1.8	1.8	1,700	—
Metals (mg/kg)									
aluminum	12	12	100	0	6,200	9,500	13,000	76,000	13,960
arsenic	16	16	100	0	1.1	3.9	8.5	0.062 [d]	9.14
barium	12	12	100	0	28.4	67	112	5,400	93.68
beryllium	12	12	100	0	0.12	0.22	0.31	150	1.27
cadmium	12	10	83	0	0.05	0.22	0.53	37	1.72
calcium	12	12	100	No PSC	2,840	6,700	20,000	—	16,800
chromium	12	12	100	0	23.9	46	86.8	210	54.84
cobalt	12	12	100	0	5.5	8.9	13.7	900	14.30
copper	12	12	100	0	7.2	27	126	3,100	39.14
iron	12	12	100	2	14,100	20,000	38,200	23,000	22,280
lead	12	12	100	0	1.6	19	40.9	150 [d]	37.66
magnesium	12	12	100	No PSC	2,570	4,900	10,800	—	7,304
manganese	12	12	100	1	147	560	3,780	1,800	383.0

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 5

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	Background (95th Percentile)
mercury	12	9	75	0	0.03	0.08	0.14	23	0.52
nickel	12	12	100	0	23.4	44	84.4	1,600	55.72
potassium	12	12	100	No PSC	646	1,100	2,060	—	1,232
selenium	12	7	58	0	0.42	1.3	3.6	390	1.78
silver	12	8	67	0	0.04	0.15	0.2	390	2.22
sodium	12	2	17	No PSC	1,270	2,300	3,260	—	1,230
vanadium	12	12	100	0	29.9	38	69.1	78	47.34
zinc	12	12	100	0	23.1	53	78.6	23,000	67.48

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

Acronyms/Abbreviations:

AOC – area of concern
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criterion (PRG)

Table 4-2
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, AOC 5

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background	Minimum[a]	Average[a]	Maximum[a]	California MCL	Background (95th Percentile)
Volatile Organic Compounds (µg/L)									
acetone	2	2	100	No PSC	2.4	6.2	9.9	—[b]	—
2-butanone	2	1	50	No PSC	1.3	1.3	1.3	—	—
carbon disulfide	2	1	50	No PSC	1.2	1.2	1.2	—	—
toluene	2	1	50	0	0.21	0.21	0.21	150	—
Metals (µg/L)									
arsenic	3	3	100	2	5.8	22	31.2	10[c]	20.72
barium	3	3	100	0	20.1	54	109	1,000	569.5
cadmium	3	2	67	0	0.65	0.68	0.7	5	—
calcium	3	3	100	No PSC	371,000	380,000	403,000	—	—
chromium	3	3	100	0	2.1	4.7	6.4	50	12.45
cobalt	3	1	33	No PSC	3.5	3.5	3.5	—	—
copper	3	1	33	No PSC	1.7	1.7	1.7	—	24.03
iron	3	3	100	No PSC	60.3	17,000	28,500	—	6,586
magnesium	3	3	100	No PSC	93,900	260,000	568,000	—	—
manganese	3	3	100	No PSC	956	1,800	2,470	—	1,741
nickel	3	1	33	0	6.8	6.8	6.8	100	—
potassium	3	3	100	No PSC	52,200	84,000	145,000	—	—
selenium	3	3	100	0	13.2	18	21.6	50	8.58
sodium	3	3	100	No PSC	741,000	2,000,000	4,600,000	—	—
vanadium	3	3	100	No PSC	2.2	8.6	20.6	—	26.27
General Chemistry (µg/L)									
solids, total dissolved	2	2	100	No PSC	3,240,000	8,500,000	13,700,000	—	—

Notes:
- [a] data review qualifiers are not included in this table
- [b] dash indicates not applicable or not established
- [c] Federal MCL

Acronyms/Abbreviations:
- AOC – area of concern
- µg/L – micrograms per liter
- MCL – maximum contaminant level
- PSC – preliminary screening criterion (MCL)

Table 4-3
Soil Sampling Results, AOC 5

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID / Sample / [a]Depth Interval / Collection Date / Result Units	A05SB01 C077S071 1 - 2 15-Dec-05	A05SB01 C077S072 3 - 4 15-Dec-05	A05SB01 C077S073 7 - 8 15-Dec-05	A05SB02 C077S074 1 - 2 15-Dec-05	A05SB02 C077S075 3 - 4 15-Dec-05	A05SB02 C077S076 7 - 8 15-Dec-05	A05SB03 C077S077 1 - 2 15-Dec-05	A05SB03 C077S078 3 - 4 15-Dec-05	A05SB03 C077S079 6.5 - 8 15-Dec-05	A05SB04 C077S080 0.5 - 2 15-Dec-05	A05SB04 C077S081 3 - 4 15-Dec-05	A05SB04 C077S082 7 - 8 15-Dec-05
VOCs																	
2-butanone	22,000,000	—[b]	—	—	µg/kg	1.4 J	100 U	100 U	2.2 J	1.2 J	200 U	100 U	2.5 J	200 U	2.3 J	4.3 J	1.8 J
carbon disulfide	360,000	—	—	—	µg/kg	100 U	100 U	100 U	1.4 J	2.3 J	200 U	3.1 J	100 U	3.8 J	12 J	3.5 J	8.2 J
4-methyl-2-pentanone	5,300,000	—	—	—	µg/kg	20 U	30 U	20 U	2.5 J	20 U	30 U	20 U	20 U	30 U	3 J	20 U	20 U
SVOCs																	
acenaphthene	3,700,000	—	—	—	µg/kg	3.2 J	4 J	6 U	4.8 J	20	17	6 U	6 U	9 U	7.7	11	4.4 J
acenaphthylene	—	—	—	—	µg/kg	9.2	6 U	6 U	12	36	28	5 J	6 U	9 U	43	3.9 J	4.7 J
anthracene	22,000,000	—	—	—	µg/kg	13	11	6 U	24	46	80	4.2 J	1.6 J	9 UJ	91 J	82 J	22 J
benz(a)anthracene	620[c]	—	—	—	µg/kg	120 J	130 J	6 U	130 J	290 J	290 J	30 J	6 U	9 U	430 J	**650 J**[d]	200 J
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	140	250	6 U	210 J	420	370	56	26 J	9 U	540 J	**740**	210
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	48 J	54 J	6 U	200 J	130 J	130 J	12 J	17 J	9 U	**590 J**	330	98
benzo(g,h,i)perylene	—	—	—	—	µg/kg	64 J	49 J	6 UJ	64 J	200 J	160 J	32 J	8.4 J	9 UJ	110 J	190 J	74 J
benzo(a)pyrene	62[c]	—	—	—	µg/kg	**140**	**120**	6 U	**100**	**330**	**320**	57	17	9 U	**330**	**550**	**170**
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	300 U	400 U	400 U	700 U	72 J	500 U	300 U	300 U	500 U	300 U	300 U	300 U
butylbenzyl phthalate	12,000,000	—	—	—	µg/kg	300 U	400 U	400 U	700 U	300 U	500 U	300 U	300 U	500 UJ	150 J	300 UJ	300 UJ
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	110 J	120 J	6 U	110 J	280 J	280 J	11 J	6 U	9 U	370	540	160
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	28	12	6 U	10 U	25	21	6 U	6 U	9 U	29	59	15
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	100 J	400 U	330 J	700 U	300 U	230 J	300 U	110 J	490 J	160 J	390	180 J
fluoranthene	2,300,000	—	—	—	µg/kg	120 J	160 J	6 U	160 J	540 J	570 J	54 J	16 J	9 U	560	790	240
fluorene	2,700,000	—	—	—	µg/kg	3 J	3.1 J	6 U	6.2 J	19	12	6 U	6 U	9 U	36	12	3.7 J
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	32 J	24 J	6 UJ	23 J	100 J	76 J	12 J	6 UJ	9 UJ	67 J	100 J	41 J
2-methylnaphthalene	—	—	—	—	µg/kg	15 J	10 J	6 U	33 J	16 J	16 J	9 J	7.4 J	9 U	15 J	9.8 J	8.4 J
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	10	5 J	6 U	28	32	22	6.6	2.1 J	9 U	9.7	5.8	4.6 J
phenanthrene	—	—	—	—	µg/kg	61	62	6 U	77	250	300	18	6.1	9 U	490	380	100
pyrene	2,300,000	—	—	—	µg/kg	160 J	180 J	2.3 J	200 J	740 J	770 J	89 J	23 J	9 U	770	890	280
Pesticides/PCBs																	
alpha-chlordane	1,600	—	—	—	µg/kg	5 U	6 U	6 U	1.5 J	2.3 J	8 U	6 U	6 U	9 UJ	5 UJ	5.2 J	5 UJ
gamma-chlordane	1,600	—	—	—	µg/kg	5 U	6 U	6 U	1.8 J	2.7 J	1.5 J	6 U	6 U	9 UJ	5 UJ	4.5 J	5 UJ
4,4'-DDD	2,400	—	—	—	µg/kg	5 U	6 U	6 U	6 U	8	9.3	6 U	6 U	9 UJ	5 UJ	5 UJ	5 UJ
4,4'-DDE	1,700	—	—	—	µg/kg	5 U	6 U	6 U	6 U	10	1.6 J	6 U	6 U	9 UJ	5 UJ	1.5 J	5 UJ
4,4'-DDT	1,700	—	—	—	µg/kg	5 U	6 U	6 U	1.8 J	6 U	8 U	6 U	6 U	9 UJ	5 UJ	5 UJ	5 UJ
Metals																	
aluminum	76,000	—	—	13,960	mg/kg	9,720	9,780	6,200	13,000	8,450	11,800	9,260	10,100	12,300	7,310	7,510	8,230
arsenic	0.39	0.062	—	9.14	mg/kg	**4.4**	**3.7**	**6.3**	**8.5**	**3.6**	**5.7**	**2.2**	**6**	**3.8**	**3.4**	**3.2**	**3.2**
barium	5,400	—	—	93.68	mg/kg	66.6	45.9	*112*[e]	*96.1*	*96.5*	73.1	28.4	43.1	71	82.4	45	42.6
beryllium	150	—	—	1.27	mg/kg	0.22	0.31	0.13 J	0.25	0.22	0.25 J	0.12 J	0.25	0.29 J	0.18 J	0.18 J	0.2
cadmium	37	—	—	1.72	mg/kg	0.14 J	0.6 U	0.6 U	0.45 J	0.059 J	0.22 J	0.081 J	0.11 J	0.53 J	0.19 J	0.045 J	0.42 J
calcium	—	—	—	16,800	mg/kg	4,540	3,510	13,400	*20,000 J*	3,530 J	3,830	5,630	3,090	13,100	2,840	3,560	3,620
chromium	210	—	—	54.84	mg/kg	37	49.5	45.5	23.9	39.9	*58*	28.9	*63.3*	*86.8*	36.4	42.5	43.1
cobalt	900	—	—	14.30	mg/kg	7.9	8.2	5.5	13.1	7.8	10.9	6.8	11.1	13.7	7	7	7.6
copper	3,100	—	—	39.14	mg/kg	29.3	15.6	7.2	*126 J*	22 J	27.2	18.9	17.5	11.9	17.5	17.3	18.1
iron	23,000	—	—	22,280	mg/kg	17,200	16,600	20,300	***38,200 J***	16,200 J	21,600	17,400	19,300	***26,100***	15,300	14,100	15,900
lead	400	150	—	37.66	mg/kg	*40.9*	33.4	1.6	28 J	16.2 J	29.3	4.1	4	3.4	32.3	19.7	20

Table 4-3
Soil Sampling Results, AOC 5

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	A05SB01 C077S071 1 - 2 15-Dec-05	A05SB01 C077S072 3 - 4 15-Dec-05	A05SB01 C077S073 7 - 8 15-Dec-05	A05SB02 C077S074 1 - 2 15-Dec-05	A05SB02 C077S075 3 - 4 15-Dec-05	A05SB02 C077S076 7 - 8 15-Dec-05	A05SB03 C077S077 1 - 2 15-Dec-05	A05SB03 C077S078 3 - 4 15-Dec-05	A05SB03 C077S079 6.5 - 8 15-Dec-05	A05SB04 C077S080 0.5 - 2 15-Dec-05	A05SB04 C077S081 3 - 4 15-Dec-05	A05SB04 C077S082 7 - 8 15-Dec-05
Metals (continued)																	
magnesium	—	—	—	7,304	mg/kg	3,030	5,500	2,570	*9,610 J*	3,510 J	6,250	3,130	2,670	*10,800*	3,670	4,080	3,740
manganese	1800	—	—	383.0	mg/kg	234	208	147	*805 J*	222 J	149	281	294	***3,780***	191	164	195
mercury	23	—	—	0.52	mg/kg	0.12	0.14	0.1 U	0.11 J	0.066 UJ	0.2 UJ	0.072 J	0.025 J	0.065 J	0.065 J	0.064 J	0.065 J
nickel	1600	—	—	55.72	mg/kg	33.3	48.9	39.8	24.9	36.5	*59.5*	23.4	*60.2*	*84.4*	34.3	36.4	47.1
potassium	—	—	—	1,232	mg/kg	*1,310*	1,190	721	646	949	*1,640*	939	951	*2,060*	*1,300*	963	996
selenium	390	—	—	1.78	mg/kg	1	0.79	1.5	0.95 U	0.71 U	0.8 U	1.2	0.42 J	*3.6*	0.57 J	0.5 U	0.6 U
silver	390	—	—	2.22	mg/kg	0.044 J	0.16	0.13	0.1 U	0.1 U	0.2	0.2	0.1 U	0.2 U	0.11	0.2	0.13
sodium	—	—	—	1,230	mg/kg	241 U	173 U	335 U	307 U	349 U	*1,270*	212 U	303 U	*3,260*	191 U	189 U	372 U
vanadium	78	—	—	47.34	mg/kg	39.5	33.4	30.4	*69.1*	30.6	43.3	36.8	37.2	41.6	31.1	29.9	30.4
zinc	23000	—	—	67.48	mg/kg	*76*	61.7	23.1	*76.2 J*	50.5 J	*78.6*	30.9	33.6	*71.8*	52.9	43.8	41.5

Table 4-3
Soil Sampling Results, AOC 5

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	K12 0040-WHA-0442 1.5 - 2 24-Apr-03	L11 (Topsoil 1) 0040-WHA-5048 0 - 0.5 03-Jul-03	L11 (Topsoil 2) 0040-WHA-5049 0 - 0.5 03-Jul-03	L11 (Backfill 1) 0040-WHA-6051 0.5 - 2 03-Jul-03	L11 (Backfill 2) 0040-WHA-6052 0.5 - 2 03-Jul-03	L12 0040-WHA-0441 0.5 - 1 24-Apr-03
VOCs											
2-butanone	22,000,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
4-methyl-2-pentanone	5,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
SVOCs											
acenaphthene	3,700,000	—	—	—	µg/kg	27 U	NA	NA	NA	NA	56 U
acenaphthylene	—	—	—	—	µg/kg	27 U	NA	NA	NA	NA	56 U
anthracene	22,000,000	—	—	—	µg/kg	16 J	NA	NA	NA	NA	56 U
benz(a)anthracene	620[c]	—	—	—	µg/kg	100	NA	NA	NA	NA	130
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	210 J	NA	NA	NA	NA	240 J
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	110 J	NA	NA	NA	NA	99 J
benzo(g,h,i)perylene	—	—	—	—	µg/kg	75 J	NA	NA	NA	NA	79 J
benzo(a)pyrene	62[c]	—	—	—	µg/kg	**140 J**	NA	NA	NA	NA	**180 J**
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
butylbenzyl phthalate	12,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	110	NA	NA	NA	NA	140
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	16 J	NA	NA	NA	NA	56 UJ
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	160	NA	NA	NA	NA	190
fluorene	2,700,000	—	—	—	µg/kg	27 U	NA	NA	NA	NA	56 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	64 J	NA	NA	NA	NA	62 J
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	27 U	NA	NA	NA	NA	56 U
phenanthrene	—	—	—	—	µg/kg	72	NA	NA	NA	NA	87
pyrene	2,300,000	—	—	—	µg/kg	230	NA	NA	NA	NA	270
Pesticides/PCBs											
alpha-chlordane	1,600	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
gamma-chlordane	1,600	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
4,4'-DDD	2,400	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
4,4'-DDE	1,700	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
4,4'-DDT	1,700	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Metals											
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	**1.2**	**1.1**	**4.1**	**2.7**	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	mg/kg	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 5

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	K12 0040-WHA-0442 1.5 - 2 24-Apr-03	L11 (Topsoil 1) 0040-WHA-5048 0 - 0.5 03-Jul-03	L11 (Topsoil 2) 0040-WHA-5049 0 - 0.5 03-Jul-03	L11 (Backfill 1) 0040-WHA-6051 0.5 - 2 03-Jul-03	L11 (Backfill 2) 0040-WHA-6052 0.5 - 2 03-Jul-03	L12 0040-WHA-0441 0.5 - 1 24-Apr-03
Metals (continued)											
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA
manganese	1800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	mg/kg	NA	NA	NA	NA	NA	NA
nickel	1600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	mg/kg	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	mg/kg	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA
zinc	23000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[d] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL
[e] italicized font indicates result above background

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
Cal – California
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-4
Groundwater Sampling Results, AOC 5

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	Groundwater TPH ESL	Background	Result Units	Station ID: A05SB01 Sample: C077G031 [a]Depth Interval: 2 - 12 Collection Date: 16-Dec-05	A05SB01 C077G032 (FD) 2 - 12 16-Dec-05	A05SB02 C077G033 2 - 12 16-Dec-05
VOCs								
acetone	—[b]	—	—	—	µg/L	2.4	NA	9.9
2-butanone	—	—	—	—	µg/L	2 U	NA	1.3 J
carbon disulfide	—	—	—	—	µg/L	0.5 U	NA	1.2
toluene	1,000	150	—	—	µg/L	0.5 U	NA	0.21 J
SVOCs						ND	NA	NA
Pesticides/PCBs						ND	NA	NA
Metals								
arsenic	10	50	—	20.72	µg/L	*31.2* [c,d]	*29.1*	5.8
barium	2,000	1,000	—	569.5	µg/L	31.5	20.1	109
cadmium	5	5	—	—	µg/L	0.7 J	5 U	0.65 J
calcium	—	—	—	—	µg/L	403,000	375,000	371,000
chromium	100	50	—	12.45	µg/L	6.4	5.6	2.1 J
cobalt	—	—	—	—	µg/L	5 U	5 U	3.5 J
copper	—	—	—	24.03	µg/L	5 U	5 U	1.7 J
iron	—	—	—	6,586	µg/L	*28,500*	*23,000*	60.3
magnesium	—	—	—	—	µg/L	121,000	93,900	568,000
manganese	—	—	—	1,741	µg/L	*2,470*	*1,910*	956
nickel	—	100	—	—	µg/L	5 U	5 U	6.8
potassium	—	—	—	—	µg/L	54,700	52,200	145,000
selenium	50	50	—	8.58	µg/L	*18.9*	*13.2*	*21.6*
sodium	—	—	—	—	µg/L	807,000	741,000	4,600,000
vanadium	—	—	—	26.27	µg/L	2.2 J	3 J	20.6
General Chemistry								
solids, total dissolved	—	—	—	—	µg/L	3,240,000	NA	13,700,000

Table 4-4
Groundwater Sampling Results, AOC 5

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

[c] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL

[d] italicized font indicates result above background

Acronyms/Abbreviations:

AOC – area of concern
Cal – California
ESL – environmental screening level
(San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/L – micrograms per liter
MCL – maximum contaminant level
NA – not analyzed
ND – not detected
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:

J – indicates an estimated value
U – indicates the compound or analyte was analyzed for,
but was not detected above the stated detection limit

Table 6-1
Tier 1 Evaluation Results by Exposure Group, AOC 5

Exposure Group [a]	Cancer Risk	Hazard Index
1. All soil and groundwater exposure pathways		
Total [b]	5E-03	12
Without metals below background	4E-03	10
2. Exposure pathways for soil and vapors from VOCs in groundwater		
Total [b]	1E-04	6
Without metals below background	4E-07	5
3. Exposure pathways for residential use of groundwater		
Total [b]	4E-03	6
Without metals below background	4E-03	6

Notes:
[a] PAHs are not included
[b] includes all COPCs

Acronyms/Abbreviations:
AOC – area of concern
COPC – chemical of potential concern
PAH – polynuclear aromatic hydrocarbon
VOC – volatile organic compound

Table 6-2
Tier 1 Evaluation Results by Risk Driver, AOC 5

Study Area	Analyte Name	TOTAL		WITHOUT BACKGROUND	
		Hazard Quotient	Cancer Risk	Hazard Quotient	Cancer Risk
AOC 5					
Soil					
	arsenic	—*	1E-04	—	—
	cadmium	0.3	—	—	—
	iron	2	—	2	—
	lead	0.3	—	—	—
	manganese	2	—	2	—
	vanadium	0.9	—	0.9	—
	Total for soil	**6**	**1E-04**	**5**	**4E-07**
Groundwater					
	arsenic	—	4E-03	—	4E-03
	iron	3	—	3	—
	manganese	3	—	3	—
	vanadium	0.6	—	—	—
	Total for groundwater	**6**	**4E-03**	**6**	**4E-03**
	Total for soil and groundwater	**12**	**5E-03**	**10**	**4E-03**

Note:
* dash indicates not applicable

Acronym/Abbreviation:
AOC – area of concern

Table 7-1
Summary of RI Results and Recommendations, AOC 5

DQO Problem	DQO Decision Questions	Nature and Extent	Tier 1 Risk Evaluation	Recommendation
The sampling plan for AOC 5 addressed possible releases from a sewage lift station housed in Building 493, which is located in an area historically used for housing. Soil samples collected in AOC 5 during the 2002 PAH study contained PAH concentrations above the PSC; soil from this area was removed as part of a PAH TCRA. Although PAH concentrations at AOC 5 have been mitigated, samples were not collected adjacent to the sewage lift station housed in Building 493, and groundwater was not assessed. The regulatory agencies have requested the collection of soil and groundwater samples at AOC 5 to assess whether soil and groundwater have been impacted by possible releases from the sewage lift station.	Have the nature and extent of contamination been defined?	Yes. There is no evidence of contaminant releases from sewage lift station. Elevated concentrations of metals in soil are naturally occurring. Elevated concentrations of metals in groundwater are indicative of reducing conditions.	NA	No further action.
	Are contaminants present in soil or groundwater at concentrations that pose unacceptable risk to potential future residents?	NA	Total cancer risk without metals below background is 4×10^{-3} with an HI of 10, due to metals in soil and groundwater. The metals in soil are naturally occurring. The metals in groundwater result from dissolution of the naturally occurring metals present in soil.	No further action.
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?	NA	NA	NA

Acronyms/Abbreviations:
AOC – area of concern
DQO – data quality objective
HI – hazard index
NA – not applicable
PAH – polynuclear aromatic hydrocarbon
RI – remedial investigation
TCRA – time-critical removal action
TDS – total dissolved solids

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ATTACHMENT F

AREA OF CONCERN 6

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL
REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT
ATTACHMENT F, AREA OF CONCERN 6
IR SITE 35, TRANSFER PARCEL EDC-5
ALAMEDA POINT
ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

Prepared by:

BECHTEL ENVIRONMENTAL, INC.
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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 6. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station Alameda), Alameda, California (Figure 1-1).

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

AOC 6 is an approximately 0.2-acre area in the north-central portion of Transfer Parcel Economic Development Conveyance (EDC)-5 (Figure 1-1). The study area consists of a parking area, grassy open spaces where buildings were formerly located, and Building 553. AOC 6 was the location of a spill of oil containing polychlorinated biphenyls (PCBs). The PCB-impacted soil was removed, and no confirmation soil samples were collected. Information on the exact location, area, and depth of excavation, and the volume of removed soil is not available. There was no visible evidence of the removal action at AOC 6 during a site visit by Bechtel Environmental, Inc., in August 2005.

1.2 HISTORICAL USE

AOC 6 is completely within Environmental Baseline Survey (EBS) Parcel 87, immediately southwest of the intersection of Seattle Road and Pan Am Way. Historical uses of EBS Parcel 87 included officers' quarters and housing (Building 85, demolished in 1968), an electrical substation (Building 553, still present and maintained by Alameda Power and Telecom, Photographs 1-1 and 1-2), and a parking lot. Stains associated with vehicle parking are present in the parking area (BEI 2005b). A portion of Building 85 was formerly located in AOC 6; Building 553 is entirely within AOC 6.

The EBS reported that a transformer located on a fenced pad adjacent to the west side of Building 553 ruptured in 1986 due to overheating. An unknown quantity of oil containing PCBs sprayed from the transformer approximately 15 feet to the west onto grass, trees, and fencing (IT 2001a). Cleanup was performed and contaminated material was removed; however, no confirmation samples were collected. The area and depth of the excavation are unknown.

1.3 PRELIMINARY SCREENING CRITERIA

Preliminary screening criteria (PSCs) used in this discussion and in the following sections are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this AOC are the following:

- residential preliminary remediation goals (PRGs) (U.S. EPA 2004b), except polynuclear aromatic hydrocarbons (PAHs) classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (µg/kg) (DON 2001a)

Photograph 1-1
Building 553, View to East

Photograph 1-2
Building 553, View to West

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being assessed. Chemicals of potential concern (COPCs) identified in the health risk evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs.

1.4 PREVIOUS INVESTIGATION

The PAH time-critical removal action (TCRA) was the only investigation that included the sampling and analysis of soil at AOC 6 (FWEC 2004). The PAH TCRA included the collection of nine soil samples at two locations in AOC 6. No PAH removals were conducted at EBS Parcel 87 or AOC 6; however, four soil borings (U33, U34, V33, and V34) were advanced in AOC 6 as part of the TCRA activities. Samples were collected from these borings at four depth intervals between 0 and 8 feet below ground surface (bgs) and analyzed for PAHs. Locations sampled in AOC 6 are shown on Figure 1-1. B(a)P equivalent concentrations reported in soil samples at depths between 0 and 8 feet bgs from each of these locations were above the PSC (620 µg/kg).

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Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, and geology at AOC 6.

Topography at AOC 6 is relatively flat. The average ground elevation at AOC 6, based on elevation data from the six borings (A06SB01 through A06SB06) advanced during the RI is 9 feet above mean sea level (MSL). Groundwater was not encountered during drilling, and groundwater samples were not collected during the RI.

The groundwater monitoring well nearest to AOC 6 is M08-04, located approximately 900 feet southwest of AOC 6. A review of groundwater depths in this well over time (September 1991 through April 2004) shows depth to water from approximately 3 to 6.5 feet bgs. The deepest historical groundwater measured in this well is approximately 3 feet MSL. This value, if subtracted from the ground elevation at AOC 6, would suggest depth to water in the vicinity of this AOC may have been as great as 6 feet bgs.

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is northwest at AOC 6. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Based on tidal studies performed at other Alameda Point sites, tidal influence would not be expected at AOC 6, located approximately 900 feet from Oakland Inner Harbor. Results of tidal studies at nearby sites (discussed in Section 2 of the main RI/FS Report) indicated a minimal effect on groundwater elevations in the fill material at the inland well, located approximately 200 feet from Oakland Inner Harbor (BEI 2004a).

Soil encountered in the six RI borings consisted of silt and silt with sand to about 1 foot bgs, underlain by silty sand to about 2 feet bgs. Poorly graded sand was encountered beneath the silty sand extending to total boring depth (the six borings extended to 4 feet bgs). One exception was boring A06SB04, where mostly fine-grained sediment (silt with sand) extended slightly deeper (to about 2 feet bgs) and was underlain by poorly graded sand to total boring depth. Fine-grained bay sediment (Young Bay Mud) was not encountered in the borings; however, based on observed lithology in borings north and south of AOC 6, it is estimated that the Young Bay Mud beneath AOC 6 is at approximately 9 feet bgs (see cross section H-H′ on Figure 2-9 of the main RI/FS Report).

As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust may be located beneath AOC 6; however, it was not encountered in borings advanced to 4 feet bgs during the RI.

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Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for AOC 6. The RI was conducted in accordance with the sitewide data quality objectives (DQOs) for AOCs presented in Table 3-1 of the main RI/FS Report.

3.1 APPROACH

RI sampling at AOC 6 addressed possible PCBs in soil. Although PAH concentrations were above PSCs at locations near AOC 6, an adequate number of samples already exists to support the RI/FS for this area; therefore, no further samples were proposed for PAH analysis. PCB-containing oil was reported to have sprayed out approximately 15 feet towards the west from an electrical substation at AOC 6. Although cleanup was performed and contaminated material was removed (the substation pad was removed by 1990), no confirmation samples were collected. Therefore, soil samples were proposed west of Building 553 to assess whether PCBs remain in soil at concentrations above PSCs.

3.2 SCOPE

Soil samples were collected during the 2005 RI from six borings west of Building 553; two soil samples were collected from each boring and were analyzed for PCBs. Groundwater samples were not deemed necessary at AOC 6. Table 3-1 summarizes samples collected during the RI and previous investigations. Figure 1-1 shows sampling locations from all investigations.

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Section 4

NATURE AND EXTENT OF CONTAMINATION

This section discusses sampling and analysis from previous investigations and from the RI, and describes the concentration ranges and spatial distributions of the analytes identified at AOC 6. Soil samples were collected from ten locations during the PAH TCRA (FWEC 2004) and the RI (Table 3-1 and Figure 4-1). Results are illustrated on Figure 4-1. Statistical summaries of soil results are presented in Table 4-1, and soil analytical results are summarized in Table 4-2. Complete analytical results for historical and RI samples collected within AOC 6 are included in Appendices B and G, respectively.

Analytical soil sampling results are discussed for each class of chemicals investigated at AOC 6.

4.1 POLYNUCLEAR AROMATIC HYDROCARBONS

PAHs were reported in soil samples from borings U33, U34, V33, and V34. B(a)P equivalent concentrations in these soil samples (depths from 0 to 0.5, 2 to 4, and 4 to 8 feet bgs) ranged from 690 to 8,300 µg/kg. These concentrations were above the PSC (620 µg/kg). These exceedances were incorporated into the PAH Areas (Attachment W).

4.2 POLYCHLORINATED BIPHENYLS

Aroclor 1260 was the only PCB reported at concentrations above the PSC. Aroclor 1260 was reported at a concentration of 430 J µg/kg at 0.5 foot bgs from boring A06SB03. This concentration was above the PSC (residential PRG of 220 µg/kg). Aroclor 1260 was reported at a concentration of 65 J µg/kg at 2 to 2.5 feet bgs from boring A06SB03. (The "J" qualifier indicates the value is estimated.) This concentration was below the PSC.

The western extent of Aroclor 1260 is not defined to below PSCs; however, concentrations would be expected to be lower west of boring A06SB03 because the PCB-containing oil sprayed out towards the west from the electrical substation at AOC 6. RI samples defined the vertical extent of Aroclor 1260 to below the PSC.

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Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for AOC 6. It discusses the conceptual site model, the physical and chemical changes that might occur to contaminants present at AOC 6, and the mechanisms that could potentially transfer the contaminants from the study area. The conceptual site model facilitates understanding of the present AOC conditions by integrating AOC-specific physical characteristics with the nature and extent of contaminants in the physical system. Section 5.2 includes an evaluation of the mobility and persistence of compounds above PSCs not attributable to background and of risk drivers identified at AOC 6. Section 5.3 discusses potential migration pathways.

5.1 AOC 6 CONCEPTUAL SITE MODEL

AOC 6 is located in the north-central portion of Transfer Parcel EDC-5. The study area is flat and most of it is covered with grass. The remaining areas of AOC 6 are covered with asphalt and Building 553. The nearest surface water is Oakland Inner Harbor, approximately 900 feet north of AOC 6.

Based on a review of RI borings logs for AOC 6, the subsurface lithology consists of silt and silt with sand underlain by poorly graded sand to about 4 feet bgs (the maximum depth explored during the RI). Groundwater was not encountered during drilling but is expected to occur within the fill material at a maximum of 6 feet bgs, with flow to the northwest. The underlying Young Bay Mud is expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. The western extent of the Marsh Crust may be located beneath AOC 6; however, it was not encountered in the RI borings. No tidal influence is expected at AOC 6 because of its distance from Oakland Inner Harbor. Although it is considered unlikely that groundwater beneath AOC 6 would be used as a drinking water source, United States Environmental Protection Agency (U.S. EPA) has classified the first water-bearing zone in this area as a Class II aquifer.

PAHs and Aroclor 1260 were reported in soil at concentrations above PSCs. One soil sample collected from A06SB03 at 0.5 to 1 foot bgs had a reported Aroclor 1260 concentration of 430 J µg/kg, above the PSC. The deeper soil sample from this same location had a reported concentration of 65 J µg/kg, indicating that the vertical extent of Aroclor 1260 in soil is defined to concentrations below the PSC. Soil samples to the east, north, and south of A06SB03 had Aroclor 1260 concentrations below the PSC. Soil samples defining the western extent of PCBs in soil were not collected; however, because of the direction of the PCB-containing oil spray, concentrations of PCBs in the soil are expected to decrease towards the west. PAH exceedances are addressed in the PAH Areas (Attachment W). Groundwater samples were not collected at AOC 6.

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in the environment tends to remain in place. The tendency toward immobility and

persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Section 5 of the main RI/FS Report discusses the physical and chemical properties of contaminants, and their chemical class (e.g., PCBs) that affect their transport and persistence in the environment. Also discussed in Section 5 of the main RI/FS Report are mobility and persistence of PAHs. This section discusses the mobility and persistence of Aroclor 1260.

The most important property of PCBs in relation to mobility and persistence is their general inertness, as they resist both acids and alkalis and have thermal stability. PCBs have large molecular structures and typically bind to soil based on their size and physical characteristics. PCBs have high organic carbon partition coefficient values, causing them to be relatively immobile and resistant to transformation processes that can degrade some chemicals, causing them to persist in soil. Table 5-1 provides estimates of mobility and persistence for Aroclor 1260. Geotechnical samples were not collected from AOC 6; therefore, the fraction organic carbon for the soil samples collected from 0.5 to 2 feet bgs at AOC 17 (closest geotechnical soil sample from a similar soil interval as the Aroclor 1260 concentrations at AOC 6) was used in the estimate. The low solubility and mobility exhibited by this compound retard its migration to groundwater as indicated by the estimate that all of Aroclor 1260 will remain sorbed to soil.

Two mechanisms allow PCBs to change in the environment: degradation and weathering. Under normal conditions, PCBs degrade slowly in soil with degradation occurring more rapidly in anaerobic systems than in aerobic systems. Aroclors are mixtures of PCB congeners whose names reflect the percent chlorine (by weight) of the mixture; Aroclor 1260 is 60 percent chlorine by weight. The more chlorinated mixtures are the most persistent and toxic. Individual congeners present in the Aroclor 1260 mixture are subject to different rates of microbial degradation. Microbial degradation depends on the position of the chlorine atom on the biphenyl molecule and the degree of chlorination. Higher chlorinated congeners (those with five or more chlorine atoms) are more persistent in the environment and are not readily transformed by bacteria. Approximately 99 percent of the Aroclor 1260 mixture consists of congeners with five or more chlorine atoms (ATSDR 2000).

5.3 CONTAMINANT MIGRATION

The potential migration pathways considered for AOC 6 include atmospheric transport (vapors and airborne fugitive dust) and transport by surface water runoff. Groundwater transport was not considered because groundwater samples were not collected and there is no reason to believe that activities at the AOC have impacted groundwater. Additionally, migration of Aroclor 1260 from soil to groundwater in the subsurface caused by infiltrating water or a fluctuating groundwater table is an unlikely mechanism for transport because Aroclor 1260 exhibits low mobility in soil and low water solubility.

Significant transport pathways were not identified at AOC 6 for the following reasons.

- Atmospheric transport of volatile PAHs (i.e., naphthalene and benzo[g,h,i]perylene) from soil is not considered significant because concentrations of these analytes were below PSCs.

- Particulate dispersion (either as fugitive dust or surface water) is not a primary transport mechanism because AOC 6 in covered by pavement, a building, and grass. However, if the surface cover at the AOC is disturbed or removed during and after redevelopment, particulate dispersion from soil is considered a possible transport pathway for nonvolatile compounds in surface soil.

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Section 6
TIER 1 EVALUATION

This section summarizes the Tier 1 risk evaluation results for AOC 6. In a Tier 1 evaluation, risk for a residential exposure scenario is assessed with the assumption that no remedial action would take place at the study area. This section also presents a qualitative uncertainty evaluation that identifies and characterizes the effects of uncertainties on the risk results.

A Tier 1 evaluation is a screening-level approach that calculates total cumulative risk values using published risk-based guidelines from the U.S. EPA, California Environmental Protection Agency (Cal/EPA), and San Francisco Bay Regional Water Quality Control Board. The Tier 1 evaluation includes all chemicals identified in at least one sample except for PAHs in soil. PAHs in soil are not included because site-specific remediation goals for PAHs are being developed and are discussed in Attachment W. The approach used to estimate risk is described in Section 6 of the main RI/FS Report. Tier 1 information is provided in Appendix J.

Cancer risk and noncancer values for AOC 6 are shown in Table 6-1. Risk drivers for cancer and noncancer risk are presented in Table 6-2.

6.1 COPC IDENTIFICATION

The data selection and identification of COPCs are based on a compilation of all usable data for soil. In accordance with the Work Plan (BEI 2006), no groundwater data were collected. All chemicals reported in at least one sample collected during the RI and/or included in the historical data were included as Tier 1 COPCs.

In soil at AOC 6, there is one Tier 1 COPC, the PCB Aroclor 1260, identified in 3 of 12 samples.

6.2 RISK CHARACTERIZATION

The cancer risk was calculated using the Tier 1 protocol from Cal/EPA (2005). The maximum concentration of each COPC in soil was compared with a risk-based guideline to estimate cancer risks for AOC 6. One result is presented for only one exposure group, which is the total risk since groundwater and metals data were deemed not necessary. The only COPC identified is classified as a carcinogen; therefore, noncancer hazard was not calculated. The hazard index is not calculated since there are no COPCs with noncancer health effects.

The total cancer risk of 5×10^{-6} at AOC 6 is based on exposure pathways for soil only (Exposure Group 2).

The total cancer risk for soil is within the risk management range. The cancer risk above 1×10^{-6} is associated with a PCB, Aroclor 1260, identified in 3 of 12 samples at concentrations of 430, 120, and 65 µg/kg. There are no COPCs with noncancer health effects guidelines; therefore, a hazard index was not calculated.

6.3 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation are representative of any potential health concerns at AOC 6. The results are consistent with

the site history and previous investigations. Twelve soil samples is considered adequate for this approximately 0.2-acre site.

6.4 CONCLUSIONS

Because groundwater data were deemed unnecessary, only Exposure Group 2 results were calculated. For reasonable future uses, the cancer risk is 5×10^{-6}. The cancer risk above 10^{-6} is due to a PCB, Aroclor 1260, identified in 3 of 12 samples. In accordance with the Work Plan (BEI 2006), samples were not analyzed for metals.

Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at AOC 6, including the nature and extent of contamination and results of the Tier 1 risk evaluation. Results form the basis of responses to the DQO decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendations presented below.

7.1 SUMMARY

The RI for AOC 6 assessed whether PCBs remain in soil west of Building 553, where a PCB removal had been performed. PCB-containing oil had sprayed out towards the west from an electrical substation housed in this structure. Although cleanup was performed and contaminated material was removed, no confirmation samples were collected.

The primary chemical reported at AOC 6 is Aroclor 1260 in soil, which was reported in 1 of 12 samples above the PSC. Groundwater data was not deemed necessary. While the extent of Aroclor 1260 was not defined to concentrations below the PSC, the western extent is likely limited because PCB-containing oil had sprayed out towards the west from an electrical substation at AOC 6.

B(a)P equivalent concentrations in soil above the PSC are discussed as part of the PAH Areas (Attachment W). Results of the Tier 1 risk evaluation show a total cancer risk for soil of 5×10^{-6} (within the risk management range). Because there is only one COPC, Aroclor 1260, which has not been assigned a reference dose, a hazard index has not been calculated.

7.2 AOC 6 CONCLUSIONS AND RECOMMENDATIONS

The RI was conducted using the seven-step U.S. EPA DQO process (U.S. EPA 2000); DQOs were developed for AOC 6 in the Work Plan (BEI 2006). The RI has addressed these DQOs, as summarized in Table 7-1.

Data collected during the RI and previous investigations sufficiently characterized the nature and extent of PCBs to perform a Tier 1 risk evaluation and support decisions on the necessity for remedial actions at AOC 6.

Confirmation sampling is recommended at AOC 6 to define the western extent of PCBs (Aroclor 1260) in soil.

No further investigation of PAHs in soil is recommended since PAHs will be addressed as part of the PAH Areas (Attachment W).

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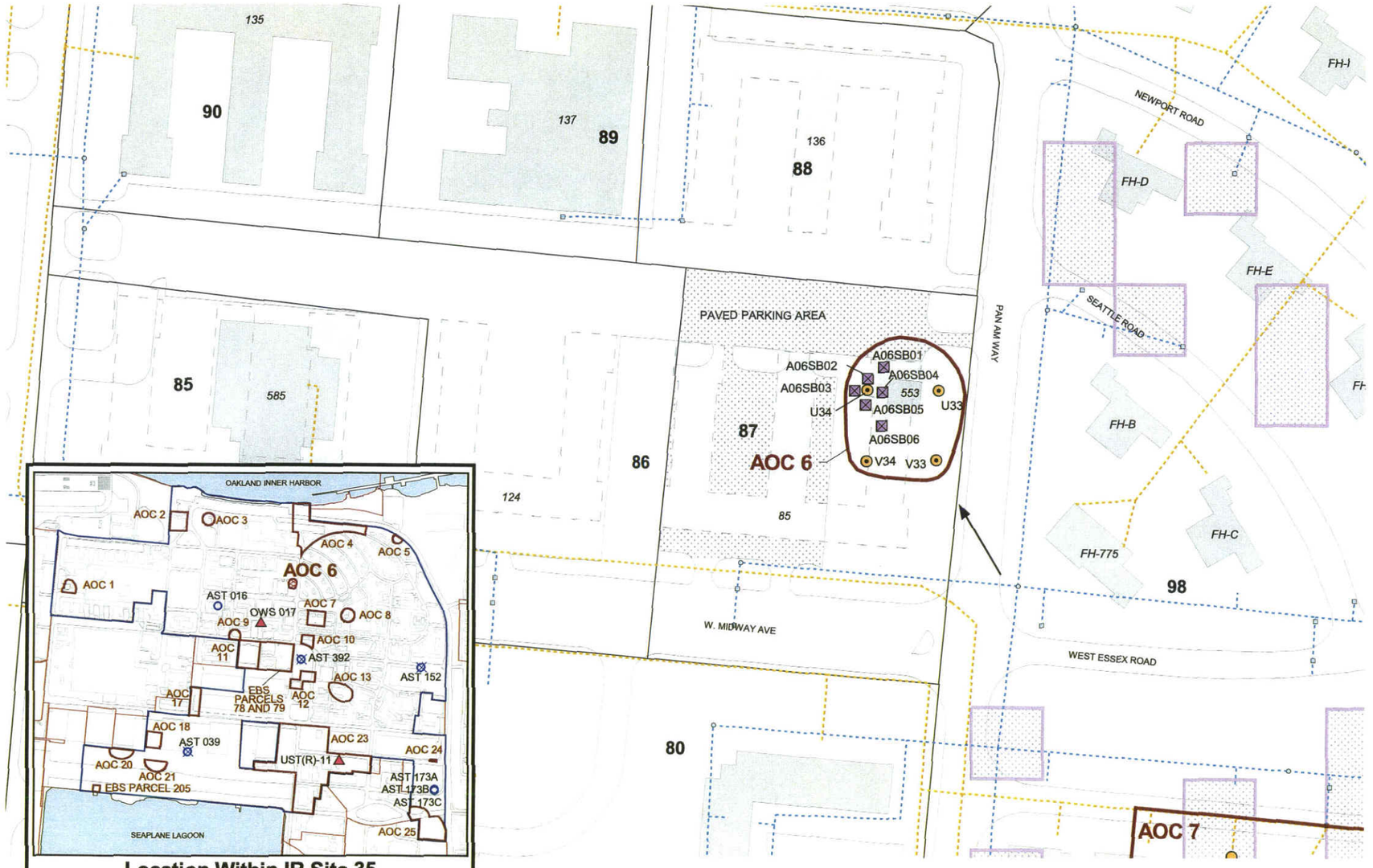
FIGURES



Location Within IR Site 35

1500 0 1500 Feet

LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

N

PAH REMOVAL ACTION SOIL SAMPLING LOCATION WITH STATION ID
- SVOCs ANALYSIS ONLY

RI SOIL SAMPLING LOCATION WITH STATION ID
- PESTICIDES/PCBs ANALYSES ONLY

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK

100 0 100 Feet

RI/FS Report for IR Site 35

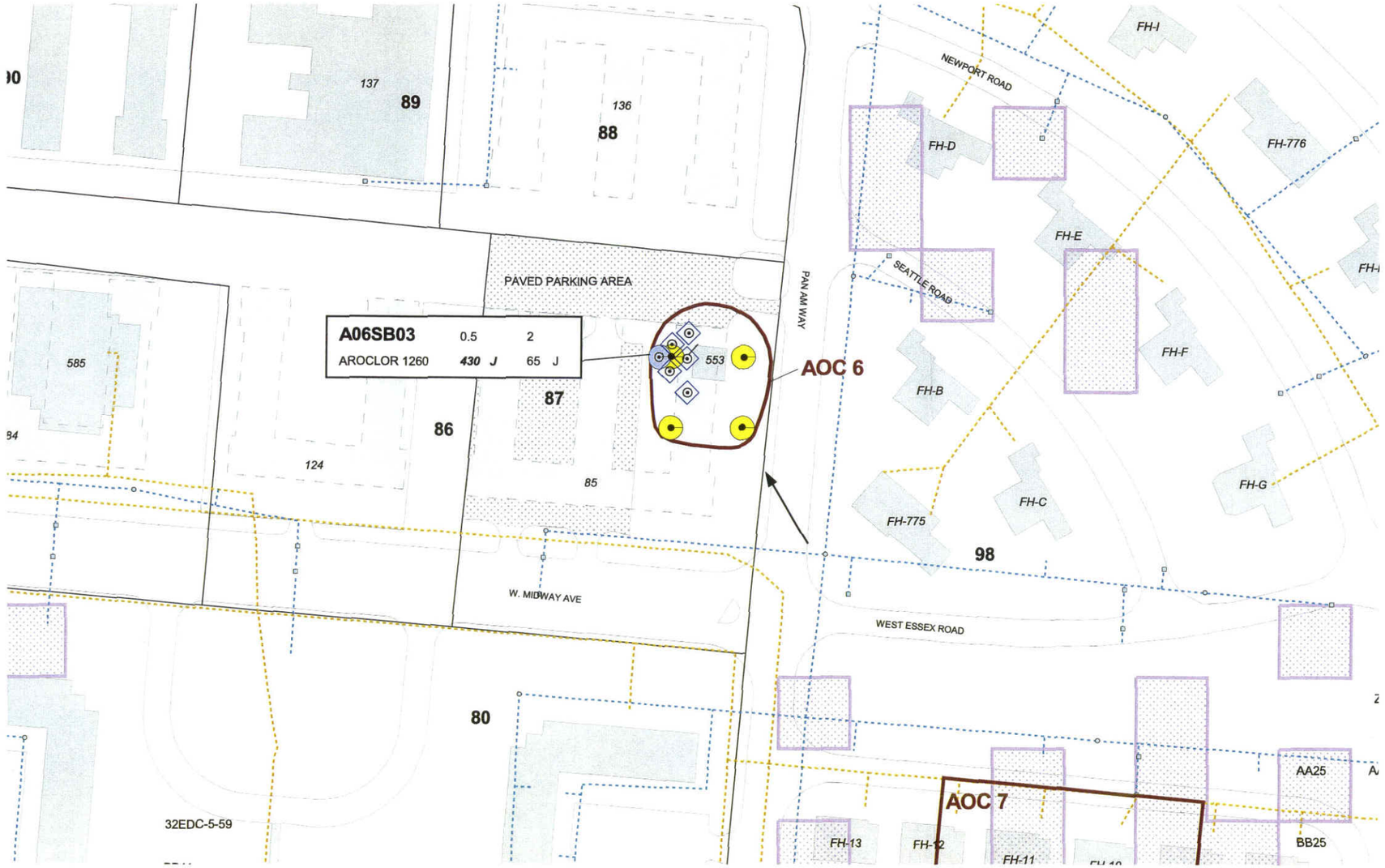
Figure 1-1

Study Area and Sampling Locations
Area of Concern 6

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/30/06
File No.: 077L14448
Job No.: 23818-077
Rev No.: C



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- HISTORICAL SOIL SAMPLING LOCATION
- RI SOIL SAMPLING LOCATION

N

SOIL SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC FOR :

- PESTICIDES/PCBs
- BENZO(A)PYRENE EQUIVALENT (SEE ATTACHMENT W, PAH AREAS, FOR ADDITIONAL INFORMATION AND CONCENTRATIONS)

SOIL SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :

- PESTICIDES/PCBs

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

A06SB03	0.5	2
AROCLOR 1260	***430 J***	65 J

ANALYTE — REVIEW QUALIFIER — CONCENTRATION in µg/kg

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
µg/kg – MICROGRAMS PER KILOGRAM
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
PRG – PRELIMINARY REMEDIATION GOAL
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

Analyte	PSC
AROCLOR 1260	220 µg/kg (Federal Residential PRG)

RI/FS Report for IR Site 35

Figure 4-1

Soil Sampling Results for Analytes Above PSC – Area of Concern 6

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/30/06
File No.: 077L14484
Job No.: 23818-077
Rev No.: C

TABLES

Table 3-1
Sample Analysis Summary, AOC 6

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE	
				PAHs	PCBs
Soil					
U33	0040-WHA-1363	PAH TCRA	0–0.5	X	
U33	0040-WHA-1364	PAH TCRA	0.5–2	X	
U33	0040-WHA-1365	PAH TCRA	2–4	X	
U33	0040-WHA-1366	PAH TCRA	4–8	X	
U33	0040-WHA-1367 (FD)	PAH TCRA	4–8	X	
U34	0040-WHA-1359	PAH TCRA	0–0.5	X	
U34	0040-WHA-1360	PAH TCRA	0.5–2	X	
U34	0040-WHA-1361	PAH TCRA	2–4	X	
U34	0040-WHA-1362	PAH TCRA	4–8	X	
V33	0040-WHA-1368	PAH TCRA	0–0.5	X	
V33	0040-WHA-1369	PAH TCRA	0.5–2	X	
V33	0040-WHA-1370	PAH TCRA	2–4	X	
V33	0040-WHA-1371	PAH TCRA	4–8	X	
V34	0040-WHA-1354	PAH TCRA	0–0.5	X	
V34	0040-WHA-1355	PAH TCRA	0.5–2	X	
V34	0040-WHA-1356	PAH TCRA	2–4	X	
V34	0040-WHA-1358 (FD)	PAH TCRA	2–4	X	
V34	0040-WHA-1357	PAH TCRA	4–8	X	
A06SB01	C077S091	Site 35 RI	1.5–2		X
A06SB01	C077S092	Site 35 RI	3.5–4		X
A06SB02	C077S093	Site 35 RI	1–1.5		X
A06SB02	C077S094	Site 35 RI	2.5–3		X
A06SB03	C077S095	Site 35 RI	0.5–1		X
A06SB03	C077S096	Site 35 RI	2–2.5		X
A06SB04	C077S097	Site 35 RI	1.5–2		X
A06SB04	C077S098	Site 35 RI	3.5–4		X
A06SB05	C077S099	Site 35 RI	1.5–2		X
A06SB05	C077S100	Site 35 RI	3.5–4		X
A06SB06	C077S101	Site 35 RI	0.5–1		X
A06SB06	C077S102	Site 35 RI	2–2.5		X

Reference: PAH TCRA (FWEC 2004)

Acronyms/Abbreviations:
- AOC – area of concern
- bgs – below ground surface
- FD – field duplicate
- PAH – polynuclear aromatic hydrocarbon
- PCB – polychlorinated biphenyl
- RI – remedial investigation
- TCRA – time-critical removal action

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 6

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG
Semivolatile Organic Compounds (µg/kg)								
acenaphthene	18	18	100	0	2.2	65	640	3,700,000
acenaphthylene	18	18	100	No PSC	6.6	160	1,400	—[c]
anthracene	18	18	100	0	12	260	2,500	22,000,000
benz(a)anthracene	18	18	100	0	37	590	4,700	620
benzo(b)fluoranthene	18	18	100	0	35	550	3,500	620
benzo(k)fluoranthene	18	18	100	0	35	500	4,300	380 [d]
benzo(g,h,i)perylene	18	18	100	No PSC	51	640	4,400	—
benzo(a)pyrene	18	18	100	0	58	790	6,200	62
chrysene	18	18	100	0	41	680	5,400	3,800 [d]
dibenz(a,h)anthracene	18	18	100	0	9	120	880	62
fluoranthene	18	18	100	0	110	1,800	16,000	2,300,000
fluorene	18	17	94	0	2.8	96	920	2,700,000
indeno(1,2,3-cd)pyrene	18	18	100	0	42	530	3,600	620
2-methylnaphthalene	18	7	39	No PSC	2.5	37	160	—
naphthalene	18	18	100	0	2.7	28	240	1,700 [d]
phenanthrene	18	18	100	No PSC	70	1,200	12,000	—
pyrene	18	18	100	0	100	1,700	14,000	2,300,000
Pesticides and PCBs (µg/kg)								
Aroclor 1260	12	3	25	1	65	210	430	220

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

Acronyms/Abbreviations:

AOC – area of concern
µg/kg – micrograms per kilogram
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion (PRG)

Table 4-2
Soil Sampling Results, AOC 6

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: A06SB01	A06SB01	A06SB02	A06SB02	A06SB03	A06SB03	A06SB04	A06SB04	A06SB05	A06SB05	A06SB06	A06SB06
Sample:						C077S091	C077S092	C077S093	C077S094	C077S095	C077S096	C077S097	C077S098	C077S099	C077S100	C077S101	C077S102
[a] Depth Interval:						1.5 - 2	3.5 - 4	1 - 1.5	2.5 - 3	0.5 - 1	2 - 2.5	1.5 - 2	3.5 - 4	1.5 - 2	3.5 - 4	0.5 - 1	2 - 2.5
Collection Date:						15-Dec-05	15-Dec-05	15-Dec-05	15-Dec-05	15-Dec-05	15-Dec-05	15-Dec-05	15-Dec-05	15-Dec-05	15-Dec-05	15-Dec-05	15-Dec-05
SVOCs																	
acenaphthene	3,700,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs																	
Aroclor 1260	220	—	—	—	µg/kg	100 UJ	100 UJ	120 J	100 UJ	**430 J**	65 J	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ

Table 4-2
Soil Sampling Results, AOC 6

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	U33 0040-WHA-1363 0 - 0.5 11-Jul-03	U33 0040-WHA-1364 0.5 - 2 11-Jul-03	U33 0040-WHA-1365 2 - 4 11-Jul-03	U33 0040-WHA-1366 4 - 8 11-Jul-03	U33 0040-WHA-1367 (FD) 4 - 8 11-Jul-03	U34 0040-WHA-1359 0 - 0.5 11-Jul-03	U34 0040-WHA-1360 0.5 - 2 11-Jul-03	U34 0040-WHA-1361 2 - 4 11-Jul-03	U34 0040-WHA-1362 4 - 8 11-Jul-03
SVOCs														
acenaphthene	3,700,000	—[b]	—	—	µg/kg	8.7	13	110 J	7.3 J	6 J	12 J	4.5 J	640 J	60 J
acenaphthylene	—	—	—	—	µg/kg	19	32	350	21 J	12	56	20	1,400	88 J
anthracene	22,000,000	—	—	—	µg/kg	26	43	590	32	17	54	20	2,500	170
benz(a)anthracene	620[c]	—	—	—	µg/kg	310	200	**1,200**[d]	87	37	270	110	**4,700**	330
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	**640**	280	**930**	86	35	530	170	**3,500**	270
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	230	80	**1,100**	83	35	190	54	**4,300**	310
benzo(g,h,i)perylene	—	—	—	—	µg/kg	470	210	1,200	130	51	500	130	4,400	460
benzo(a)pyrene	62[c]	—	—	—	µg/kg	**500**	**250**	**1,600 J**	**140 J**	58 J	**410**	**140**	**6,200 J**	**490 J**
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	420	220	1,300	94	41	370	120	**5,400**	360
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	**110**	34	**250**	20 J	9	**76**	20	**880**	**100 J**
fluoranthene	2,300,000	—	—	—	µg/kg	440	400	4,000 J	320 J	110 J	530	210	16,000 J	1,000 J
fluorene	2,700,000	—	—	—	µg/kg	8.6	14	210	7.3 J	7.5	15 J	5.3 J	920	53 J
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	490	200	**980**	99	42	410	110	**3,600**	360
2-methylnaphthalene	—	—	—	—	µg/kg	3.6 J	2.5 J	44 J	29 U	5.9 U	27 U	10 U	160	150 U
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	6.3	5.8	61	4.8 J	4.6 J	20 J	4.8 J	240	21 J
phenanthrene	—	—	—	—	µg/kg	210	250	2,700	150	95	250	110	12,000	700
pyrene	2,300,000	—	—	—	µg/kg	510	490	3,500 J	240 J	100 J	640	270	14,000 J	890 J
Pesticides/PCBs														
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 6

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	V33 0040-WHA-1368 0 - 0.5 11-Jul-03	V33 0040-WHA-1369 0.5 - 2 11-Jul-03	V33 0040-WHA-1370 2 - 4 11-Jul-03	V33 0040-WHA-1371 4 - 8 11-Jul-03	V34 0040-WHA-1354 0 - 0.5 11-Jul-03	V34 0040-WHA-1355 0.5 - 2 11-Jul-03	V34 0040-WHA-1356 2 - 4 11-Jul-03	V34 0040-WHA-1357 4 - 8 11-Jul-03	V34 0040-WHA-1358 (FD) 2 - 4 11-Jul-03
SVOCs														
acenaphthene	3,700,000	—[b]	—	—	µg/kg	66	2.2 J	35 J	29 J	5 J	18	60 J	30 J	56 J
acenaphthylene	—	—	—	—	µg/kg	26	11	220	11 J	6.6	81	340	20 J	120
anthracene	22,000,000	—	—	—	µg/kg	70	12	360	15 J	13	110	420	28 J	160
benz(a)anthracene	620[c]	—	—	—	µg/kg	330	76	**870**	48	110	500	**930**	84	510
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	460	100	**760**	54	210	610	**720**	75	480
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	140	37	**840**	47	75	190	**820**	84	**410**
benzo(g,h,i)perylene	—	—	—	—	µg/kg	350	83	1,000	84	170	440	990	120	700
benzo(a)pyrene	62[c]	—	—	—	µg/kg	**420**	**95**	**1,300 J**	**84 J**	**170**	**590**	**1,200 J**	**130 J**	**490 J**
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	390	86	1,000	54	160	510	1,000	93	550
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	50	18	**210**	13 J	25	**67**	**230**	20 J	**110**
fluoranthene	2,300,000	—	—	—	µg/kg	820	160	2,900 J	160 J	250	1,000	3,200 J	290 J	1,100 J
fluorene	2,700,000	—	—	—	µg/kg	28	2.8 J	99	29 U	4.8 J	32	170	7.7 J	44 J
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	330	76	**810**	64	160	420	**810**	91	530
2-methylnaphthalene	—	—	—	—	µg/kg	3.3 J	5.1 U	59 U	29 U	5.2 U	3.8 J	44 J	30 U	56 U
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	6.1	2.7 J	32 J	4.5 J	5.2	13	46 J	4.8 J	19 J
phenanthrene	—	—	—	—	µg/kg	590	70	1,600	74	120	590	2,200	140	570
pyrene	2,300,000	—	—	—	µg/kg	950	200	2,700 J	120 J	280	1,300	2,700 J	210 J	1,300 J
Pesticides/PCBs														
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[d] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/kg – micrograms per kilogram
NA – not analyzed
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons

Table 5-1
Estimates of Mobility and Persistence for Aroclor 1260, AOC 6

Analyte	K_{oc} (L/kg)	f_{oc}	Percent Sorbed[a]	Half-Life in Soil (years)[b]
Aroclor 1260	3.47E+05	0.0064	100	4.1E+05

Notes:
[a] percent sorbed = $[K_{oc}f_{oc} / (1+K_{oc}f_{oc})] \times 100$
[b] for microbially mediated degradation in soil (Howard et al. 1991)

Acronyms/Abbreviations:
f_{oc} – fraction organic carbon; value for surface soils classified silty sand at AOC 6
K_{oc} – organic carbon partition coefficient
L/kg – liters per kilogram

Table 6-1
Tier 1 Evaluation Results by Exposure Group, AOC 6

Exposure Group [a]	Cancer Risk	Hazard Index
1. All soil and groundwater exposure pathways		
Total [b]	NG	NG
Without metals below background	NG	NG
2. Exposure pathways for soil and vapors from VOCs in groundwater		
Total [b]	5E-06	NC
Without metals below background	NM	NM
3. Exposure pathways for residential use of groundwater		
Total [b]	NG	NG
Without metals below background	NG	NG

Notes:
[a] PAHs are not included
[b] includes all COPCs

Acronyms/Abbreviations:
AOC – area of concern
COPC – chemical of potential concern
NC – not calculated (no COPCs in this group)
NG – no groundwater data
NM – no metals data
PAH – polynuclear aromatic hydrocarbon
VOC – volatile organic compound

Table 6-2
Tier 1 Evaluation Results by Risk Driver, AOC 6

Study Area	Analyte Name	TOTAL		WITHOUT BACKGROUND	
		Hazard Quotient	Cancer Risk	Hazard Quotient	Cancer Risk
AOC 6					
Soil					
	Aroclor 1260	—*	5E-06	—	5E-06
	Total for soil	**0**	**5E-06**	**0**	**5E-06**

Note:
* dash indicates not applicable

Acronym/Abbreviation:
AOC – area of concern

Table 7-1
Summary of RI Results and Recommendations, AOC 6

DQO Problem	DQO Decision Questions	Nature and Extent	Tier 1 Risk Evaluation	Recommendation
PCB-containing oil sprayed out approximately 15 feet towards the west from an electrical substation at AOC 6. Although cleanup was performed and contaminated material was removed (the substation pad was removed by 1990), no confirmation samples were collected.	Have the nature and extent of contamination been defined?	Yes, except at one outer location (A06SB03), where nature and extent are only partially defined laterally. The definition is considered adequate for performing a risk evaluation and supporting decisions on the necessity for remedial actions at AOC 6.	NA	Confirmation sampling is recommended at AOC 6 to define the western extent of PCBs (Aroclor 1260) in soil.
	Are contaminants present in soil or groundwater at concentrations that pose unacceptable risk to potential future residents?	NA	No, total cancer risk for soil is 5×10^{-6}, within the risk management range. Based on fate and transport characteristics, PCBs would not be expected to be dissolved in groundwater at AOC 6.	No further action.
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?	NA	NA. Pathway was not evaluated for AOC 6, located approximately 900 feet from the nearest surface water body.	No further action.

Acronyms/Abbreviations:
AOC – area of concern
DQO – data quality objective
NA – not applicable
PCB – polychlorinated biphenyl
RI – remedial investigation

ATTACHMENT G

AREA OF CONCERN 7

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT ATTACHMENT G, AREA OF CONCERN 7 IR SITE 35, TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

Prepared by:

BECHTEL ENVIRONMENTAL, INC.
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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 7. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station Alameda), Alameda, California (Figure 1-1).

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

AOC 7 is an approximately 0.9-acre area in the central portion of Transfer Parcel Economic Development Conveyance (EDC)-5 (Figure 1-1) and in the southwestern portion of Environmental Baseline Survey (EBS) Parcel 98 just southeast of the intersection of Pan Am Way and Pensacola Lane. AOC 7 contains portions of Buildings FH-9 and FH-12, and all of the Buildings FH-10, FH-11, and FH-278. Buildings FH-9, FH-10, FH-11, and FH-12 are currently occupied by tenants; Building FH-278 is a high-voltage electrical substation. AOC 7 also includes open space that is either landscaped or paved for vehicle parking.

1.2 HISTORICAL USE

The portion of Parcel 98 covered by AOC 7 may have historically been used as a location for family housing, temporary barracks, and open space for vehicle parking, storage activities associated with maintenance operations, drum storage, and recreation (Photograph 1-1). It is not known which of these outdoor activities occurred specifically in AOC 7.

1.3 PRELIMINARY SCREENING CRITERIA AND BACKGROUND METALS

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this AOC are the following:

- residential soil preliminary remediation goals (PRGs) (U.S. EPA 2004b), except polynuclear aromatic hydrocarbons (PAHs) classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (µg/kg) (DON 2001a)
- environmental screening levels for total petroleum hydrocarbons (TPH) – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being assessed. Chemicals of potential concern (COPCs) identified in the health risk evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs.

Photograph 1-1
AOC 7, General View to Northeast

In addition to the PSCs, metals concentrations in soil at AOC 7 were compared to the following Alameda Point background concentrations to help discriminate between site-related and naturally occurring metals:

- Alameda Point background soil concentrations (95th percentile of the pink data set; Appendix E of the final RI Report of Operable Unit [OU] 1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)

For ease of discussion in this report, the Alameda Point 95th percentile concentrations for metals in soil (pink background data set) and groundwater are referred to as "background."

1.4 PREVIOUS INVESTIGATIONS

During two investigations at AOC 7, soil samples were collected at AOC 7, and results of these investigations are summarized below. Locations sampled in AOC 7 are shown on Figure 1-1. Analytical results for these soil samples provided in Appendix B.

1.4.1 Operable Unit 5 Addendum

Samples were collected in Transfer Parcel EDC-5 as part of the OU-5 Addendum activities conducted in 2001 in support of the OU-5 RI (IT 2001b). Twenty-four soil samples were collected from six locations in the transfer parcel; one of these borings (098-010) was located in AOC 7. Samples were collected from this boring at depth

intervals between 2 and 8 feet below ground surface (bgs) and analyzed for PAHs. Soil collected from the boring at 6 to 8 feet bgs had a B(a)P equivalent concentration of 25,000 µg/kg that was above the PSC (620 µg/kg).

1.4.2 Polynuclear Aromatic Hydrocarbon Removal Action

PAH time-critical removal action (TCRA) soil removals in the West Housing Area were conducted using a grid pattern at several EBS parcels, including an area of EBS Parcel 98 in AOC 7 (FWEC 2004). Soil was removed to a depth of approximately 2 feet bgs from certain grid areas to address elevated concentrations of PAHs. The excavations were backfilled using clean fill material. Locations of the removals at AOC 7 are shown on Figure 1-1.

As part of the TCRA, 12 soil borings were advanced in AOC 7 (BB27 through 30, CC27 through 30, and DD27 through 30). Soil samples collected from these borings were analyzed for one or more of the following analytes: volatile organic compounds (VOCs), TPH, PAHs, pesticides, polychlorinated biphenyls (PCBs), and metals. Only laboratory results for soil samples collected outside of or below the TCRA excavations were reviewed for this report, and PAH analytical results are summarized below.

VOCs, diesel- and gasoline-range TPH, and pesticides were not reported above laboratory detection limits. Motor oil–range TPH was reported at concentrations below the PSC. Metals were reported at concentrations below PSCs, except arsenic. Arsenic was reported above the PSC (PRG of 0.062 milligrams per kilogram [mg/kg]), but the maximum concentration of 5.1 mg/kg was below the background concentration of 9.14 mg/kg. Other reported metals were also below background. Soil collected at depths of 1 to 1.5 and 1.5 to 2 feet bgs from borings CC27 and BB30, respectively, had reported B(a)P equivalent concentrations of 980 and 780 µg/kg, respectively, that were above the PSC (620 µg/kg). Aroclor 1254 concentrations in soil from these two samples (320 and 300 µg/kg, respectively) were also above the PSC (220 µg/kg). Aroclor 1254 was not reported at concentrations above laboratory detection limits in samples from other borings (BB27, BB29, CC28, and CC30) in the area.

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Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, and geology at AOC 7.

Topography at AOC 7 is relatively flat at about 12 feet above mean sea level. This elevation was estimated based on elevations measured at nearby AOCs 8 and 10. Drilling was not conducted at AOC 7 during the RI; however, groundwater was encountered from about 5 to 7.5 feet bgs in nearby borings advanced during the 2002 PAH study (BEI 2005a).

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is northwest at AOC 7. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Based on tidal studies performed at other Alameda Point sites, tidal influence would not be expected at AOC 7, located approximately 1,300 feet from Oakland Inner Harbor. Results of tidal studies at nearby sites (see Section 2 of the main RI/FS Report) indicated a minimal effect on groundwater elevations in the fill material at the inland well, located approximately 200 feet from Oakland Inner Harbor (BEI 2004a).

Borings logs from adjacent borings 32-EDC-5-85 and 32-EDC-5-96 located to the west and east of the site, respectively, advanced during the 2002 PAH study (BEI 2005a) were reviewed for lithology in this area. Fill material (sand and silty sand) was encountered in both borings (to a depth of 5 feet bgs west of AOC 7 and 7.5 feet to the east). Fill material was underlain by fine-grained bay sediment (Young Bay Mud) and extended to the total depth of the borings (8 and 8.5 feet bgs). RI boring logs are presented in Appendix D. The Young Bay Mud is estimated to be approximately 5 feet bgs as shown on cross section H-H′ on Figure 2-9 of the main RI/FS Report. As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust is likely to be located beneath AOC 7.

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Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

AOC 7 was established to address PAH and PCB concentrations reported in soil. No additional soil sampling and no groundwater sampling were conducted at AOC 7 because the Navy and regulatory agencies agreed that there were sufficient existing analytical results to support a risk evaluation and decisions on the necessity for remedial actions. Results from previous investigations presented in Section 1.4 provide the basis for the discussion of contaminant nature and extent in the conceptual site model in Section 5. Table 3-1 provides a summary of sampling conducted during previous investigations.

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Section 4
NATURE AND EXTENT OF CONTAMINATION

No sampling was conducted for the RI at AOC 7 because the Navy and regulatory agencies agreed that existing analytical results were sufficient. Historical sampling and analytical results are presented in Section 1.4. Table 4-1 presents a statistical summary of soil samples; groundwater samples were not collected at AOC 7. Table 4-2 summarizes the analytical results for soil. Figure 4-1 shows soil results above PSCs.

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Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for AOC 7. It discusses the conceptual site model, the physical and chemical changes that might occur to contaminants present at AOC 7, and the mechanisms that could potentially transfer the contaminants from the study area. The conceptual site model facilitates understanding of the present AOC conditions by integrating AOC-specific physical characteristics with the nature and extent of contaminants in the physical system. Section 5.2 includes an evaluation of the mobility and persistence of compounds above PSCs not attributable to background and of risk drivers identified at AOC 7. Section 5.3 discusses potential migration pathways.

5.1 AOC 7 CONCEPTUAL SITE MODEL

AOC 7 is an approximately 0.9-acre area in the central portion of Transfer Parcel EDC-5. The area is flat and is a mix of open space that is either landscaped or paved for vehicle parking, and areas covered by building structures (portions of Buildings FH-9 and FH-12, and all of Buildings FH-10, FH-11, and FH-278). Buildings FH-9, FH-10, FH-11, and FH-12 are currently occupied by tenants; Building FH-278 is a high-voltage electrical substation. The nearest surface water is Oakland Inner Harbor, approximately 1,300 feet north of AOC 7.

Based on review of boring logs for locations adjacent to AOC 7, the subsurface lithology in the area consists of coarse-grained fill material (sand and silty sand) to about 5 to 7.5 feet bgs that is underlain by Young Bay Mud extending to the total depth of the borings (8 and 8.5 feet bgs). Drilling was not conducted at AOC 7 during the RI; however, groundwater was encountered from about 5 to 7.5 feet bgs in nearby borings advanced during the 2002 PAH study. Groundwater is expected to occur within the fill material with flow to the northwest. The underlying Young Bay Mud is expected to be an aquitard that inhibits hydraulic communication with deeper water-bearing zones. The Marsh Crust is likely to be located beneath AOC 7 (SWDIV 2001), although it was not encountered in AOC 7 borings. Negligible tidal influence is expected at AOC 7 because of its distance from Oakland Inner Harbor.

PAHs and Aroclor 1254 were reported in soil at concentrations above PSCs. Three soil samples had B(a)P equivalent concentrations above the PSC: one soil sample from boring 098-010 at 6 to 8 foot bgs, and two surface soil samples from borings BB30 and CC27. The two soil samples collected from between 1 and 2 feet bgs also had reported concentrations of Aroclor 1254 above the PSC. Both sampling locations (BB30 and CC27) are surrounded by other surface samples without PAHs or PCB concentrations above PSCs, thereby defining the lateral extent. PAH exceedances are addressed in the PAH Areas (Attachment W). Groundwater samples were not collected at AOC 7.

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in

the environment tends to remain in place. The tendency toward immobility and persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Section 5 of the main RI/FS Report discusses the physical and chemical properties of contaminants, and their chemical class (e.g., PCBs), that affect their transport and persistence in the environment. Also discussed in Section 5 of the main RI/FS Report are mobility and persistence of PAHs. This section discusses the mobility and persistence of Aroclor 1254.

The most important property of PCBs in relation to mobility and persistence is their general inertness, as they resist both acids and alkalis and have thermal stability. PCBs have large molecular structures and typically bind to soil based on their size and physical characteristics. PCBs have high organic carbon partition coefficient values, causing them to be relatively immobile and resistant to transformation processes that can degrade some chemicals, resulting in their persistence in soil. Table 5-1 provides estimates of mobility and persistence for Aroclor 1254. Geotechnical samples were not collected from AOC 7; therefore, the fraction organic carbon for the soil samples collected from 0.5 to 2.0 feet bgs at AOC 17 (closest geotechnical soil sample from a similar soil interval as the Aroclor 1254 concentrations at AOC 7) was used in the estimate. The low solubility and mobility exhibited by this compound retard its migration to groundwater as indicated by the estimate (Table 5-1) that all of Aroclor 1254 will remain sorbed to soil.

Two mechanisms allow PCBs to change in the environment: degradation and weathering. Under normal conditions, PCBs degrade slowly in soil with degradation occurring more rapidly in anaerobic systems than in aerobic systems. Aroclors are mixtures of PCB congeners whose names reflect the percent chlorine (by weight) of the mixture; Aroclor 1254 is 54 percent chlorine by weight. The more chlorinated mixtures are the most persistent and toxic. Individual congeners present in the Aroclor 1254 mixture are subject to different rates of microbial degradation. Microbial degradation depends on the position of the chlorine atom on the biphenyl molecule and the degree of chlorination. Higher chlorinated congeners (those with five or more chlorine atoms) are more persistent in the environment and are not readily transformed by bacteria. Between 88 and 95 percent (by weight) of the Aroclor 1254 mixture, depending on the manufacturer, consists of congeners with five or more chlorine atoms (ATSDR 2000).

5.3 CONTAMINANT MIGRATION

The potential migration pathways considered for this AOC include atmospheric transport (i.e., vapors and airborne fugitive dust) and transport by surface water runoff. Groundwater transport was not considered because migration of Aroclor 1254 from soil to groundwater in the subsurface caused by infiltrating water or a fluctuating groundwater table is an unlikely mechanism for transport due to the chemical's low mobility in soil and low water solubility.

Significant transport pathways were not identified at AOC 7 for the following reasons.

- Atmospheric transport of volatile PAHs (e.g., benzo[g,h,i]perylene) from soil is not considered significant because concentrations of these analytes were below

PSCs. No VOCs were reported above laboratory detection limits in samples from AOC 7.

- Particulate dispersion (either as fugitive dust or surface water) is not a primary transport mechanism because AOC 7 is covered by pavement, buildings, and grass. However, if the surface cover at the AOC is disturbed or removed during and after redevelopment, particulate dispersion from soil is considered a possible transport pathway for nonvolatile compounds in surface soil.

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Section 6
TIER 1 EVALUATION

This section summarizes the Tier 1 risk evaluation results for AOC 7. In a Tier 1 evaluation, risk for a residential exposure scenario is assessed with the assumption that no remedial action would take place at the study area. This section also presents a qualitative uncertainty evaluation that identifies and characterizes the effects of uncertainties on the risk results.

A Tier 1 evaluation is a screening-level approach that calculates total cumulative risk values using published risk-based guidelines from the United States Environmental Protection Agency (U.S. EPA), California Environmental Protection Agency (Cal/EPA), and San Francisco Bay Regional Water Quality Control Board. The Tier 1 evaluation includes all chemicals identified in at least one sample except for PAHs in soil. PAHs in soil are not included because site-specific remediation goals for PAHs are being developed and are discussed in Attachment W. The approach used to estimate risk is described in Section 6 of the main RI/FS Report. Tier 1 information is provided in Appendix J.

Cancer risk and noncancer values for AOC 7 are shown in Table 6-1. Risk drivers for cancer and noncancer risk are presented in Table 6-2.

6.1 COPC IDENTIFICATION

The data selection and identification of COPCs are based on a compilation of all usable data for soil. In accordance with the Work Plan (BEI 2006), no groundwater samples were collected because the Navy and regulatory agencies agreed that existing analytical results were sufficient. All chemicals reported in at least one sample collected and/or included in the historical data were included as Tier 1 COPCs.

In soil at AOC 7, there are 13 Tier 1 COPCs: 11 metals based on 2 samples except arsenic based on 18 samples, and 2 PCBs (Aroclor 1254 and Aroclor 1260) based on 18 samples.

6.2 RISK CHARACTERIZATION

The cancer risk and noncancer hazard values were calculated using the Tier 1 protocol from Cal/EPA (2005). The maximum concentration of each COPC in soil was compared with a risk-based guideline to estimate cancer and noncancer risks. Since groundwater samples were not collected, two results are presented for one exposure group, the total risk and a second value that does not include risk associated with metals concentrations that are below background.

At AOC 7, the cancer risks of 9×10^{-5} (total) and 4×10^{-6} (without metals below background) are based on exposure pathways for soil only (Exposure Group 2). Without metals below background, there are no COPCs with noncancer health effects guidelines; therefore, a hazard index (HI) was not calculated.

The cancer risk above 10^{-6} without metals below background is largely due to Aroclor 1254 reported in 2 of 18 samples.

6.3 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation are representative of any potential health concerns at AOC 7. The results are consistent with the site history and previous investigations. Eighteen soil samples is considered adequate for this approximately 0.9-acre site.

6.4 CONCLUSIONS

For AOC 7, total cancer risk and noncancer HI including metals below background are 9×10^{-5} and less than 1, respectively, for Exposure Group 2.

Because groundwater data were deemed unnecessary, only Exposure Group 2 results were calculated. For reasonable future use, the cancer risk without metals below background at AOC 7 is 4×10^{-6} due to a PCB, Aroclor 1254, reported in 2 of 18 samples. There are no COPCs with noncancer health effect guidelines when metals below background are eliminated.

Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at AOC 7, including the nature and extent of contamination and results of the Tier 1 risk evaluation. Results form the basis of responses to the data quality objective (DQO) decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendations presented below.

7.1 SUMMARY

No sampling was conducted at AOC 7 for the 2005 RI because the Navy and regulatory agencies agreed that the existing analytical results were sufficient. The primary chemical reported at AOC 7 is Aroclor 1254 in soil, which was reported in 2 of 18 samples, the lateral extent of which appears limited to two areas (BB30 and CC27) based on nearby sampling results.

B(a)P equivalent concentrations in soil above the PSC are addressed under the PAH Areas (Attachment W). Results of the Tier 1 risk evaluation show a total cancer risk for soil of 9×10^{-5}; the noncancer HI is less than 1. Cancer risk, excluding metals at concentrations below background, is 4×10^{-6}. All reported metals concentrations were below background. There are no COPCs with noncancer health effects guidelines when metals below background are eliminated.

7.2 AOC 7 CONCLUSIONS AND RECOMMENDATIONS

The RI was conducted using the seven-step U.S. EPA DQO process (U.S. EPA 2000); DQOs were developed for AOC 7 in the Work Plan (BEI 2006). Data from previous investigations and Tier 1 risk results have adequately addressed DQOs, as summarized in Table 7-1. Sampling was not conducted during the RI; however, previous investigations were sufficient to support the Tier 1 risk evaluation and decisions on the necessity for remedial action at AOC 7.

Further evaluation of the extent of PCBs (Aroclor 1254), metals, and PAHs in soil is not recommended for the following reasons.

- Cancer risk associated with Aroclor 1254 in soil is within the risk management range of 10^{-6} to 10^{-4}.
- Groundwater impacts are not a concern because PCBs in soil are generally not soluble or mobile and not expected to readily migrate to groundwater.
- All reported metals concentrations were below background.
- PAHs are addressed as part of the PAH Areas (Attachment W).

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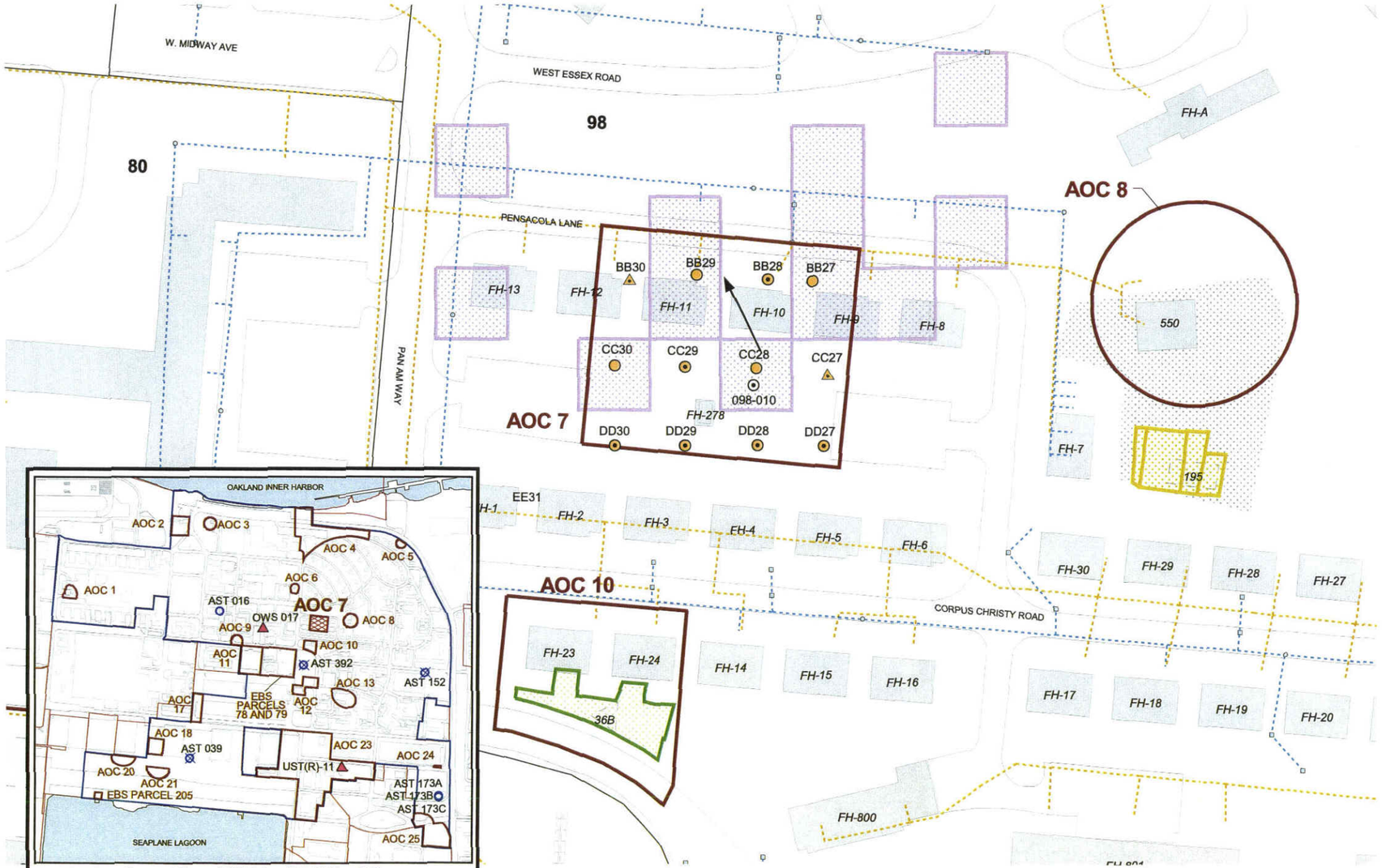
FIGURES



Location Within IR Site 35

1500 0 1500 Feet

LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- NTCRA REMOVAL LOCATION
- BUILDING 195 REMOVAL LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

N

PAH REMOVAL ACTION SOIL SAMPLING LOCATION WITH STATION ID

- SVOCs ANALYSIS ONLY
- SVOCs, PESTICIDES/PCBs, AND METALS ANALYSES ONLY
- VOCs, SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY

OU-5 ADDENDUM SOIL SAMPLING LOCATION WITH STATION ID

- SVOCs ANALYSIS ONLY

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
NTCRA – NON-TIME-CRITICAL REMOVAL ACTION
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOCs – VOLATILE ORGANIC COMPOUNDS

100 0 100 Feet

RI/FS Report for IR Site 35

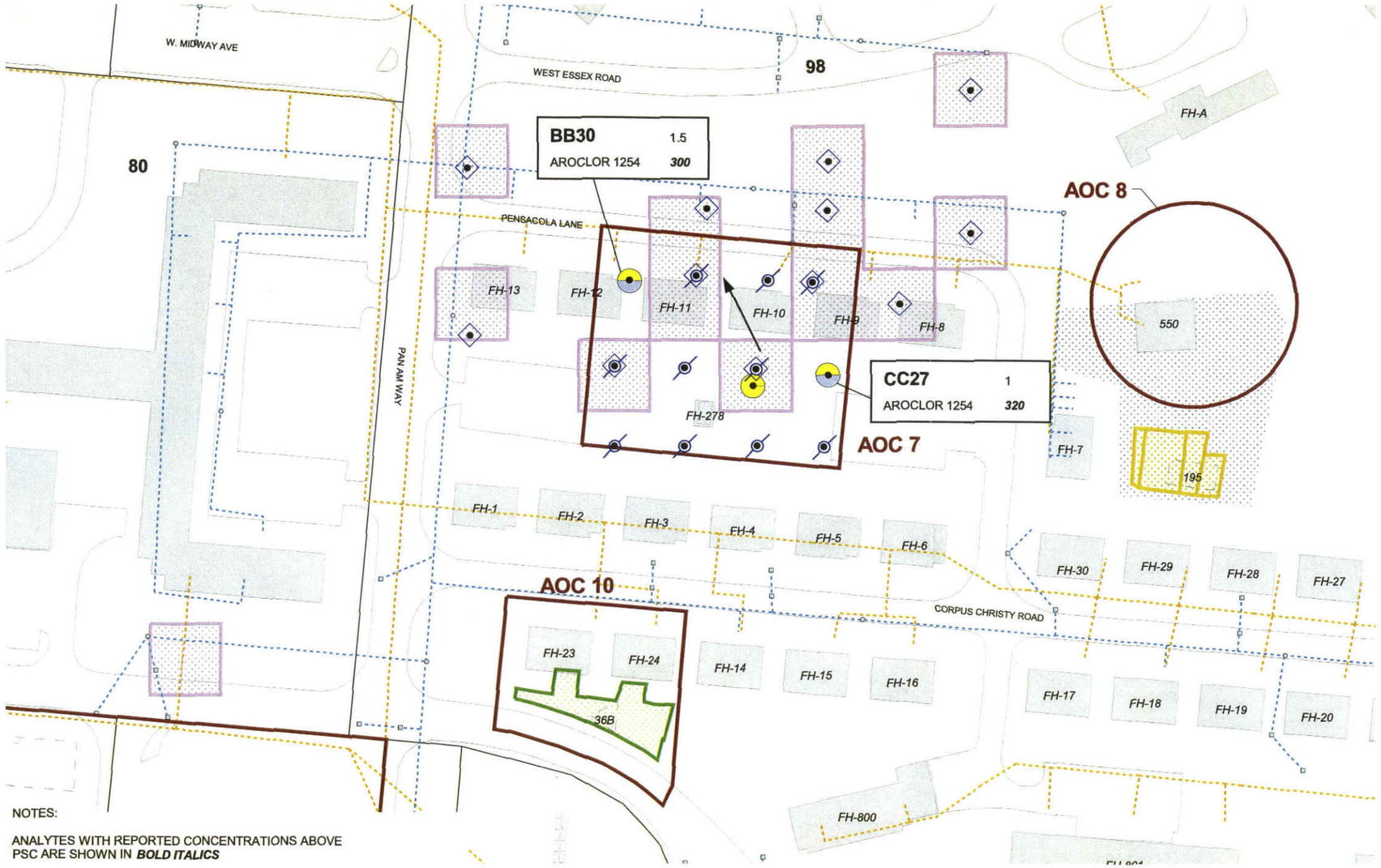
Figure 1-1

Study Area and Sampling Locations
Area of Concern 7

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/30/06
File No.: 077L14463
Job No.: 23818-077
Rev No.: C



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- NTCRA REMOVAL LOCATION
- BUILDING 195 REMOVAL LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL SOIL SAMPLING LOCATION

SOIL SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC FOR :

- PESTICIDES/PCBs
- BENZO(A)PYRENE EQUIVALENT (SEE ATTACHMENT W, PAH AREAS, FOR ADDITIONAL INFORMATION AND CONCENTRATIONS)

SOIL SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :

- PESTICIDES/PCBs
- SVOCs

N

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

CC27 1
AROCLOR 1254 320

ANALYTE — CONCENTRATION in µg/kg

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
µg/kg – MICROGRAMS PER KILOGRAM
NTCRA – NON-TIME-CRITICAL REMOVAL ACTION
PCBs – POLYCHLORINATED BIPHENYLS
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PRG – PRELIMINARY REMEDIATION GOAL
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS

Analyte	PSC
AROCLOR 1254	220 µg/kg (Federal Residential PRG)

RI/FS Report for IR Site 35

Figure 4-1

Soil Sampling Results for Analytes Above PSC – Area of Concern 7

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/12/07
File No.: 077L14510
Job No.: 23818-077
Rev No.: D

TABLES

Table 3-1
Sample Analysis Summary, AOC 7

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE					
				VOCs	SVOCs	TPH	Pest/PCBs	Metals	Arsenic
Soil									
098-010	98-0106	OU-5 Addendum	2–4		X				
098-010	98-0107 (FD)	OU-5 Addendum	2–4		X				
098-010	98-0108	OU-5 Addendum	4–6		X				
098-010	98-0109	OU-5 Addendum	6–8		X				
BB27	0040-WHA-5026	PAH TCRA	0–0.5		X		X		X
BB27	0040-WHA-5027 (FD)	PAH TCRA	0–0.5		X		X		X
BB27	0040-WHA-6029	PAH TCRA	0.5–2		X		X		X
BB27	0040-WHA-6030 (FD)	PAH TCRA	0.5–2		X		X		X
BB28	0040-WHA-0362	PAH TCRA	1–1.5		X				
BB29	0040-WHA-5014	PAH TCRA	0–0.5		X		X		X
BB29	0040-WHA-5015 (FD)	PAH TCRA	0–0.5		X		X		X
BB29	0040-WHA-6017	PAH TCRA	0.5–2		X		X		X
BB29	0040-WHA-6018 (FD)	PAH TCRA	0.5–2		X		X		X
BB30	0040-WHA-0067	PAH TCRA	1.5–2		X				
BB30	0040-WHA-488	PAH TCRA	1.5–2	X		X*	X	X	
CC27	0040-WHA-0106	PAH TCRA	1–1.5		X				
CC27	0040-WHA-489	PAH TCRA	1–1.5	X		X*	X	X	
CC28	0040-WHA-5014	PAH TCRA	0–0.5		X		X		X
CC28	0040-WHA-5015 (FD)	PAH TCRA	0–0.5		X		X		X
CC28	0040-WHA-6017	PAH TCRA	0.5–2		X		X		X
CC28	0040-WHA-6018 (FD)	PAH TCRA	0.5–2		X		X		X
CC29	0040-WHA-496	PAH TCRA	1–1.5		X				
CC30	0040-WHA-5014	PAH TCRA	0–0.5		X		X		X
CC30	0040-WHA-5015 (FD)	PAH TCRA	0–0.5		X		X		X
CC30	0040-WHA-6017	PAH TCRA	0.5–2		X		X		X
CC30	0040-WHA-6018 (FD)	PAH TCRA	0.5–2		X		X		X
DD27	0040-WHA-0078	PAH TCRA	0.5–1		X				
DD28	0040-WHA-567	PAH TCRA	0.5–1		X				
DD29	0040-WHA-566	PAH TCRA	1–1.5		X				
DD30	0040-WHA-565	PAH TCRA	0.5–1		X				

Table 3-1
Sample Analysis Summary, AOC 7

References:
OU-5 Addendum (IT 2001b)
PAH TCRA (FWEC 2004)

Note:
* analyzed for gasoline-, diesel-, and motor oil–range TPH

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
FD – field duplicate
OU – operable unit
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
Pest – pesticides
SVOC – semivolatile organic compound
TCRA – time-critical removal action
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 7

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
Fuels (µg/kg)										
motor oil	2	1	50	0	21,000	21,000	21,000	—[c]	500,000	—
Semivolatile Organic Compounds (µg/kg)										
acenaphthene	28	1	3.6	0	140	140	140	3,700,000	—	—
acenaphthylene	28	1	3.6	No PSC	68	68	68	—	—	—
anthracene	28	13	46	0	0.5	21	120	22,000,000	—	—
benz(a)anthracene	28	16	57	0	2	480	6,700	620	—	—
benzo(b)fluoranthene	28	17	61	0	0.8	600	9,200	620	—	—
benzo(k)fluoranthene	28	16	57	0	1	250	3,500	380 [d]	—	—
benzo(g,h,i)perylene	28	6	21	No PSC	6	1,700	9,400	—	—	—
benzo(a)pyrene	28	16	57	0	8	910	13,000	62	—	—
chrysene	28	16	57	0	1	520	7,300	3,800 [d]	—	—
dibenz(a,h)anthracene	28	8	29	0	5	1,300	9,800	62	—	—
fluoranthene	28	16	57	0	8	2,700	40,000	2,300,000	—	—
fluorene	28	3	11	0	16	50	110	2,700,000	—	—
indeno(1,2,3-cd)pyrene	28	13	46	0	3	850	10,000	620	—	—
phenanthrene	28	16	57	No PSC	3	310	3,700	—	—	—
pyrene	28	17	61	0	6	2,300	35,000	2,300,000	—	—
Pesticides and Polychlorinated Biphenyls (µg/kg)										
Aroclor 1254	18	2	11	2	300	310	320	220	—	—
Aroclor 1260	18	10	56	0	3	24	58	220	—	—
Metals (mg/kg)										
antimony	2	1	50	0	0.3	0.3	0.3	31	—	9.50
arsenic	18	18	100	0	1.6	3.2	5.1	0.062 [d]	—	9.14
barium	2	2	100	0	23.9	25	25.2	5,400	—	93.68
chromium	2	2	100	0	25.8	27	28.3	210	—	54.84
cobalt	2	2	100	0	4.1	4.2	4.2	900	—	14.30
copper	2	2	100	0	5.7	6.9	8	3,100	—	39.14
lead	2	2	100	0	1.6	12	22	150 [d]	—	37.66
mercury	2	2	100	0	0.034	0.034	0.034	23	—	0.52
nickel	2	2	100	0	23.3	23	23.6	1,600	—	55.72
vanadium	2	2	100	0	16.6	17	17.9	78	—	47.34
zinc	2	2	100	0	15	17	18	23,000	—	67.48

Notes:
[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[b] data review qualifiers are not included in this table
[c] dash indicates not applicable or not established
[d] California PRG

Acronyms/Abbreviations:
AOC – area of concern
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
TPH – total petroleum hydrocarbons

Table 4-2
Soil Sampling Results, AOC 7

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	098-010 98-0106 2 - 4 11-Apr-01	098-010 98-0107 (FD) 2 - 4 11-Apr-01	098-010 98-0108 4 - 6 11-Apr-01	098-010 98-0109 6 - 8 11-Apr-01	BB27 0040-WHA-5026 0 - 0.5 20-Jun-03	BB27 0040-WHA-5027 0 - 0.5 20-Jun-03	BB27 0040-WHA-6029 0.5 - 2 20-Jun-03	BB27 0040-WHA-6030 0.5 - 2 20-Jun-03	BB28 0040-WHA-0362 1 - 1.5 23-Apr-03	BB29 0040-WHA-5014 0 - 0.5 12-Jun-03
VOCs						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons															
motor oil	—[b]	—	500,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs															
acenaphthene	3,700,000	—	—	—	µg/kg	49 U	49 U	53 U	70 U	110 U	110 U	110 U	110 U	280 U	110 U
acenaphthylene	—	—	—	—	µg/kg	53 U	53 U	68 J	75 U	55 U	56 U	56 U	54 U	140 U	55 U
anthracene	22,000,000	—	—	—	µg/kg	3.4 U	3.4 U	3.7 U	4.9 U	2.2 U	2.2 U	0.5 J	1 J	40	2.2 U
benz(a)anthracene	620[c]	—	—	—	µg/kg	0.99 U	0.99 U	1.1 U	**6,700**[d]	5.5 U	5.6 U	8	10	130	5.5 U
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	2.2 U	2.2 U	2.4 U	**9,200**	2.2 U	2.2 U	5	6.5	114	2.2 U
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	1.4 U	1.4 U	1.5 U	**3,500**	2.2 U	2.2 U	3	3	50	2.2 U
benzo(g,h,i)perylene	—	—	—	—	µg/kg	2.1 U	2.1 U	2.2 U	9,400	7.7 U	7.8 U	7.9 U	7.6 U	130	7.7 U
benzo(a)pyrene	62[c]	—	—	—	µg/kg	2.3 U	2.3 U	2.5 U	**13,000**	5.5 U	5.6 U	8	10	**170**	5.5 U
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	1.7 U	1.7 U	1.8 U	**7,300**	5.5 U	5.6 U	7	10	110	5.5 U
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	6.9 U	6.8 U	7.3 U	**9,800**	19 U	19 U	19 U	19 U	56 U	19 U
fluoranthene	2,300,000	—	—	—	µg/kg	2.9 U	2.9 U	3.1 U	40,000	5.5 U	5.6 U	12	19	493	5.5 U
fluorene	2,700,000	—	—	—	µg/kg	9.5 U	9.5 U	10 U	110	11 U	11 U	11 U	11 U	28 U	11 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	0.77 U	0.77 U	0.83 U	**10,000**	5.5 U	5.6 U	5.6 U	5.4 U	130	5.5 U
phenanthrene	—	—	—	—	µg/kg	2.2 U	2.2 U	2.4 U	3,700 J	4.4 U	4.5 U	5	5	210	4.4 U
pyrene	2,300,000	—	—	—	µg/kg	2.8 U	2.8 U	8 J	35,000	11 U	11 U	18	25	490	11 U
Pesticides/PCBs															
Aroclor 1254	220	—	—	—	µg/kg	NA	NA	NA	NA	36 U	37 U	37 U	36 U	NA	36 U
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	58	45	58	58	NA	36 U
Metals															
antimony	31	—	—	9.50	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	**2.1**	**1.9**	**4.4**	**5.1**	NA	**1.9**
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 7

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: BB29 / Sample: 0040-WHA-5015 / [a] Depth Interval: 0 - 0.5 / Collection Date: 12-Jun-03	BB29 / 0040-WHA-6017 / 0.5 - 2 / 12-Jun-03	BB29 / 0040-WHA-6018 / 0.5 - 2 / 12-Jun-03	BB30 / 0040-WHA-0067 / 1.5 - 2 / 23-Apr-03	BB30 / 0040-WHA-488 / 1.5 - 2 / 12-May-03	CC27 / 0040-WHA-0106 / 1 - 1.5 / 24-Apr-03	CC27 / 0040-WHA-489 / 1 - 1.5 / 12-May-03	CC28 / 0040-WHA-5014 / 0 - 0.5 / 12-Jun-03
VOCs						NA	NA	NA	NA	ND	NA	ND	NA
Petroleum Hydrocarbons													
motor oil	—[b]	—	500,000	—	µg/kg	NA	NA	NA	NA	21,000	NA	11,000 U	NA
SVOCs													
acenaphthene	3,700,000	—	—	—	µg/kg	110 U	110 U	110 U	550 U	NA	140 J	NA	110 U
acenaphthylene	—	—	—	—	µg/kg	54 U	55 U	56 U	280 U	NA	300 U	NA	55 U
anthracene	22,000,000	—	—	—	µg/kg	2.2 U	4	2	79	NA	120	NA	2.2 U
benz(a)anthracene	620[c]	—	—	—	µg/kg	5.4 U	18	12	300	NA	380	NA	5.5 U
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	2.2 U	12	8.1	318	NA	362	NA	2.2 U
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	2.2 U	6.9	4	140	NA	170	NA	2.2 U
benzo(g,h,i)perylene	—	—	—	—	µg/kg	7.6 U	7.7 U	7.8 U	330	NA	300	NA	7.7 U
benzo(a)pyrene	62[c]	—	—	—	µg/kg	5.4 U	19	13	**470**	NA	**570**	NA	5.5 U
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	5.4 U	27	18	250	NA	360	NA	5.5 U
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	18 U	19 U	7 J	**210**	NA	**290**	NA	19 U
fluoranthene	2,300,000	—	—	—	µg/kg	5.4 U	39	24	1,080	NA	1,280	NA	5.5 U
fluorene	2,700,000	—	—	—	µg/kg	11 U	11 U	11 U	16 J	NA	23 J	NA	11 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	5.4 U	8	3 J	350	NA	420	NA	5.5 U
phenanthrene	—	—	—	—	µg/kg	4.3 U	12	9	380	NA	554	NA	4.4 U
pyrene	2,300,000	—	—	—	µg/kg	11 U	51	35	900	NA	1,200	NA	11 U
Pesticides/PCBs													
Aroclor 1254	220	—	—	—	µg/kg	36 U	36 U	37 U	NA	**300**	NA	**320**	36 U
Aroclor 1260	220	—	—	—	µg/kg	36 U	4 J	3 J	NA	36 U	NA	36 U	36 U
Metals													
antimony	31	—	—	9.50	mg/kg	NA	NA	NA	NA	0.3 J	NA	5.4 U	NA
arsenic	0.39	0.062	—	9.14	mg/kg	**2**	**4.9**	**4.6**	NA	**1.6**	NA	**1.9**	**1.9**
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	23.9	NA	25.2	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	25.8	NA	28.3	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	4.1	NA	4.2	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	5.7 J	NA	8 J	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	1.6	NA	22	NA
mercury	23	—	—	0.52	mg/kg	NA	NA	NA	NA	0.034	NA	0.034	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	23.6	NA	23.3	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	16.6	NA	17.9	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	15	NA	18	NA

Table 4-2
Soil Sampling Results, AOC 7

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	CC28 0040-WHA-5015 0 - 0.5 12-Jun-03	CC28 0040-WHA-6017 0.5 - 2 12-Jun-03	CC28 0040-WHA-6018 0.5 - 2 12-Jun-03	CC29 0040-WHA-496 1 - 1.5 13-May-03	CC30 0040-WHA-5014 0 - 0.5 12-Jun-03	CC30 0040-WHA-5015 0 - 0.5 12-Jun-03	CC30 0040-WHA-6017 0.5 - 2 12-Jun-03	CC30 0040-WHA-6018 0.5 - 2 12-Jun-03
VOCs						NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
motor oil	—[b]	—	500,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthene	3,700,000	—	—	—	µg/kg	110 U	110 U	110 U	100 U	110 U	110 U	110 U	110 U
acenaphthylene	—	—	—	—	µg/kg	54 U	55 U	56 U	52 U	55 U	54 U	55 U	56 U
anthracene	22,000,000	—	—	—	µg/kg	2.2 U	4	2	2.1 U	2.2 U	2.2 U	4	2
benz(a)anthracene	620[c]	—	—	—	µg/kg	5.4 U	18	12	2 J	5.5 U	5.4 U	18	12
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	2.2 U	12	8.1	2	2.2 U	2.2 U	12	8.1
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	2.2 U	6.9	4	1 J	2.2 U	2.2 U	6.9	4
benzo(g,h,i)perylene	—	—	—	—	µg/kg	7.6 U	7.7 U	7.8 U	7.3 U	7.7 U	7.6 U	7.7 U	7.8 U
benzo(a)pyrene	62[c]	—	—	—	µg/kg	5.4 U	19	13	8	5.5 U	5.4 U	19	13
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	5.4 U	27	18	1 J	5.5 U	5.4 U	27	18
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	18 U	19 U	7 J	18 U	19 U	18 U	19 U	7 J
fluoranthene	2,300,000	—	—	—	µg/kg	5.4 U	39	24	8	5.5 U	5.4 U	39	24
fluorene	2,700,000	—	—	—	µg/kg	11 U	11 U	11 U	10 U	11 U	11 U	11 U	11 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	5.4 U	8	3 J	5.2 U	5.5 U	5.4 U	8	3 J
phenanthrene	—	—	—	—	µg/kg	4.3 U	12	9	3 J	4.4 U	4.3 U	12	9
pyrene	2,300,000	—	—	—	µg/kg	11 U	51	35	6 J	11 U	11 U	51	35
Pesticides/PCBs													
Aroclor 1254	220	—	—	—	µg/kg	36 U	36 U	37 U	NA	36 U	36 U	36 U	37 U
Aroclor 1260	220	—	—	—	µg/kg	36 U	4 J	3 J	NA	36 U	36 U	4 J	3 J
Metals													
antimony	31	—	—	9.50	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	**2**	**4.9**	**4.6**	NA	**1.9**	**2**	**4.9**	**4.6**
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 7

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	DD27 0040-WHA-0078 0.5 - 1 23-Apr-03	DD28 0040-WHA-567 0.5 - 1 28-May-03	DD29 0040-WHA-566 1 - 1.5 28-May-03	DD30 0040-WHA-565 0.5 - 1 28-May-03
VOCs						NA	NA	NA	NA
Petroleum Hydrocarbons									
motor oil	—[b]	—	500,000	—	µg/kg	NA	NA	NA	NA
SVOCs									
acenaphthene	3,700,000	—	—	—	µg/kg	93 U	100 U	100 U	320 U
acenaphthylene	—	—	—	—	µg/kg	47 U	52 U	51 U	160 U
anthracene	22,000,000	—	—	—	µg/kg	2.4	2.1 U	2.1 U	10
benz(a)anthracene	620[c]	—	—	—	µg/kg	29	5.2 U	5 J	69
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	62	0.8 J	5.9	86
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	28	2.1 U	3	35
benzo(g,h,i)perylene	—	—	—	—	µg/kg	7.4 U	7.3 U	6 J	170
benzo(a)pyrene	62[c]	—	—	—	µg/kg	37	5.2 U	8	**130**
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	73	5.2 U	4 J	83
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	19 U	18 U	5 J	**82**
fluoranthene	2,300,000	—	—	—	µg/kg	96	5.2 U	13	180
fluorene	2,700,000	—	—	—	µg/kg	9.3 U	10 U	10 U	32 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	14	5.2 U	5	110
phenanthrene	—	—	—	—	µg/kg	20	4.2 U	6	70
pyrene	2,300,000	—	—	—	µg/kg	95	10 U	17	250
Pesticides/PCBs									
Aroclor 1254	220	—	—	—	µg/kg	NA	NA	NA	NA
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA
Metals									
antimony	31	—	—	9.50	mg/kg	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA
mercury	23	—	—	0.52	mg/kg	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[d] bolded font indicates result above one of the following:
Fed PRG, Cal PRG, TPH ESL

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
ND – not detected
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit

Table 5-1
Estimates of Mobility and Persistence for Aroclor 1254, AOC 7

Analyte	K_{oc} (L/kg)	f_{oc}	Percent Sorbed[a]	Half-Life in Soil (years)[b]
Aroclor 1254	3.47E+05	0.0064	100	4.1E+05

Notes:
[a] percent sorbed = $[K_{oc}f_{oc} / (1+K_{oc}f_{oc})] \times 100$
[b] for microbially mediated degradation in soil (Howard et al. 1991)

Acronyms/Abbreviations:
AOC – area of concern
f_{oc} – fraction organic carbon; value for surface soils classified silty sand at AOC 17
K_{oc} – organic carbon partition coefficient
L/kg – liters per kilogram

Table 6-1
Tier 1 Evaluation Results by Exposure Group, AOC 7

Exposure Group [a]	Cancer Risk	Hazard Index
1. All soil and groundwater exposure pathways		
Total [b]	NG	NG
Without metals below background	NG	NG
2. Exposure pathways for soil and vapors from VOCs in groundwater		
Total [b]	9E-05	0.4
Without metals below background	4E-06	NC
3. Exposure pathways for residential use of groundwater		
Total [b]	NG	NG
Without metals below background	NG	NG

Notes:
[a] PAHs are not included
[b] includes all COPCs

Acronyms/Abbreviations:
AOC – area of concern
COPC – chemical of potential concern
NC – not calculated (no COPCs in this group)
NG – no groundwater data
PAH – polynuclear aromatic hydrocarbon
VOC – volatile organic compound

Table 6-2
Tier 1 Evaluation Results by Risk Driver, AOC 7

Study Area	Analyte Name	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND Hazard Quotient	WITHOUT BACKGROUND Cancer Risk
AOC 7					
Soil					
	arsenic	—*	8E-05	—	—
	Aroclor 1254	—	4E-06	—	4E-06
	Total for soil	**0.4**	**9E-05**	**0**	**4E-06**

Note:
* dash indicates not applicable

Acronym/Abbreviation:
AOC – area of concern

Table 7-1
Summary of RI Results and Recommendations, AOC 7

DQO Problem	DQO Decision Questions	Nature and Extent	Tier 1 Evaluation	Recommendation
AOC 7 addresses PAHs and PCBs in soil. No sampling was conducted during the RI at AOC 7 because the Navy and regulatory agencies agreed that there are sufficient existing analytical results.	Have the nature and extent of contamination been defined?	Yes. Definition is adequate. The Navy and agencies agreed that previous sampling was adequate to support the risk evaluation and decisions on the necessity for remedial action. The primary chemical reported at AOC 7 is Aroclor 1254 in soil, the lateral extent of which appears to be limited.	NA	No further action.
	Are contaminants present in soil or groundwater at concentrations that pose unacceptable risk to potential future residents?	NA	Results of the Tier 1 risk evaluation show a total cancer risk for soil of 9×10^{-5} (within the risk management range); the noncancer HI is less than 1. Cancer risk, excluding metals at concentrations below Alameda Point background 95th percentile, is 4×10^{-6}. Based on fate and transport analysis, PCBs would not be expected to be dissolved in groundwater at AOC 7.	No further action.
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?	NA	NA. Pathway was not evaluated for AOC 7, located approximately 1,300 feet from the nearest surface water body.	No further action.

Acronyms/Abbreviations:
AOC – area of concern
DQO – data quality objective
HI – hazard index
NA – not applicable
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
RI – remedial investigation

ATTACHMENT H

AREA OF CONCERN 8

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT ATTACHMENT H, AREA OF CONCERN 8 IR SITE 35, TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

Prepared by:

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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 8. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station Alameda), Alameda, California (Figure 1-1).

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

AOC 8 is an approximately 0.5-acre site in the central portion of Transfer Parcel Economic Development Conveyance (EDC)-5, near Pensacola Lane and Corpus Christi Road, in the northeastern portion of Environmental Baseline Survey (EBS) Parcel 98. AOC 8 is a small portion of approximately 34 acres conveyed to the Alameda County Homeless Base Conversion Collaborative (subsequently known as the Alameda Point Collaborative [APC]) under a no-cost, long-term lease negotiated with the Alameda Reuse and Redevelopment Authority in 1995. Pursuant to an agreement with the City of Alameda, the APC is developing and managing 200+ housing units on this land and offering social services and resources to the homeless and the wider Alameda Point community.

Building 550, a metal shed, is the only structure located in AOC 8; the remainder of the AOC is unpaved and includes portions of a residential backyard and portions of the Alameda Point community garden staging area (Figure 1-1). The Alameda Point community garden project is an APC service project that was begun in June 2002 to provide an opportunity for APC housing residents to grow their own produce to supplement their incomes (Alternatives in Action 2006); the grounds dedicated to this project occupy approximately 1.5 acres.

The APC garden project currently uses Building 550 at AOC 8 to house gardening equipment and supplies. The open area surrounding Building 550 at AOC 8 is covered with wood chips and is used as a staging area for gardening activities. The actual garden plots are located in an adjacent field to the southeast of AOC 8; the garden plots are not present within the boundaries of AOC 8 (Figure 1-1). Because of the long-term lease to the APC of the land that includes AOC 8, the site is likely to be used by the community garden project or other APC projects for the foreseeable future.

1.2 HISTORICAL USE

The portion of EBS Parcel 98 located in AOC 8 was historically open space and is in the West Housing Area. Building 550 was part of a larger landscape maintenance facility in the West Housing Area (Photographs 1-1 and 1-2). The landscape maintenance facility is a fenced area that formerly contained three large sheds (one wooden and two aluminum) and two buildings, Buildings 550 and 195 (located immediately south of AOC 8). Building 550 was used for grounds maintenance; Building 195 was used as a pesticide and fertilizer storage shed where small batches of pesticides and fertilizers were mixed.

Photograph 1-1
Building 550 (Currently Used by the Alameda Point Collaborative Community Garden Project), View to North

Photograph 1-2
Building 550 (Currently Used by the Alameda Point Collaborative Community Garden Project), View to East

Building 195 was demolished in November 2001 (Shaw 2003). Oil, fuel, pesticides, herbicides, and fertilizers were stored in the maintenance facility, both indoors and in the surrounding open space.

During the EBS, stains were observed on bare earth in Building 195 (IT 2001a). Various other stains (some with strong hydrocarbon odors) were observed in the open space surrounding Building 550. Potentially hazardous wastes, including an abandoned 55-gallon drum covered with oil and a 30-gallon drum of waste oil, were also observed near the maintenance facility. In the remaining open space areas, only minor stains related to vehicle parking were observed.

1.3 PRELIMINARY SCREENING CRITERIA

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this AOC are the following:

- environmental screening levels (ESLs) for total petroleum hydrocarbons (TPH) – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)
- residential preliminary remediation goals (PRGs) (U.S. EPA 2004b) for all other chemicals except polynuclear aromatic hydrocarbons (PAHs) classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (µg/kg) (DON 2001a)

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment. Chemicals of potential concern (COPCs) identified in the health risk evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs.

1.4 PREVIOUS INVESTIGATIONS

During three previous investigations at AOC 8, soil samples were collected, and results of these investigations are summarized below. Locations sampled in AOC 8 are shown on Figure 1-1. Analytical results for soil samples collected within AOC 8 are provided in Appendix B.

1.4.1 Environmental Baseline Survey

Two portions of the former landscape maintenance facility were investigated during the EBS: one in AOC 8 and the other near former Building 195, immediately south of AOC 8 (IT 2001a).

The area around Building 550 in AOC 8 was investigated to address the storage and use of potentially hazardous substances; stains were observed in the fenced area of the landscape maintenance facility. Initially, three soil samples (098-0004, -0005, and -0006)

were collected from 0 to 1 foot below ground surface (bgs) and analyzed for TPH, pesticides, and polychlorinated biphenyls (PCBs). Aroclor 1254 was reported at concentrations above the PSC in sample 098-0006, collected at 0.5 to 1 foot bgs. Three additional samples (098-0034, -0035, and -0041) were collected in AOC 8 between 0 and 4 feet bgs to further delineate the extent of PCBs. These samples were also analyzed for TPH, pesticides, and PCBs. None of the analytes were reported at concentrations above PSCs.

1.4.2 2002 Polynuclear Aromatic Hydrocarbon Study

One soil boring (32EDC-5-196) was advanced in AOC 8 during the 2002 PAH study (BEI 2005a). Samples were collected from four depth intervals between 0 and 8 feet bgs and analyzed for PAHs. B(a)P equivalent concentrations were below the PSC.

1.4.3 Polynuclear Aromatic Hydrocarbon Removal Action

PAH time-critical removal action (TCRA) soil removals in the West Housing Area were conducted using a grid pattern at several EBS parcels, but no removals were performed at AOC 8 (Figure 1-1). However, eight soil borings (AA21, AA21RA, AA21RB, AA23, BB21, BB22RA, CC21, and CC22) were advanced in AOC 8 as part of the PAH TCRA activities (FWEC 2004). Samples were collected from these borings at four depth intervals between 0 and 2 feet bgs and were analyzed for PAHs. B(a)P equivalent concentrations were below the PSC.

1.5 ADJACENT SITES

Due to the elevated concentrations of pesticides and PCBs reported near Building 195 (immediately south of AOC 8) during the EBS, former Building 195 (demolished November 2001) and surrounding soil were removed as part of a series of removal actions completed in February 2004 (Shaw 2004a). In addition, elevated concentrations of lead associated with lead-based paint were identified in soil around the footprint of former Building 195 and subsequently removed. Based on the analytical results and the potential for these contaminants to pose a threat to human health, pesticides, PCBs, and lead concentrations were evaluated in post-removal confirmation sampling.

Between February and March 2002, 203 cubic yards of soil was removed (from a maximum depth of 2 feet bgs) in the vicinity of former Building 195. The results of confirmation sampling indicated that PCBs and lead were present at concentrations below their respective cleanup levels and that pesticides were not reported at concentrations above detection limits. As a result, no additional action was recommended in the vicinity of Building 195.

The cleanup levels used during the TCRA were United States Environmental Protection Agency (U.S. EPA) 2002 PRGs (U.S. EPA 2002) for residential soil for pesticides and PCBs, and 209 milligrams per kilogram (mg/kg) for lead (derived using a site-specific application of the Lead Risk Assessment Spreadsheet Version 7 model from the California Environmental Protection Agency [Cal/EPA] Department of Toxic Substances Control).

Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, and geology at AOC 8.

Topography at AOC 8 is relatively flat. The average ground elevation at AOC 8, based on elevation data from the five borings (A08SB01 through A08SB05) advanced during the RI, is 12 feet above mean sea level (MSL). Groundwater was not encountered during drilling, and groundwater samples were not collected during the RI.

The groundwater monitoring well nearest to AOC 8 is MBG-2, located approximately 450 feet southeast of AOC 8. A review of groundwater depths in this well over time (March 1995 through August 1998) shows depth to water from approximately 2 to 5.5 feet bgs. The deepest historical groundwater measured in this well is approximately 5 feet MSL. This value, if subtracted from the ground elevation at AOC 8, would suggest groundwater in the vicinity of this AOC may have been as deep as 6 feet bgs.

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is northwest at AOC 8. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Based on tidal studies performed at other Alameda Point sites, tidal influence would not be expected at AOC 8, located approximately 1,300 feet from Oakland Inner Harbor. As discussed in Section 2 of the main RI/FS Report, results of tidal studies performed at nearby sites indicated a minimal effect on groundwater elevations in the fill material at the inland well, located approximately 200 feet from Oakland Inner Harbor.

Soil encountered in the five RI borings consisted of silt with sand or silty sand to about 0.5 to 1 foot bgs. Well-graded gravel with silt and sand was encountered beneath these sediments in two of the borings (A08SB04 and A08SB05). Poorly graded sand was encountered in all borings to total boring depth (the five borings extended to 4 feet bgs). Fine-grained bay sediment (Young Bay Mud) was not encountered in the borings; however, based on observed lithology in borings south of AOC 8, it is estimated that the Young Bay Mud is at approximately 9 feet bgs (see cross section D-D′ on Figure 2-8 of the main RI/FS Report). As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust may be located beneath AOC 8; however, it was not encountered in borings advanced to 4 feet bgs during the RI. RI boring logs are included in Appendix D.

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Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for AOC 8. The RI was conducted in accordance with the sitewide data quality objectives (DQOs) for the evaluation of AOCs presented in Table 3-1 of the main RI/FS Report.

3.1 APPROACH

RI sampling at AOC 8 addressed PCBs in soil. A PCB (Aroclor 1254) was reported above the screening criterion in soil collected during the EBS. The extent of contamination was defined southeast of EBS sample 098-0006, but not in the other directions. Therefore, additional soil samples were proposed to assess the distribution of PCBs around the location of EBS sample 098-0006.

3.2 SCOPE

Soil samples were collected during the 2005 RI from five borings around the location of EBS sample 098-0006; two soil samples were collected from each boring at depths of approximately 1 to 1.5 feet bgs and 3 to 4 feet bgs and analyzed for PCBs. Groundwater samples were not deemed necessary at AOC 8. Table 3-1 provides a summary of samples collected during the RI and previous investigations. Figure 1-1 shows sampling locations from all investigations.

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Section 4
NATURE AND EXTENT OF CONTAMINATION

This section presents the analytical results from previous investigations and from the RI, along with the concentration ranges and spatial distributions of the analytes identified at AOC 8. Soil samples were collected from 18 locations during the EBS (IT 2001a), the 2002 PAH study (BEI 2005a), the PAH TCRA (FWEC 2004), and the RI (Table 3-1 and Figure 1-1). Results for analytes reported at concentrations above PSCs are illustrated on Figure 4-1. Statistical summaries of soil results are presented in Table 4-1, and soil analytical results are summarized in Table 4-2. Complete analytical results for historical and RI samples collected within AOC 8 are included in Appendices B and G, respectively.

Analytical soil sampling results are discussed for each class of chemicals investigated at AOC 8.

4.1 POLYNUCLEAR AROMATIC HYDROCARBONS

PAHs were reported in soil from borings 32EDC-5-106, AA21, AA21RA, AA21RB, BB21, BB22RA, CC21, and CC22. B(a)P equivalent concentrations were below the PSC.

4.2 PESTICIDES AND POLYCHLORINATED BIPHENYLS

Aroclor 1254 was the only PCB reported at concentrations above the PSC. Aroclor 1254 was reported at a concentration of 300 µg/kg at 0.5 foot bgs from boring 098-0006. This reported concentration was above the PSC (residential PRG of 220 µg/kg). The RI sampling defined the extent of Aroclor 1254 in soil. Pesticides/PCBs were not reported at concentrations above laboratory detection limits in samples collected at two depths (1 to 1.5 and 3 to 3.5 feet bgs) from surrounding locations.

4.3 TOTAL PETROLEUM HYDROCARBONS

Motor oil–range TPH was reported in soil from borings 098-0004, -0005, and -0006 at a maximum concentration of 240 J mg/kg. All concentrations were below the PSC of 500 mg/kg (ESL for residential soil).

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Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for AOC 8. It discusses the conceptual site model, the physical and chemical changes that might occur to contaminants present at AOC 8, and the mechanisms that could potentially transfer the contaminants from the study area. The conceptual site model facilitates understanding of the present AOC conditions by integrating AOC-specific physical characteristics with the nature and extent of contaminants in the physical system. Section 5.2 includes an evaluation of the mobility and persistence of compounds above PSCs and of risk drivers identified at AOC 8. Section 5.3 discusses potential migration pathways.

5.1 AOC 8 CONCEPTUAL SITE MODEL

AOC 8 is an approximately 0.5-acre area in the central portion of Transfer Parcel EDC-5 in the northeastern portion of EBS Parcel 98. Building 550, a sheet metal building, is the only structure located in AOC 8; the remainder of the AOC is flat, open space. Roughly half of the AOC is in a residential backyard and is covered with grass; the other unpaved areas of the AOC are covered with bark. The Alameda Point Garden is located to the east and south of Building 550. The nearest surface water is Oakland Inner Harbor, approximately 1,300 feet north of AOC 8.

Based on a review of borings logs for AOC 8, the subsurface lithology at AOC 8 generally consists of silt with sand or silty sand to about 1 foot bgs, then poorly graded sand to about 4 feet bgs (the maximum depth explored during the RI). The underlying Young Bay Mud is expected to be an aquitard, which inhibits hydraulic communication with deeper water-bearing zones. The western extent of the Marsh Crust may be located beneath AOC 8 (SWDIV 2001), although it was not encountered in RI borings. Groundwater was not encountered during drilling. Groundwater flow direction is approximately northeast, and maximum depth to water is approximately 6 feet bgs, which is consistent with historical groundwater depths. Negligible tidal influence is expected at AOC 8 because of its distance from Oakland Inner Harbor.

Aroclor 1254, a PCB, was the only chemical reported at a concentration above the PSC in a surface (0.5 to 1 foot bgs) soil sample collected from boring 098-0006. RI soil samples, collected at two depths from locations around this exceedance, did not have PCBs at concentrations above detection limits, thereby defining the lateral and vertical extent. Groundwater samples were not collected at AOC 8.

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in the environment tends to remain in place. The tendency toward immobility and persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Section 5 of the main RI/FS Report discusses the physical and chemical properties of contaminants, and their chemical class (e.g., PCBs), that affect their transport and persistence in the environment. This section discusses the mobility and persistence of Aroclor 1254.

The most important property of PCBs in relation to mobility and persistence is their general inertness, as they resist both acids and alkalis and have thermal stability. PCBs have large molecular structures and typically bind to soil based on their size and physical characteristics. PCBs have high organic carbon partition coefficient values, causing them to be relatively immobile and resistant to transformation processes that can degrade some chemicals, causing them to persist in soil. Table 5-1 provides estimates of mobility and persistence for Aroclor 1254. Geotechnical samples were not collected from AOC 8; therefore, the fraction organic carbon for the soil samples collected from 0.5 to 2 feet bgs at AOC 17 (closest geotechnical soil sample from a similar soil interval as the Aroclor 1254 concentrations at AOC 8) was used in the estimate. The low solubility and mobility exhibited by this compound retard their migration to groundwater as indicated by the estimate that all of Aroclor 1254 will remain sorbed to soil.

Two mechanisms allow PCBs to change in the environment: degradation and weathering. Under normal conditions, PCBs degrade slowly in soil with degradation occurring more rapidly in anaerobic systems than in aerobic systems. Aroclors are mixtures of PCB congeners whose names reflect the percent chlorine (by weight) of the mixture; Aroclor 1254 is 54 percent chlorine by weight. The more chlorinated mixtures are the most persistent and toxic. Individual congeners present in the Aroclor 1254 mixture are subject to different rates of microbial degradation. Microbial degradation depends on the position of the chlorine atom on the biphenyl molecule and the degree of chlorination. Higher chlorinated congeners (those with five or more chlorine atoms) are more persistent in the environment and are not readily transformed by bacteria. Between 88 and 95 percent (by weight) of the Aroclor 1254 mixture, depending on the manufacturer, consists of congeners with five or more chlorine atoms (ATSDR 2000).

5.3 CONTAMINANT MIGRATION

The potential migration pathways considered for this AOC are atmospheric transport (i.e., vapors and airborne fugitive dust) and transport by surface water runoff. Atmospheric transport of volatile PAHs (i.e., naphthalene and benzo[g,h,i]perylene) from soil is not considered significant because concentrations of these analytes, the only volatile compounds reported in soil samples from AOC 8, were below PSCs. Groundwater transport was not considered because migration of Aroclor 1254 from soil to groundwater in the subsurface caused by infiltrating water or a fluctuating groundwater table is unlikely due to the chemical's low mobility in soil and low water solubility. Additionally, the extent of Aroclor 1254 in soil at AOC 8 is limited. The only transport pathway identified at AOC 8 is the following.

- Particulate dispersion (either by wind or surface water) of impacted soils in a small area of AOC 8 is possible. However, because the concentrations of Aroclor 1254 above the PSC are limited to one location at the northeast corner of Building 550 and the surrounding soil samples collected during the RI did not have reported concentrations of Aroclor 1254, the mass available for transport is not considered significant.

Section 6
TIER 1 EVALUATION

This section summarizes the Tier 1 risk evaluation results for AOC 8. In a Tier 1 evaluation, risk for a residential exposure scenario is assessed with the assumption that no remedial action would take place at the study area. This section also presents a qualitative uncertainty evaluation that identifies and characterizes the effects of uncertainties on the risk results.

A Tier 1 evaluation is a screening-level approach that calculates total cumulative risk values using published risk-based guidelines from the U.S. EPA, Cal/EPA, and San Francisco Bay Regional Water Quality Control Board. The Tier 1 evaluation includes all chemicals identified in at least one sample except for PAHs in soil. PAHs in soil are not included because site-specific remediation goals for PAHs are being developed and are presented in Attachment W. The approach used to estimate risk is described in Section 6 of the main RI/FS Report. Tier 1 information is provided in Appendix J.

Cancer risk and noncancer values for AOC 8 are shown in Table 6-1. Risk drivers for cancer and noncancer risk are presented in Table 6-2.

6.1 COPC IDENTIFICATION

The data selection and identification of COPCs are based on a compilation of all usable data for soil. In accordance with the Work Plan (BEI 2006), groundwater data were deemed unnecessary. All chemicals reported in at least one sample collected during the RI and/or included in the historical data were included as Tier 1 COPCs.

In soil at AOC 8, there is one Tier 1 COPC, a PCB (Aroclor 1254), which was reported in 1 of 14 samples.

6.2 RISK CHARACTERIZATION

For soil, the total cancer risk of 3×10^{-6} at AOC 8 is based on exposure pathways for soil only (Exposure Group 2).

The total cancer risk is within the risk management range based on 1 of 14 samples with a reportable quantity of Aroclor 1254. A hazard index (HI) was not calculated because there are no noncancer health effects guidelines for Aroclor 1254, the only COPC identified.

6.3 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation are representative of any potential health concerns at AOC 8. The results are consistent with the site history and previous investigations. Fourteen samples are considered adequate for the approximately 0.5-acre site. Due to the low solubility and low mobility in soil, PCBs typically do not impact groundwater quality. The cancer risk is within the risk management range for current and reasonable future uses.

6.4 CONCLUSIONS

Because groundwater data were deemed unnecessary, only Exposure Group 2 results were calculated. For reasonable future use, the cancer risk is 3×10^{-6} due to Aroclor 1254 reported in 1 of 14 samples. There are no Tier 1 COPCs with noncancer health effect guidelines, and there are no metals data.

Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at AOC 8, including the nature and extent of contamination and results of the Tier 1 risk evaluation. RI results form the basis of responses to the DQO decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendations presented below.

7.1 SUMMARY

Previous investigations at AOC 8 had defined the extent of contamination southeast of an exceedance of Aroclor 1254 in soil, but not in the other directions. The RI results completed the definition of the nature and extent of Aroclor 1254 in soil.

The primary chemical reported at AOC 8 is Aroclor 1254 in soil. Groundwater data were not deemed necessary.

Results of the Tier 1 risk evaluation show a total cancer risk for soil of 3×10^{-6}. Only one COPC was identified (Aroclor 1254). There is no reference dose for Aroclor 1254; therefore, an HI was not calculated.

7.2 AOC 8 CONCLUSIONS AND RECOMMENDATIONS

The RI was conducted using the seven-step U.S. EPA DQO process (U.S. EPA 2000); DQOs were developed for AOC 8 in the Work Plan (BEI 2006). The RI has addressed these DQOs, as summarized in Table 7-1.

Data collected during the RI sufficiently characterized the nature and extent of PCBs to perform a Tier 1 evaluation of risk in soil and support decisions on the necessity for remedial actions at AOC 8.

No further action is recommended at AOC 8 for the following reasons.

- Cancer risk associated with PCBs in soil is within the risk management range of 10^{-6} to 10^{-4}.
- Groundwater impacts are not a concern because PCBs are generally not soluble or mobile and do not readily migrate to groundwater.

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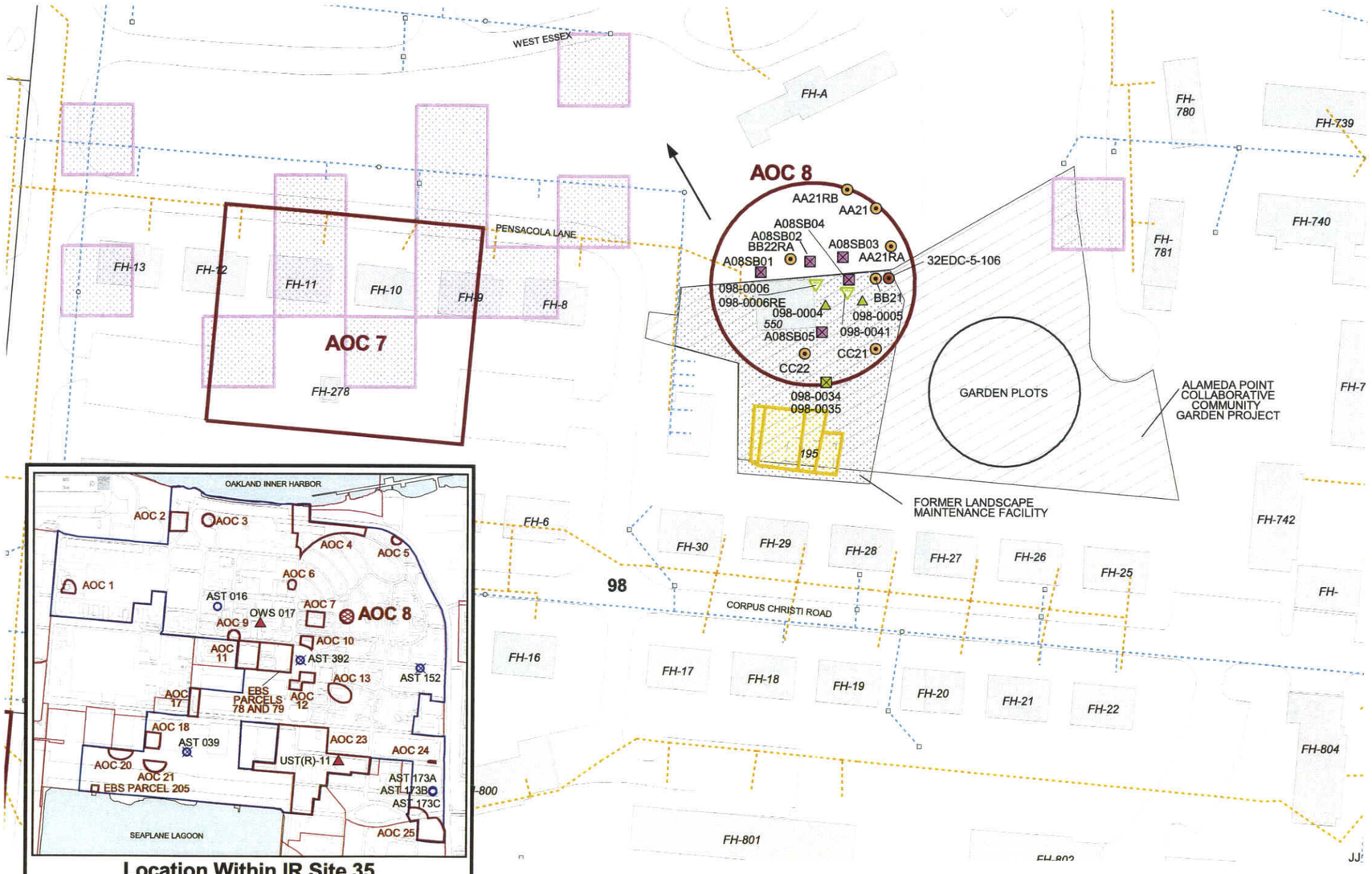
FIGURES



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- BUILDING 195 REMOVAL LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

N

PAH REMOVAL ACTION SOIL SAMPLING LOCATION WITH STATION ID
- SVOCs ANALYSIS ONLY

EBS SOIL SAMPLING LOCATION WITH SAMPLE ID
- FUELS ANALYSIS ONLY
- FUELS AND PESTICIDES/PCBs ANALYSES ONLY
- PESTICIDES/PCBs ANALYSIS ONLY

RI SOIL SAMPLING LOCATION WITH STATION ID
- PESTICIDES/PCBs ANALYSES ONLY

PAH STUDY SOIL SAMPLING LOCATION WITH STATION ID
- SVOCs ANALYSIS ONLY

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK

100 0 100 Feet

RI/FS Report for IR Site 35

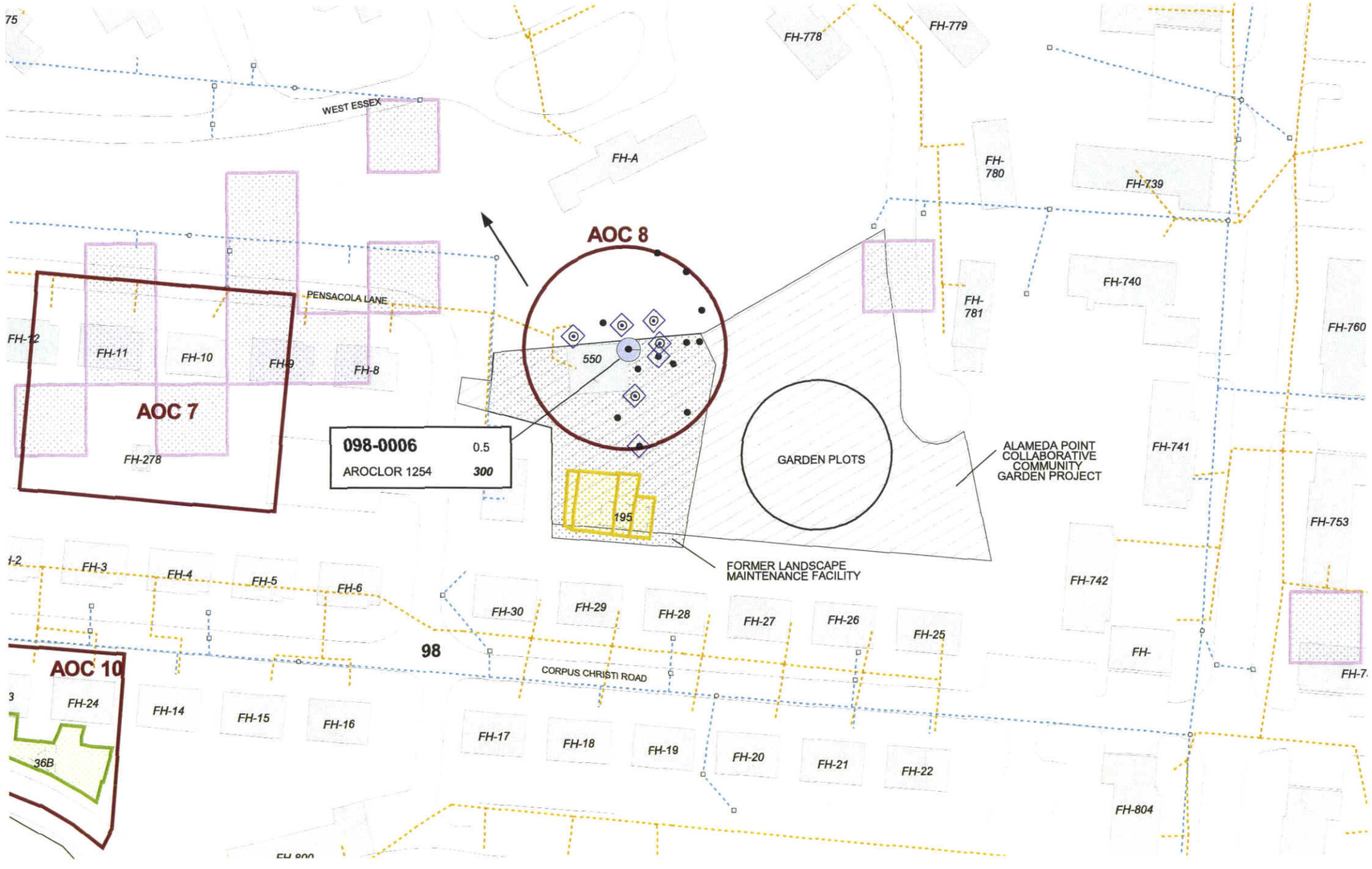
Figure 1-1

Study Area and Sampling Locations
Area of Concern 8

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 11/14/06
File No.: 077L14449
Job No.: 23818-077
Rev No.: D



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- BUILDING 195 REMOVAL LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL SOIL SAMPLING LOCATION
- RI SOIL SAMPLING LOCATION

N

SOIL SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC FOR :
- PESTICIDES/PCBs

SOIL SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :
- PESTICIDES/PCBs

SAMPLE ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

098-0006 0.5
AROCLOR 1254 ***300***

ANALYTE — CONCENTRATION in µg/kg

Analyte	PSC
AROCLOR 1254	220 µg/kg (Federal Residential PRG)

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
µg/kg – MICROGRAMS PER KILOGRAM
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
PRG – PRELIMINARY REMEDIATION GOAL
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

RI/FS Report for IR Site 35

Figure 4-1

Soil Sampling Results for Analytes Above PSC – Area of Concern 8

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 11/14/06
File No.: 077L14485
Job No.: 23818-077
Rev No.: D

TABLES

Table 3-1
Sample Analysis Summary, AOC 8

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE			
				PAHs	TPH	Pest/PCBs	PCBs
Soil							
098-002-004	098-0004	EBS	0.5–1		X[a]		
098-002-005	098-0005	EBS	0.33–0.83		X[a]		
098-002-006	098-0006[b]	EBS	0.5–1		X[a]	X	
098-003-030	098-0034	EBS	0.5–1			X	
098-003-030	098-0035	EBS	3.5–4			X	
098-003-034	098-0041	EBS	3.5–4		X[a]	X	
AA21	0040-WHA-530	PAH TCRA	1–1.5	X			
AA21RA	0040-WHA-0364	PAH TCRA	1.5–2	X			
AA21RB	0040-WHA-0369	PAH TCRA	1.5–2	X			
BB21	0040-WHA-517	PAH TCRA	2–2.5	X			
BB22RA	0040-WHA-0365	PAH TCRA	1–1.5	X			
CC21	0040-WHA-506	PAH TCRA	0.5–1	X			
CC22	0040-WHA-0471	PAH TCRA	1.5–2	X			
32EDC-5-106	C032CC21	PAH Study	0–0.5	X			
32EDC-5-106	C032CC22	PAH Study	0.5–2	X			
32EDC-5-106	C032CC23	PAH Study	2–4	X			
32EDC-5-106	C032CC24	PAH Study	4–8	X			
A08SB01	C077S111	Site 35 RI	1–1.5				X
A08SB01	C077S112	Site 35 RI	3–3.5				X
A08SB02	C077S113	Site 35 RI	1–1.5				X
A08SB02	C077S114	Site 35 RI	3–4				X
A08SB03	C077S115	Site 35 RI	1–1.5				X
A08SB03	C077S116	Site 35 RI	3–3.5				X
A08SB04	C077S117	Site 35 RI	1–1.5				X
A08SB04	C077S118	Site 35 RI	3–3.5				X
A08SB05	C077S119	Site 35 RI	1–1.5				X
A08SB05	C077S120	Site 35 RI	3–3.5				X

References:

EBS (IT 2001a)
PAH Study (BEI 2005a)
PAH TCRA (FWEC 2004)

Notes:

[a] analyzed for gasoline-, diesel-, and motor oil–range TPH

[b] this sample was also reanalyzed and thus is shown as sample 098-0006RE on Figure 1-1

Acronyms/Abbreviations:

AOC – area of concern
bgs – below ground surface
EBS – environmental baseline survey
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
Pest – pesticides
RI – remedial investigation
TCRA – time-critical removal action
TPH – total petroleum hydrocarbons

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 8

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	TPH ESL
Fuels (µg/kg)									
motor oil	4	3	75	0	32,000	110,000	240,000	—[c]	500,000
Semivolatile Organic Compounds (µg/kg)									
acenaphthylene	11	3	27	No PSC	1.3	2	3.1	—	—
anthracene	11	5	45	0	0.4	2.4	5.2	22,000,000	—
benz(a)anthracene	11	7	64	0	4.4	12	26	620	—
benzo(b)fluoranthene	11	9	82	0	1	12	35	620	—
benzo(k)fluoranthene	11	7	64	0	3	11	31	380 [d]	—
benzo(g,h,i)perylene	11	6	55	No PSC	2.3	35	140	—	—
benzo(a)pyrene	11	10	91	0	3	14	39	62	—
chrysene	11	7	64	0	5.5	15	30	3,800 [d]	—
dibenz(a,h)anthracene	11	4	36	0	1.7	22	79	62	—
fluoranthene	11	11	100	0	0.52	24	77	2,300,000	—
fluorene	11	1	9.1	0	1.5	1.5	1.5	2,700,000	—
indeno(1,2,3-cd)pyrene	11	8	73	0	0.62	14	39	620	—
2-methylnaphthalene	4	3	75	No PSC	0.36	0.5	0.74	—	—
naphthalene	11	3	27	0	0.58	0.92	1.3	1,700 [d]	—
phenanthrene	11	10	91	No PSC	2	11	37	—	—
pyrene	11	10	91	0	0.95	32	82	2,300,000	—
Pesticides and Polychlorinated Biphenyls (µg/kg)									
Aroclor 1254	14	1	7.1	1	300	300	300	220	—

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

Acronyms/Abbreviations:

AOC – area of concern
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/kg – micrograms per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
TPH – total petroleum hydrocarbons

Table 4-2
Soil Sampling Results, AOC 8

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: 098-002-004	098-002-005	098-002-006	098-003-030	098-003-030	098-003-034	32EDC-5-106	32EDC-5-106	32EDC-5-106
						Sample: 098-0004	098-0005	098-0006	098-0034	098-0035	098-0041	C032CC21	C032CC22	C032CC23
						[a] Depth Interval: 0.5 - 1	0.33 - 0.83	0.5 - 1	0.5 - 1	3.5 - 4	3.5 - 4	0 - 0.5	0.5 - 2	2 - 4
						Collection Date: 16-Nov-94	16-Nov-94	16-Nov-94	19-Oct-95	19-Oct-95	19-Oct-95	31-May-02	31-May-02	31-May-02
Petroleum Hydrocarbons														
motor oil	—[b]	—	500,000	—	µg/kg	32,000 J	240,000 J	69,000 J	NA	NA	26,000 U	NA	NA	NA
SVOCs														
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	1.3 J	3.1 J	1.5 J
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	0.68 J	5.2	0.9 J
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	4.4 J	23	8.2
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	6.4	24	15
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	7.5	31	16
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	14	27	19
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	8.7	35	19
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	5.5	29	12
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	1.7 J	4 J	2.9 J
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	12	60	26
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	5.1 UJ	1.5 J	5.4 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	10	23	15
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	0.39 J	0.36 J	0.74 J
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	0.58 J	0.87 J	1.3 J
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	4.3 J	37	7.6
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	16 J	75 J	39 J
Pesticides/PCBs														
Aroclor 1254	220	—	—	—	µg/kg	NA	NA	**300**[d]	34 U	37 U	39 U	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 8

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: 32EDC-5-106	A08SB01	A08SB01	A08SB02	A08SB02	A08SB03	A08SB03	A08SB04	A08SB04	A08SB05	A08SB05
Sample:						C032CC24	C077S111	C077S112	C077S113	C077S114	C077S115	C077S116	C077S117	C077S118	C077S119	C077S120
[a] Depth Interval:						4 - 8	1 - 1.5	3 - 3.5	1 - 1.5	3 - 4	1 - 1.5	3 - 3.5	1 - 1.5	3 - 3.5	1 - 1.5	3 - 3.5
Collection Date:						31-May-02	07-Dec-05	07-Dec-05	07-Dec-05	07-Dec-05	07-Dec-05	07-Dec-05	07-Dec-05	07-Dec-05	07-Dec-05	07-Dec-05
Petroleum Hydrocarbons																
motor oil	—[b]	—	500,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																
acenaphthylene	—	—	—	—	µg/kg	5.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	5.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	5.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	5.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	5.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	2.3 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	5.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	5.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	5.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	0.52 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluorene	2,700,000	—	—	—	µg/kg	5.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	0.62 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg	5.9 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	5.9 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg	5.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	0.95 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs																
Aroclor 1254	220	—	—	—	µg/kg	NA	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ	100 UJ

Table 4-2
Soil Sampling Results, AOC 8

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	AA21 0040-WHA-530 1 - 1.5 14-May-03	AA21RA 0040-WHA-0364 1.5 - 2 23-Apr-03	AA21RB 0040-WHA-0369 1.5 - 2 23-Apr-03	BB21 0040-WHA-517 2 - 2.5 14-May-03	BB22RA 0040-WHA-0365 1 - 1.5 23-Apr-03	CC21 0040-WHA-506 0.5 - 1 13-May-03	CC22 0040-WHA-0471 1.5 - 2 25-Apr-03
Petroleum Hydrocarbons												
motor oil	—[b]	—	500,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
SVOCs												
acenaphthylene	—	—	—	—	µg/kg	56 U	43 U	44 U	54 U	51 U	58 U	46 U
anthracene	22,000,000	—	—	—	µg/kg	2.2 U	1.7 U	1.8 U	2.2 U	2 U	0.4 J	4.9
benz(a)anthracene	620[c]	—	—	—	µg/kg	5.6 U	6.8	4.4 U	5.4 U	6.9	7	26
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	1 J	6.6	3.8	2.2 U	5.5	9.2	35
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	2.2 U	3.5	1.8 U	2.2 U	3	4.8	11
benzo(g,h,i)perylene	—	—	—	—	µg/kg	7.8 U	8.8	7.1 U	7.6 U	8.1 U	8.1 U	140
benzo(a)pyrene	62[c]	—	—	—	µg/kg	4 J	8	4.8	3 J	6.7	10	39
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	5.6 U	6.5	4.4 U	5.4 U	6.1	14	30
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	**79 J**	17 U	18 U	19 U	20 U	20 U	18 U
fluoranthene	2,300,000	—	—	—	µg/kg	4 J	17	8.1	3 J	23	31	77
fluorene	2,700,000	—	—	—	µg/kg	11 U	8.7 U	8.8 U	11 U	10 U	12 U	9.2 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	5.6 U	8.5	4.4 U	5.4 U	7	5 J	39
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	56 U	43 U	44 U	54 U	51 U	58 U	46 U
phenanthrene	—	—	—	—	µg/kg	2 J	5.8	5.6	4 J	8.4	9	27
pyrene	2,300,000	—	—	—	µg/kg	11 U	20	9.4	27	25	24	82
Pesticides/PCBs												
Aroclor 1254	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[d] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/kg – micrograms per kilogram
NA – not analyzed
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons

Table 5-1
Estimates of Mobility and Persistence for Aroclor 1254, AOC 8

Analyte	K_{oc} (L/kg)	f_{oc}	Percent Sorbed [a]	Half-Life in Soil (years) [b]
Aroclor 1254	3.47E+05	0.0064	100	4.1E+05

Notes:
[a] percent sorbed = $[K_{oc}f_{oc} / (1+K_{oc}f_{oc})] \times 100$
[b] for microbially mediated degradation in soil (Howard et al. 1991)

Acronyms/Abbreviations:
AOC – area of concern
f_{oc} – fraction organic carbon; value for surface soils classified silty sand at AOC 17
K_{oc} – organic carbon partition coefficient
L/kg – liters per kilogram

Table 6-1
Tier 1 Evaluation Results by Exposure Group, AOC 8

Exposure Group [a]	Cancer Risk	Hazard Index
1. All soil and groundwater exposure pathways		
Total [b]	NG	NG
Without metals below background	NG	NG
2. Exposure pathways for soil and vapors from VOCs in groundwater		
Total [b]	3E-06	NC
Without metals below background	NM	NM
3. Exposure pathways for residential use of groundwater		
Total [b]	NG	NG
Without metals below background	NG	NG

Notes:

[a] PAHs are not included

[b] includes all COPCs

Acronyms/Abbreviations:

AOC – area of concern

COPC – chemical of potential concern

NC – not calculated (no COPCs in this group)

NG – no groundwater data

NM – no metals data

PAH – polynuclear aromatic hydrocarbon

VOC – volatile organic compound

Table 6-2
Tier 1 Evaluation Results by Risk Driver, AOC 8

Study Area	Analyte Name	TOTAL		WITHOUT BACKGROUND	
		Hazard Quotient	Cancer Risk	Hazard Quotient	Cancer Risk
AOC 8					
Soil					
	Aroclor 1254	—*	3E-06	—	3E-06
	Total for soil	**0**	**3E-06**	**0**	**3E-06**

Note:
* dash indicates not applicable

Acronym/Abbreviation:
AOC – area of concern

Table 7-1
Summary of RI Results and Recommendations, AOC 8

DQO Problem	DQO Decision Questions	Nature and Extent	Tier 1 Evaluation	Recommendation
A PCB (Aroclor 1254) was reported above the screening criterion in soil collected during the EBS. The extent of contamination was defined southeast of EBS sample 098-0006, but not in the other directions.	Have the nature and extent of contamination been defined?	Yes.	NA	No further action.
	Are contaminants present in soil or groundwater at concentrations that pose unacceptable risk to potential future residents?	NA	Total cancer risk for soil is 3×10^{-6}, within the risk management range. Based on chemical properties of PCBs, PCBs would not be expected to be dissolved in groundwater at AOC 8.	No further action.
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?	NA	NA. Pathway was not evaluated for AOC 8, located approximately 1,300 feet from the nearest surface water body.	No further action.

Acronyms/Abbreviations:
AOC – area of concern
DQO – data quality objective
EBS – environmental baseline survey
NA – not applicable
PCB – polychlorinated biphenyl
RI – remedial investigation

ATTACHMENT I

AREA OF CONCERN 9

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
.San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT ATTACHMENT I, AREA OF CONCERN 9 IR SITE 35, TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

Prepared by:

BECHTEL ENVIRONMENTAL, INC.
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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 9. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station Alameda), Alameda, California (Figure 1-1).

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

AOC 9 is an approximately 0.3-acre area in the central portion of Transfer Parcel Economic Development Conveyance 5 (northeast of the intersection of Todd Street and West Midway Avenue) (Figure 1-1). Most of AOC 9 is in Environmental Baseline Survey (EBS) Parcel 80, with a small portion on the western edge located in EBS Parcel 81. AOC 9 currently consists of a portion of the landscaped area around Building 17 and the entire width of West Midway Avenue located east of Todd Street. AOC 9 is adjacent to the northeastern boundary of IR Site 8, an area of known contamination from pesticides, metals, and polynuclear aromatic hydrocarbons (PAHs) in soil, and benzene and chlorinated hydrocarbons in groundwater.

1.2 HISTORICAL USE

EBS Parcel 80 was historically used for officers' quarters and housing, including a mess hall and school (Building 17), and open space for vehicle parking, gardening, and composting (Photographs 1-1 and 1-2). Household cleaning products were stored in small quantities in the building. A grease trap was located immediately outside the southwestern corner of the building. A grease drum, an oil drip pan, and a 1-quart oil container were observed during the EBS (IT 2001a). However, no visible evidence of the grease trap or related items was observed during an August 2005 site visit by Bechtel Environmental, Inc. The portion of EBS Parcel 81 located in AOC 9 was historically open space.

1.3 PRELIMINARY SCREENING CRITERIA AND BACKGROUND METALS

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this AOC are the following:

- Soil
  - residential preliminary remediation goals (PRGs) (U.S. EPA 2004b), except PAHs classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (DON 2001a)

Photograph 1-1
Southwest Corner of Building 17, View to Northeast

Photograph 1-2
Building 114, View to South

  - environmental screening levels (ESLs) for total petroleum hydrocarbons (TPH) – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)

- Groundwater
  - maximum contaminant levels (MCLs) and advisory level for lead (U.S. EPA 2002, DHS 2006)
  - ESLs for TPH (RWQCB 2005)

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being assessed. For example, groundwater concentrations from all study areas were compared to MCLs, whether or not the groundwater was considered a potential drinking water source in that area. Chemicals of potential concern (COPCs) identified in the health risk evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs.

In addition to the above-listed PSCs, arsenic concentrations in soil at AOC 9 were compared to the following Alameda Point background concentrations to help discriminate between site-related and naturally occurring metals:

- Alameda Point background soil concentrations (95th percentile of the pink data set; Appendix E of the final RI Report of Operable Unit [OU]-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)

For ease of discussion in this report, the Alameda Point 95th percentile concentrations for metals in soil (pink background data set) and groundwater are referred to as "background."

1.4 PREVIOUS INVESTIGATIONS

One investigation, a PAH time-critical removal action (TCRA), included the collection of soil samples at AOC 9 (FWEC 2004). Locations sampled in and around AOC 9 are shown on Figure 1-1. Analytical results for soil samples collected within AOC 9 are summarized in Appendix B.

PAH TCRA soil removals in the West Housing Area were conducted using a grid pattern at several EBS parcels, including an area of EBS Parcel 80 in AOC 9. Soil was removed to a depth of approximately 2 feet below ground surface (bgs) from certain grid areas to address elevated concentrations of PAHs. The excavations were backfilled using clean fill material. Locations of the removals at AOC 9 are shown on Figure 1-1. Only laboratory results for soil samples collected outside of or below the TCRA excavations were reviewed for this report.

Soil samples were collected from three borings during TCRA activities in AOC 9 from soil still in place after the removals (EE46, FF45, and FF46). Samples were collected from these borings at four depth intervals between 0 and 8 feet bgs and analyzed for semivolatile organic compounds. Selected samples from boring FF46 were also analyzed for Aroclors and arsenic. No analytes were reported at concentrations above PSCs.

1.5 ADJACENT SITES

IR Site 8, which contains Corrective Action Area (CAA) 8, is located adjacent to the south of AOC 9. Both are discussed below.

1.5.1 IR Site 8

IR Site 8 is adjacent to the south and upgradient of AOC 9 and is known as the pesticide storage area. The site was operated as the center for weed and pest control for the base by the Navy Public Works Center. Activities previously conducted at IR Site 8 include pesticide storage and mixing, paint stripping, public works maintenance and storage, sandblasting, carpentry, equipment cleaning, and painting. The primary source of contamination on-site is likely historical activities that included the disposal of wastes in sinks and floor drains that flowed through leaking sewer lines. The RI for OU-1 (TtEMI 2004) identified Aroclor 1260 (northeastern corner of IR Site 8), benzo(a)pyrene, and lead as the primary chemicals of concern in soil, as well as benzene and trichloroethene in groundwater. There is a low likelihood that the contaminant plume extends beyond the IR site.

1.5.2 Corrective Action Area 8

CAA-8 includes Building 114 (maintenance, storage, and weed and pest control) and Building 191 (storage). CAA-8 is located within the boundaries of IR Site 8 and is adjacent to the western boundary of IR Site 35 AOC 11 and south of AOC 9. This CAA was reported to have lead in groundwater and soil and benzene in groundwater (TtEMI 2003a).

Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, and geology at AOC 9.

Topography at AOC 9 is relatively flat. The average ground elevation at AOC 9, based on elevation data from the four borings (A09SB01 through A09SB04) advanced during the RI is 10 feet above mean sea level (MSL). Groundwater was encountered during drilling from about 5.5 to 6 feet bgs. Total dissolved solids were reported at a concentration of 2,830 milligrams per liter in the groundwater sample from boring A09SB04.

The groundwater monitoring well nearest to AOC 9 is M08-04, located approximately 20 feet south of AOC 9. A review of groundwater depths in this well over time (September 1991 through April 2004) shows a range in depth to water from approximately 3 to 6.5 feet bgs. The deepest historical groundwater measured in this well was approximately 3 feet above MSL. This value, if subtracted from the ground elevation at AOC 9, would suggest groundwater in the vicinity of this AOC may have been as deep as 7 feet bgs.

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is northwest at AOC 9. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Based on tidal studies performed at other Alameda Point sites, tidal influence would not be expected at AOC 9, located approximately 1,550 feet from Oakland Inner Harbor. Results of tidal studies performed at nearby sites (see Section 2 of the main RI/FS Report) indicated a minimal effect on groundwater elevations in the fill material at the inland well, located approximately 200 feet from Oakland Inner Harbor.

Soil encountered in the four RI borings predominantly consisted of coarse-grained fill material (poorly graded sand, silty sand, and silty sand with gravel) to approximately 6 to 8 feet bgs. Bay sediments consisting of poorly graded sand and lean clay were encountered beneath the fill material to total boring depth (8 to 12 feet bgs). One exception was boring A09SB03, where fill material was encountered to the total boring depth of 8 feet bgs. Additionally, lean clay (most likely Young Bay Mud) was encountered from 11 to 12 feet bgs in boring A09SB04 (see cross sections D-D′ on Figure 2-8 of the main RI/FS Report). RI boring logs are presented in Appendix D. As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust may be located beneath AOC 9; however, it was not encountered in borings advanced to 12 feet bgs during the RI.

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Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for AOC 9. The RI was conducted in accordance with the sitewide data quality objectives (DQOs) for the evaluation of AOCs presented in Table 3-1 of the main RI/FS Report.

3.1 APPROACH

RI sampling at AOC 9 addressed a request by regulatory agencies to further assess whether pesticides are present in soil due to the area's proximity to IR Site 8 and to evaluate potential contaminants from a grease trap formerly located in AOC 9.

3.2 SCOPE

Soil samples were collected during the 2005 RI from four borings at AOC 9; three soil samples were collected from each boring and a groundwater sample was collected from the soil boring assumed to be downgradient from the grease trap. All soil samples were analyzed for pesticides. The bottom two soil samples collected from boring A09SB04 and the groundwater sample were analyzed for TPH as diesel, jet propellant grade 5, and motor oil. Table 3-1 summarizes samples collected during the RI and previous investigations. Figure 1-1 shows sampling locations from all investigations.

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Section 4
NATURE AND EXTENT OF CONTAMINATION

This section discusses analytical results from previous investigations and from the RI, and describes the concentration ranges and spatial distributions of the analytes identified at AOC 9. Soil and groundwater samples were collected at seven locations during the 2002 PAH TCRA (FWEC 2004) and the RI (Table 3-1 and Figure 1-1). Statistical summaries of soil and groundwater results are presented in Tables 4-1 and 4-2, and soil and groundwater analytical results are summarized in Tables 4-3 through 4-4. Complete analytical results for historical and RI samples collected within AOC 9 are included in Appendices B and G, respectively.

4.1 SOIL SAMPLING RESULTS

Analytical soil sampling results are discussed for each class of chemicals investigated at AOC 9.

4.1.1 Semivolatile Organic Compounds

PAHs were reported in soil from borings EE46, FF45, and FF46. B(a)P equivalent concentrations were below the PSC.

4.1.2 Pesticides and Polychlorinated Biphenyls

The pesticide endrin was reported in soil from boring A09SB04 at a concentration below the PSC. Pesticides/polychlorinated biphenyls were not reported at concentrations above laboratory detection limits in any other samples.

4.1.3 Total Petroleum Hydrocarbons

Diesel- and motor oil–range TPH was reported in soil from boring A09SB04 at concentrations below PSCs.

4.1.4 Arsenic

Arsenic was reported in soil from boring FF46 at concentrations above the PSC. Arsenic concentrations ranged from 2.3 to 5.5 milligrams per kilogram (mg/kg) at depths of 0 to 2 feet bgs. These concentrations were above the California residential PRG of 0.062 mg/kg, but were below the background concentration of 9.14 mg/kg.

4.2 GROUNDWATER SAMPLING RESULTS

Groundwater samples were not collected at AOC 9 during previous investigations. During the RI, a groundwater sample from boring A09SB04 was analyzed for TPH. TPH was not reported at concentrations above laboratory detection limits.

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Section 5
CONCEPTUAL SITE MODEL

The conceptual site model for AOC 9 facilitates understanding of the present AOC conditions by integrating AOC-specific physical characteristics, nature and extent of contaminants in the physical system, and potential migrations pathways.

Based on a review of borings logs for AOC 9, the subsurface lithology at AOC 9 consists of generally homogeneous artificial fill material comprising poorly graded sand, silty sand, and silty sand with gravel and underlain by poorly graded sand and lean clay of the Young Bay Mud. Shallow groundwater of the first water-bearing zone beneath AOC 9 occurs in the fill material or coarse-grained bay sediments; the underlying Young Bay Mud would be expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. Groundwater flow direction is approximately northwest, and groundwater may have historically been as deep as 7 feet bgs.

Reported concentrations of chemicals at AOC 9 were not above PSCs; therefore, fate and transport are not discussed. However, a general fate and transport discussion for the classes of chemical reported at IR Site 35 is included in Section 5 of the main RI/FS Report.

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Section 6
TIER 1 EVALUATION

This section summarizes the Tier 1 risk evaluation results for AOC 9. In a Tier 1 evaluation, risk for a residential exposure scenario is assessed with the assumption that no remedial action would take place at the study area. This section also presents a qualitative uncertainty evaluation that identifies and characterizes the effects of uncertainties on the risk results.

A Tier 1 evaluation is a screening-level approach that calculates total cumulative risk values using published risk-based guidelines from the United States Environmental Protection Agency (U.S. EPA), California Environmental Protection Agency (Cal/EPA), and San Francisco Bay Regional Water Quality Control Board. The Tier 1 evaluation includes all chemicals identified in at least one sample except for PAHs in soil. PAHs in soil are not included because site-specific remediation goals for PAHs are being developed. The approach used to estimate risk is described in Section 6 of the main RI/FS Report. Tier 1 information is provided in Appendix J.

Cancer risk and noncancer values for AOC 9 are shown in Table 6-1. Risk drivers for cancer and noncancer risk are presented in Table 6-2.

6.1 COPC IDENTIFICATION

The data selection and identification of COPCs are based on a compilation of all usable data for soil and groundwater. All chemicals reported in at least one sample collected during the RI and/or included in the historical data were included as Tier 1 COPCs.

There are two Tier 1 COPCs in soil at AOC 9: one metal (arsenic) based on 4 samples and one pesticide (endrin) based on 12 samples.

Groundwater data, other than for TPH, were not collected in accordance with the Work Plan (BEI 2006); therefore, no groundwater COPCs were identified.

6.2 RISK CHARACTERIZATION

The cancer risk and noncancer hazard values were calculated using the Tier 1 protocol from Cal/EPA (2005). The maximum concentration of each COPC in soil and groundwater was compared with a risk-based guideline to estimate cancer and noncancer risks. Because groundwater data other than for TPH were deemed unnecessary, two results are presented for one exposure group, the total risk and a second value that does not include risk associated with metals concentrations that are below background.

For soil at AOC 9, the total cancer risk of 9×10^{-5} and noncancer hazard value of 0.001 are based on exposure pathways for soil only (Exposure Group 2). Without metals below background, the noncancer hazard value is 0.001. There are no COPCs with risk-based guidelines for cancer when metals below background are eliminated, and so a cancer risk was not estimated. The total cancer risk is within the risk management range, and noncancer hazard value is below 1.

6.3 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation are representative of any potential health concerns at AOC 9. The results are consistent with the site history and previous investigations. Twelve samples for pesticides are considered an adequate number for this approximately 0.3-acre site.

6.4 CONCLUSIONS

For AOC 9, total cancer risk and noncancer hazard index (HI) including metals below background are 9×10^{-5} and less than 1, respectively, for Exposure Group 2.

Because groundwater data were deemed unnecessary, only Exposure Group 2 results were calculated. For reasonable future use without metals below background, the noncancer hazard is below 1. There are no COPCs with risk-based guidelines for cancer when metals below background are eliminated.

Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at AOC 9, including the nature and extent of contamination and results of the Tier 1 risk evaluation. Results form the basis of responses to the DQO decisions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendations presented below.

7.1 SUMMARY

The RI at AOC 9 addressed a request by regulatory agencies to further assess whether pesticides are present in soil due to the area's proximity to IR Site 8 and to evaluate potential contaminants from a grease trap formerly located in AOC 9.

Chemicals at AOC 9 were not reported in soil or groundwater above PSCs. Reported arsenic concentrations in soil were below background.

Results of the Tier 1 risk evaluation show a total cancer risk for soil of 9×10^{-5} (within the risk management range), due to arsenic in soil; the hazard index is below 1. Without arsenic, which was reported at a concentration below background, there is no estimated cancer risk because arsenic is the only COPC at AOC 9 classified as a carcinogen.

7.2 AOC 9 CONCLUSIONS AND RECOMMENDATIONS

The RI was conducted using the seven-step U.S. EPA DQO process (U.S. EPA 2000); DQOs were developed for AOC 9 in the Work Plan (BEI 2006). The RI has addressed these DQOs, as summarized in Table 7-1.

The data collected during the RI were sufficient to define the nature and extent, perform a Tier 1 evaluation of risk, and support decisions on the necessity for remedial actions at AOC 9.

No further action is recommended for AOC 9. Further evaluation of the extent of the metal arsenic in soil is not recommended for the following reasons.

- Chemicals were not identified at concentrations above PSCs.
- The noncancer HI is less than 1, and without metals below background, no carcinogenic COPCs were identified.
- Groundwater impacts are not a concern because pesticides in soil are generally not soluble or mobile and do not readily migrate to groundwater.
- All reported arsenic concentrations were below background.

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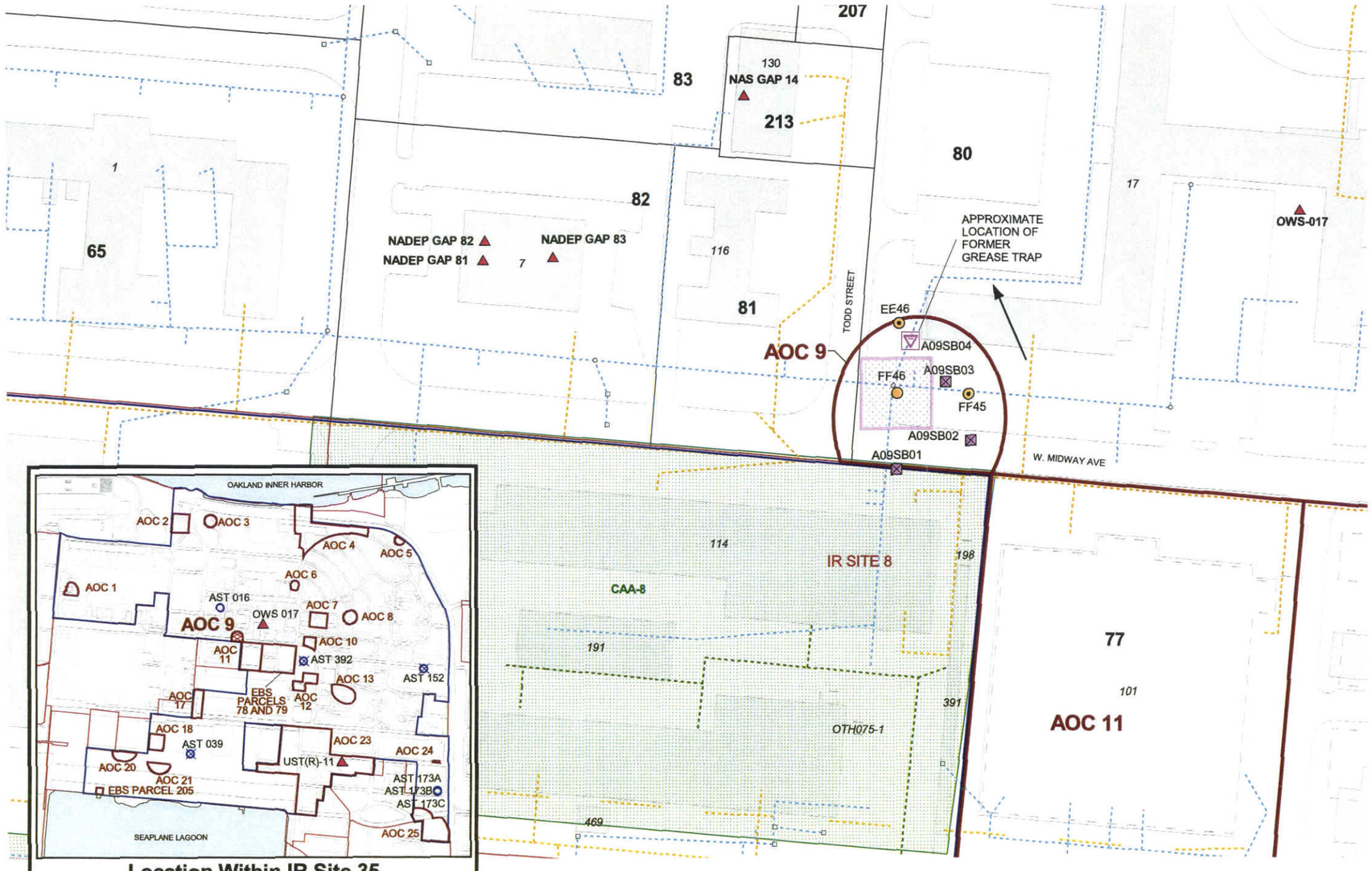
FIGURE



Location Within IR Site 35

1500 0 1500 Feet

LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- CORRECTIVE ACTION AREA (CAA)
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

PAH REMOVAL ACTION SOIL SAMPLING LOCATION WITH STATION ID
- SVOCs ANALYSIS ONLY
- SVOCs, PESTICIDES/PCBs, AND METALS ANALYSES ONLY

RI SOIL SAMPLING LOCATION WITH STATION ID
- FUELS AND PESTICIDES/PCBs ANALYSES ONLY
- PESTICIDES/PCBs ANALYSES ONLY

RI GROUNDWATER SAMPLING LOCATION WITH STATION ID
- FUELS ANALYSIS ONLY

N

NOTES:

AOC -- AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC -- ECONOMIC DEVELOPMENT CONVEYANCE
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
NADEP – NAVAL AVIATION DEPOT
NAS – NAVAL AIR STATION
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK

100 0 100 Feet

RI/FS Report for IR Site 35

Figure 1-1

Study Area and Sampling Locations
Area of Concern 9

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 11/2/06
File No.: 077L14450
Job No.: 23818-077
Rev No.: D

TABLES

Table 3-1
Sample Analysis Summary, AOC 9

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE					
				PAHs	TPH	Pesticides	PCBs	Arsenic	TDS
Soil									
EE46	0040-WHA-1619	PAH TCRA	0–0.5	X					
EE46	0040-WHA-1620	PAH TCRA	0.5–2	X					
EE46	0040-WHA-1621	PAH TCRA	2–4	X					
EE46	0040-WHA-1622	PAH TCRA	4–8	X					
FF45	0040-WHA-1627	PAH TCRA	0–0.5	X					
FF45	0040-WHA-1628	PAH TCRA	0.5–2	X					
FF45	0040-WHA-1629	PAH TCRA	2–4	X					
FF45	0040-WHA-1630	PAH TCRA	4–8	X					
FF46	0040-WHA-5096	PAH TCRA	0–0.5	X			X	X	
FF46	0040-WHA-5097 (FD)	PAH TCRA	0–0.5	X			X	X	
FF46	0040-WHA-6123	PAH TCRA	0.5–2	X			X	X	
FF46	0040-WHA-6124 (FD)	PAH TCRA	0.5–2	X			X	X	
FF46	0040-WHA-1625	PAH TCRA	2–4	X					
FF46	0040-WHA-1626	PAH TCRA	4–8	X					
A09SB01	C077S131	Site 35 RI	1.5–2			X			
A09SB01	C077S132	Site 35 RI	3.5–4			X			
A09SB01	C077S133	Site 35 RI	7.5–8			X			
A09SB02	C077S134	Site 35 RI	1.5–2			X			
A09SB02	C077S135	Site 35 RI	3.5–3			X			
A09SB02	C077S136	Site 35 RI	7–8			X			
A09SB03	C077S137	Site 35 RI	1.5–2			X			
A09SB03	C077S138	Site 35 RI	3.5–4			X			
A09SB03	C077S139	Site 35 RI	7.5–8			X			
A09SB04	C077S140	Site 35 RI	1.5–2			X			
A09SB04	C077S141	Site 35 RI	3.5–4		X*	X			
A09SB04	C077S142	Site 35 RI	7.5–8		X*	X			
Groundwater									
A09SB04	C077G041	Site 35 RI	7–12		X*				X

Table 3-1
Sample Analysis Summary, AOC 9

Reference: PAH TCRA (FWEC 2004)

Note:
* analyzed for diesel-, JP-5–, and motor oil–range TPH

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
FD – field duplicate
JP-5 – jet propellant grade 5
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
RI – remedial investigation
TCRA – time-critical removal action
TDS – total dissolved solids
TPH – total petroleum hydrocarbons

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 9

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
Fuels (µg/kg)										
diesel	2	1	50	0	11,000	11,000	11,000	—[c]	100,000	—
motor oil	2	1	50	0	13,000	13,000	13,000	—	500,000	—
Semivolatile Organic Compounds (µg/kg)										
acenaphthene	14	2	14	0	1.1	1.8	2.4	3,700,000	—	—
acenaphthylene	14	5	36	No PSC	1.8	7.8	21	—	—	—
anthracene	14	6	43	0	0.8	9.6	35	22,000,000	—	—
benz(a)anthracene	14	10	71	0	2.8	21	94	620	—	—
benzo(b)fluoranthene	14	12	86	0	3.9	22	78	620	—	—
benzo(k)fluoranthene	14	12	86	0	2	17	89	380 [d]	—	—
benzo(g,h,i)perylene	14	10	71	No PSC	4.7	25	72	—	—	—
benzo(a)pyrene	14	12	86	0	2	27	120	62	—	—
chrysene	14	10	71	0	3.5	25	110	3,800 [d]	—	—
dibenz(a,h)anthracene	14	4	29	0	2.8	7.9	15	62	—	—
fluoranthene	14	12	86	0	6.2	47	260	2,300,000	—	—
fluorene	14	2	14	0	3.1	6.2	9.2	2,700,000	—	—
indeno(1,2,3-cd)pyrene	14	10	71	0	3.7	22	63	620	—	—
naphthalene	14	9	64	0	0.44	1.5	2.6	1,700 [d]	—	—
phenanthrene	14	12	86	No PSC	1	29	190	—	—	—
pyrene	14	12	86	0	6	52	270	2,300,000	—	—
Pesticides and Polychlorinated Biphenyls (µg/kg)										
endrin	12	1	8.3	0	21	21	21	18,000	—	—
Metals (mg/kg)										
arsenic	4	4	100	0	2.3	3.5	5.5	0.062 [d]	—	9.14

Notes:
[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[b] data review qualifiers are not included in this table
[c] dash indicates not applicable or not established
[d] California PRG

Acronyms/Abbreviations:
AOC – area of concern
ESL – environmental screening level
(San Francisco Bay Regional Water Quality Control Board)
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
TPH – total petroleum hydrocarbons

Table 4-2
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, AOC 9

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC	Minimum [a]	Average [a]	Maximum [a]	California MCL
General Chemistry (µg/L)								
solids, total dissolved	1	1	100	No PSC	2,830,000	2,800,000	2,830,000	—[b]

Notes:

[a] data review qualifiers are not included in this table

[b] dash indicates not applicable or not established

Acronyms/Abbreviations:

AOC – area of concern

µg/L – micrograms per liter

MCL – maximum contaminant level

PSC – preliminary screening criterion (MCL)

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Table 4-3
Soil Sampling Results, AOC 9

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: A09SB01	A09SB01	A09SB01	A09SB02	A09SB02	A09SB02	A09SB03	A09SB03	A09SB03	A09SB04	A09SB04	A09SB04
						Sample: C077S131	C077S132	C077S133	C077S134	C077S135	C077S136	C077S137	C077S138	C077S139	C077S140	C077S141	C077S142
						[a]Depth Interval: 1.5 - 2	3.5 - 4	7.5 - 8	1.5 - 2	3.5 - 4	7 - 8	1.5 - 2	3.5 - 4	7.5 - 8	1.5 - 2	3.5 - 4	7.5 - 8
						Collection Date: 16-Dec-05	16-Dec-05	16-Dec-05	16-Dec-05	16-Dec-05	16-Dec-05	16-Dec-05	16-Dec-05	16-Dec-05	16-Dec-05	16-Dec-05	16-Dec-05
Petroleum Hydrocarbons																	
diesel	—[b]	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,100 UJ	11,000 J
motor oil	—	—	500,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11,000 U	13,000
SVOCs																	
acenaphthene	3,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs																	
endrin	18,000	—	—	—	µg/kg	5 UJ	5 UJ	6 UJ	6 UJ	6 UJ	6 UJ	5 UJ	5 UJ	6 UJ	21 J	5 UJ	6 UJ
Metals																	
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 9

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: EE46 / Sample: 0040-WHA-1619 / [a] Depth Interval: 0 - 0.5 / Collection Date: 16-Jul-03	EE46 / 0040-WHA-1620 / 0.5 - 2 / 16-Jul-03	EE46 / 0040-WHA-1621 / 2 - 4 / 16-Jul-03	EE46 / 0040-WHA-1622 / 4 - 8 / 16-Jul-03	FF45 / 0040-WHA-1627 / 0 - 0.5 / 16-Jul-03	FF45 / 0040-WHA-1628 / 0.5 - 2 / 16-Jul-03	FF45 / 0040-WHA-1629 / 2 - 4 / 16-Jul-03
Petroleum Hydrocarbons												
diesel	—[b]	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
SVOCs												
acenaphthene	3,700,000	—	—	—	µg/kg	5.1 U	5.1 U	5.1 U	5.6 U	5 U	5 U	5.1 U
acenaphthylene	—	—	—	—	µg/kg	1.8 J	5.1 U	1.8 J	5.6 U	2.6 J	5 U	5.1 U
anthracene	22,000,000	—	—	—	µg/kg	5.1 U	1.6 J	1.6 J	5.6 U	2.7 J	5 U	5.1 U
benz(a)anthracene	620[c]	—	—	—	µg/kg	9.2	12	11	2.8 J	16	8	6.6
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	16	21	17	3.9 J	32	18	11
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	4.7 J	6.6	14 J	3.4 J	11	4.7 J	8.8
benzo(g,h,i)perylene	—	—	—	—	µg/kg	14	18	20	4.7 J	38 J	20 J	10
benzo(a)pyrene	62[c]	—	—	—	µg/kg	13	19	22	5.4 J	28	17	13
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	11	14	15	3.5 J	20	9.3	9.8
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	5.1 U	5.1 U	4.3 J	5.6 U	5 UJ	5 UJ	2.8 J
fluoranthene	2,300,000	—	—	—	µg/kg	15	21	24	6.2	32	16	13
fluorene	2,700,000	—	—	—	µg/kg	5.1 U	5.1 U	5.1 U	5.6 U	5 U	5 U	5.1 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	14	19	15	3.7 J	33 J	19 J	8.4
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	2.2 J	1.8 J	0.81 J	5.6 U	1.8 J	1.6 J	0.72 J
phenanthrene	—	—	—	—	µg/kg	8	10	8.1	2.3 J	19	6.8	5 J
pyrene	2,300,000	—	—	—	µg/kg	17	24	36 J	9.3 J	37	20	22 J
Pesticides/PCBs												
endrin	18,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Metals												
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 9

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: FF45 / Sample: 0040-WHA-1630 / [a]Depth Interval: 4 - 8 / Collection Date: 16-Jul-03	FF46 / 0040-WHA-1625 / 2 - 4 / 16-Jul-03	FF46 / 0040-WHA-1626 / 4 - 8 / 16-Jul-03	FF46 / 0040-WHA-5096 / 0 - 0.5 / 25-Aug-03	FF46 / 0040-WHA-5097 / 0 - 0.5 / 25-Aug-03	FF46 / 0040-WHA-6123 / 0.5 - 2 / 25-Aug-03	FF46 / 0040-WHA-6124 / 0.5 - 2 / 25-Aug-03
Petroleum Hydrocarbons												
diesel	—[b]	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
SVOCs												
acenaphthene	3,700,000	—	—	—	µg/kg	5.4 U	1.1 J	2.4 J	110 U	110 U	100 U	100 U
acenaphthylene	—	—	—	—	µg/kg	5.4 U	12	21	54 U	55 U	52 U	52 U
anthracene	22,000,000	—	—	—	µg/kg	5.4 U	16	35	2.2 U	2.2 U	2.1 U	0.8 J
benz(a)anthracene	620[c]	—	—	—	µg/kg	3.7 J	45	94	5.4 U	5.5 U	5.2 U	5.2 U
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	5.5	49	78	2.2 U	2.2 U	6.2	6.2
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	4.2 J	53 J	89	2.2 U	2.2 U	2 J	2 J
benzo(g,h,i)perylene	—	—	—	—	µg/kg	5.3 J	46 J	72 J	7.6 U	7.7 U	7.3 U	7.3 U
benzo(a)pyrene	62[c]	—	—	—	µg/kg	6.5	**73**[d]	**120**	5.4 U	5.5 U	2 J	3 J
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	4.6 J	54	110	5.4 U	5.5 U	5.2 U	5.2 U
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	5.4 U	9.3 J	15 J	18 U	19 U	18 U	18 U
fluoranthene	2,300,000	—	—	—	µg/kg	9	150	260	5.4 U	5.5 U	7	8
fluorene	2,700,000	—	—	—	µg/kg	5.4 U	3.1 J	9.2	11 U	11 U	10 U	10 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	4.3 J	40 J	63 J	5.4 U	5.5 U	5.2 U	5.2 U
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	0.44 J	1.6 J	2.6 J	54 U	55 U	52 U	52 U
phenanthrene	—	—	—	—	µg/kg	4.5 J	89	190	4.3 U	4.4 U	1 J	8
pyrene	2,300,000	—	—	—	µg/kg	14 J	160 J	270 J	11 U	11 U	6 J	6 J
Pesticides/PCBs												
endrin	18,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Metals												
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	**2.3**	**2.3**	**3.9**	**5.5**

Notes:
- [a] feet below ground surface
- [b] dash indicates not applicable or not established
- [c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
- [d] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL

Review Qualifiers:
- J – indicates an estimated value
- U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
- UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Acronyms/Abbreviations:
- AOC – area of concern
- B(a)P – benzo(a)pyrene
- Cal – California
- ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
- Fed – federal
- µg/kg – micrograms per kilogram
- mg/kg – milligrams per kilogram
- NA – not analyzed
- PAH – polynuclear aromatic hydrocarbon
- PCB – polychlorinated biphenyl
- PRG – preliminary remediation goal
- PSC – preliminary screening criterion
- Res – residential
- SVOC – semivolatile organic compound
- TPH – total petroleum hydrocarbons

Table 4-4
Groundwater Sampling Results, AOC 9

Analyte	PRELIMINARY SCREENING CRITERIA Federal MCL	California MCL	GW TPH ESL	Back-ground	Result Units	Station ID: A09SB04 Sample: C077G041 [a] Depth Interval: 7 - 12 Collection Date: 16-Dec-05
Petroleum Hydrocarbons						ND
General Chemistry						
solids, total dissolved	—[b]	—	—	—	µg/L	2,830,000

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established

Acronyms/Abbreviations:
AOC – area of concern
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
GW – groundwater
µg/L – micrograms per liter
MCL – maximum contaminant level
ND – not detected
TPH – total petroleum hydrocarbons

Table 6-1
Tier 1 Evaluation Results by Exposure Group, AOC 9

Exposure Group [a]	Cancer Risk	Hazard Index
1. All soil and groundwater exposure pathways		
Total [b]	NG	NG
Without metals below background	NG	NG
2. Exposure pathways for soil and vapors from VOCs in groundwater		
Total [b]	9E-05	0.001
Without metals below background	NC	0.001
3. Exposure pathways for residential use of groundwater		
Total [b]	NG	NG
Without metals below background	NG	NG

Notes:
[a] PAHs are not included
[b] includes all COPCs

Acronyms/Abbreviations:
AOC – area of concern
COPC – chemical of potential concern
NC – not calculated (no COPCs in this group)
NG – no groundwater data
PAH – polynuclear aromatic hydrocarbon
VOC – volatile organic compound

Table 6-2
Tier 1 Evaluation Results by Risk Driver, AOC 9

Study Area	Analyte Name	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND Hazard Quotient	WITHOUT BACKGROUND Cancer Risk
AOC 9					
Soil					
	arsenic	—*	9E-05	—	—
	Total for soil	**0.001**	**9E-05**	**0.001**	**0E+00**

Note:
* dash indicates not applicable

Acronym/Abbreviation:
AOC – area of concern

Table 7-1
Summary of RI Results and Recommendations, AOC 9

DQO Problem	DQO Decision Questions	Nature and Extent	Tier 1 Evaluation	Recommendation
Regulatory agencies requested further assessment as to whether pesticides are present in soil due to the area's proximity to IR Site 8 and to evaluate potential contaminants from a grease trap formerly located in AOC 9.	Have the nature and extent of contamination been defined?	Yes. Definition is considered adequate. Chemicals were not reported above PSCs. Results of RI sampling indicate that AOC 9 has not been significantly impacted by pesticides from the adjacent IR Site 8 or by TPH from the former grease trap.	NA	No further action.
	Are contaminants present in soil or groundwater at concentrations that pose unacceptable risk to potential future residents?	NA	Results of the Tier 1 risk evaluation show a total cancer risk for soil of 9×10^{-5} (within the risk management range), due to arsenic in soil; the HI is below 1. Without arsenic, which is below background, there is no estimated cancer risk because arsenic is the only COPC at AOC 9 classified as a carcinogen.	No further action.
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?	NA	NA. Pathway was not evaluated for AOC 9, located approximately 1,550 feet from the nearest surface water body.	No further action.

Acronyms/Abbreviations:
AOC – area of concern
COPC – chemical of potential concern
DQO – data quality objective
HI – hazard index
IR – Installation Restoration
NA – not applicable
PSC – preliminary screening criterion
RI – remedial investigation
TPH – total petroleum hydrocarbons

ATTACHMENT J

AREA OF CONCERN 10

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL
REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT
ATTACHMENT J, AREA OF CONCERN 10
IR SITE 35, TRANSFER PARCEL EDC-5
ALAMEDA POINT
ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

Prepared by:

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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 10. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station Alameda), Alameda, California (Figure 1-1).

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

AOC 10 is an approximately 0.4-acre area in the central portion of Transfer Parcel Economic Development Conveyance (EDC)-5 (Figure 1-1), and along the west-central edge of Environmental Baseline Survey (EBS) Parcel 98. The two buildings (FH-23 and FH-24, Photograph 1-1) located on-site are residences currently occupied by tenants. A radio antenna tower (Structure 036B) was also historically located on-site.

1.2 HISTORICAL USE

Prior to its removal in December 1995, the radio antenna tower had been used as a communications antenna since its construction in 1953. The footings for the tower were removed in October 2001. The portion of EBS Parcel 98 located in AOC 10 is in the West Housing Area. The two on-site buildings were used for housing.

Photograph 1-1
Residences, Buildings FH-23 and FH-24, View to Northeast

1.3 PRELIMINARY SCREENING CRITERIA

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this AOC are the following:

- Soil
  - residential preliminary remediation goals (PRGs) (U.S. EPA 2004b), except polynuclear aromatic hydrocarbons (PAHs) classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (DON 2001a)
  - environmental screening levels for total petroleum hydrocarbons (TPH) – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)
  - lead removal action objective of 199 milligrams per kilogram (mg/kg) (TtEMI 2002b)

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being assessed.

1.4 PREVIOUS INVESTIGATIONS

During two previous investigations, soil samples were collected at AOC 10, and results are summarized below. Locations sampled in AOC 10 are shown on Figure 1-1. Analytical results for soil samples collected within AOC 10 are provided in Appendix B.

1.4.1 2002 Polynuclear Aromatic Hydrocarbon Study

One soil boring (32EDC-5-84) was advanced in AOC 10 during the 2002 PAH study (BEI 2005a). Samples were collected from four depth intervals between 0 and 8 feet below ground surface (bgs) and analyzed for PAHs. B(a)P equivalent concentrations reported in all soil samples from this boring were below the PSC.

1.4.2 Lead Removal Action

Based on potential historical use of lead-based paint (LBP) and elevated lead concentrations in soil samples collected around the two water towers near AOC 10, an investigation was conducted to assess the extent of lead contamination surrounding other structures, including the radio antenna tower (Structure 036B) located in AOC 10 (TtEMI 2002b).

Soil samples were collected from several locations around the radio antenna tower in AOC 10. Locations of 18 samples collected from soil not removed during subsequent removal actions (discussed below) are shown on Figure 1-1 (SS-36B-C00, -E25, -E50, -N25, -N50, -N75, -NE50, -NE75, -NW25, -NW50, -NW75, -S25, -SE25, -SE50, -SW25, -W25, -W50, and -W75).

An engineering evaluation/cost analysis (EE/CA) was completed in 2002 (TtEMI 2002b). The EE/CA presented a framework for evaluating the best remedial technologies to address LBP on the former antenna tower in AOC 10 and lead-impacted soil near the structure. During the EE/CA, a site-specific human-health lead removal action objective (199 mg/kg) was developed using the Lead Risk Assessment Spreadsheet 7 model from the California Environmental Protection Agency Department of Toxic Substances Control.

A lead non-time-critical removal action (NTCRA) was conducted by the Navy between November 2002 and July 2003 (Shaw 2003). During this NTCRA, soil was removed to 1 to 2 feet bgs in AOC 10. Soil samples were analyzed for metals including lead, total chromium, and hexavalent chromium. One sample (88-001) was collected from fill material before placement. This sample was analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), TPH, pesticides/polychlorinated biphenyls (PCBs), and metals. None of the chemicals were reported in the sample of fill material above laboratory detection limits.

Results of the confirmation sampling conducted as part of the NTCRA indicated that the metals concentrations were below the removal action objective for lead. However, analytical results for soil samples collected on the south side of the excavation during previous sampling indicate the presence of lead at concentrations above the removal action objective (Figure 4-1) at five locations (SS-36B-S25, -SE50, -SW25, -W50, and -W75). The soil with these elevated lead concentrations was not removed due to the presence of hardscape cover over these areas.

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Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, and geology at AOC 10.

Topography at AOC 10 is relatively flat. The average ground elevation at AOC 10, based on elevation data from the five borings (A10SB01 through A10SB05) advanced during the RI, is 12 feet above mean sea level (MSL). Groundwater was encountered during drilling in the five RI borings at approximately 5 feet bgs.

The groundwater monitoring well nearest to AOC 10 is M08-04, located approximately 750 feet west of AOC 10. A review of groundwater depths in this well over time (September 1991 through April 2004) shows depth to water from approximately 3 to 6.5 feet bgs. The deepest historical groundwater measured in this well was approximately 3 feet above MSL. This value, if subtracted from the ground elevation at AOC 10, would suggest groundwater in the vicinity of this AOC may have been as deep as 9 feet bgs.

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is northwest at AOC 10. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Based on tidal studies performed at other Alameda Point sites, tidal influence would not be expected at AOC 10, located approximately 1,600 feet from Oakland Inner Harbor. Results of tidal studies performed at nearby sites (see Section 2 of the main RI/FS Report) indicated a minimal effect on groundwater elevations in the fill material at an inland well, located approximately 200 feet from Oakland Inner Harbor.

Soil encountered in the five borings was predominantly coarse-grained sediment with some silt to the total boring depth of 8 feet bgs. Observed lithology consisted of silt with sand, silt with gravel, silty sand with gravel, poorly graded sand with silt and gravel, and poorly graded sand with gravel to about 2.5 to 3 feet bgs, which was underlain by poorly graded sand to total boring depth. One exception was boring A10SB01, where the poorly graded sand was encountered at about 0.5 foot bgs to total boring depth. Fine-grained bay sediment (Young Bay Mud) was not encountered in the borings; however, based on observed lithology in borings at EBS Parcels 78–79 west of AOC 10 and borings at previous PAH sampling locations east and north of AOC 10, it is estimated that the Young Bay Mud is at approximately 10 to 12 feet bgs (see cross section D-D′ on Figure 2-8 and cross section H-H′ on Figure 2-9 of the main RI/FS Report). As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust may be located beneath AOC 10; however, it was not encountered in borings advanced to 8 feet bgs during the RI.

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Section 3

REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for AOC 10. The RI was conducted in accordance with the sitewide data quality objectives (DQOs) for the evaluation of AOCs presented in Table 3-1 of the main RI/FS report.

3.1 APPROACH

RI sampling at AOC 10 addressed the remaining lead concentrations in soil outside the area that was subject to the lead NTCRA. Locations with lead reported at concentrations above the NTCRA removal action objective (199 mg/kg) are situated along the southern perimeter of the excavation area; these locations were not excavated due to the presence of hardscape cover over them (TtEMI 2002b). Therefore, additional samples were collected to assess the extent of lead outside the excavation area.

3.2 SCOPE

Soil samples were collected during the 2005 RI from five borings around previous sampling locations where lead concentrations were above the removal action objective. Three soil samples were collected from each boring from depths of 0.5 to 8 feet bgs and analyzed for lead. Groundwater samples were deemed unnecessary. Table 3-1 summarizes samples collected during the RI and previous investigations. Figure 1-1 shows sampling locations from all investigations.

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Section 4

NATURE AND EXTENT OF CONTAMINATION

This section discusses sampling and analysis from previous investigations and from the RI, and describes the concentration ranges and spatial distributions of the analytes identified at AOC 10. Soil samples were collected at 62 locations during the 2002 PAH Study (BEI 2005a), the lead NTCRA (Shaw 2003), the lead removal action (TtEMI 2002b), and the RI (Table 3-1 and Figure 1-1). Metals reported in soil at concentrations above Alameda Point background are discussed in detail in Section 4.3.3 of the main RI/FS Report. Metals discussion in this section focuses on concentrations above PSCs.

Results for analytes with concentrations above PSCs are illustrated on Figure 4-1. Soil sampling statistics and results are summarized in Tables 4-1 and 4-2. Complete analytical results for historical and RI samples collected within AOC 10 are included in Appendices B and G, respectively.

Analytical soil sampling results are discussed for each class of chemicals investigated at AOC 10.

4.1 VOLATILE ORGANIC COMPOUNDS

VOCs were not reported at concentrations above laboratory detection limits.

4.2 SEMIVOLATILE ORGANIC COMPOUNDS

All SVOCs reported from boring 32EDC-5-84 were PAHs. B(a)P equivalent concentrations were below the PSC. No other SVOCs were reported at concentrations above PSCs.

4.3 TOTAL PETROLEUM HYDROCARBONS

TPH was not reported at concentrations above PSCs.

4.4 PESTICIDES AND POLYCHLORINATED BIPHENYLS

Pesticides and PCBs were not reported at concentrations above laboratory detection limits.

4.5 METALS

Sixteen metals were reported in soil samples from 61 locations. Lead was the only metal reported at concentrations above the PSC. Lead was reported at concentrations from 221 to 819 mg/kg in borings SS-36B-S25, -SE50, -SW25, -W50, and -W75 at depths of 0 to 0.5 foot bgs, and from 0.5 to 1 foot bgs in boring SS-36B-S25. These concentrations were above the PSC (removal action objective of 199 mg/kg). Previous results defined the vertical extent of lead in soil.

Results from the RI borings defined the lateral extent of lead in soil. Lead was not reported at concentrations above the PSC in soil samples collected from the RI borings, which were advanced to the south of the historical borings with PSC exceedances.

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Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for AOC 10. It discusses the conceptual site model, the physical and chemical changes that might occur to contaminants present at AOC 10, and the mechanisms that could potentially transfer the contaminants from the study area. The conceptual site model facilitates understanding of the present AOC conditions by integrating AOC-specific physical characteristics with the nature and extent of contaminants in the physical system. Section 5.2 includes an evaluation of the mobility and persistence of compounds above PSCs not attributable to background identified at AOC 10. Section 5.3 discusses potential migration pathways.

5.1 AOC 10 CONCEPTUAL SITE MODEL

AOC 10 is located in the central portion of Transfer Parcel EDC-5. The study area is flat and most of it is open space covered with grass. The remaining areas of AOC 10 are covered with asphalt and two residential buildings. The nearest surface water is Oakland Inner Harbor, approximately 1,600 feet north of AOC 10.

Based on a review of borings logs, the subsurface lithology at AOC 10 generally consists of coarse-grained sediments with some silt to about 8 feet bgs (the total boring depth explored during the RI). Young Bay Mud was not encountered in the RI borings; however, it is estimated to be at approximately 10 to 12 feet bgs at this AOC. Young Bay Mud is expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. Shallow groundwater of the first water-bearing zone beneath AOC 10 occurs in the fill material. Groundwater, which was encountered at approximately 5 feet bgs in RI borings, flows to the northwest. Groundwater may have been historically as deep as 9 feet bgs. Negligible tidal influence is expected at AOC 10 because of its distance from Oakland Inner Harbor.

Lead was the primary contaminant reported at AOC 10. The source of the lead in soil is LBP from the former radio antenna tower. Lead at concentrations above the PSC was reported in soil samples along the southern extent of the previous lead soil removal action area where soil was not removed due to the presence of hardscape. Confirmation samples did not have lead concentrations above the PSC. The RI samples collected south of the confirmation samples did not have lead concentrations above the PSC, and thereby defined the lateral extent of lead-affected soil. The vertical extent is approximately 1 foot bgs, based on previous sampling. Groundwater samples were not collected at AOC 10.

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in the environment tends to remain in place. The tendency toward immobility and persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Section 5 of the main RI/FS Report discusses the physical and chemical properties of contaminants, and their chemical class (e.g., metals)

that affect their transport and persistence in the environment. This section discusses the mobility and persistence of lead.

Lead is an element and cannot be destroyed; however, lead compounds may be transformed in the environment to other lead compounds. Lead is strongly adsorbed to soil, and therefore it is generally retained in the upper layers of soil and does not leach appreciably into the subsoil and groundwater (ATSDR 2005c). The solubility of lead in soil is dependent on pH, being sparingly soluble at pH 8 and becoming more soluble as the pH approaches 5. Between pH 5 and 3.3, large increases in lead solubility in soil are observed and appear to correlate with the adsorption and dissolution of iron and manganese oxides (ATSDR 2005c).

Lead may mobilize from AOC 10 if lead-bearing soil particles run off to surface waters during heavy rains. Lead may also mobilize from soil to the atmosphere by transport of smaller lead-containing soil particles entrained in the prevailing wind.

An estimate of the mobility of lead in the subsurface is shown in Table 5-1. Estimates indicate that all of the lead would be adsorbed to soil and that if lead were present in groundwater, it would tend to travel 115 times slower than the groundwater flow. The conditions that induce leaching are the presence of lead in soil at concentrations that either approach or exceed the sorption capacity of the soil, the presence in the soil of materials that are capable of forming soluble chelates with lead, and a decrease in the pH of the leaching solution (e.g., acid rain) (NSF 1977).

5.3 CONTAMINANT MIGRATION

The potential migration pathways considered for this AOC include atmospheric transport (i.e., airborne fugitive dust), transport by surface water runoff, and leaching to groundwater. Groundwater transport was not considered because there is no reason to believe that activities at the site have impacted or will impact groundwater. In addition, lead was not reported in soil samples at concentrations above the PSC deeper than approximately 1 foot bgs; therefore, lead is not in contact with groundwater. Leaching of lead from soil to groundwater is not likely at AOC 10 because of lead's high propensity for soil adsorption and the high retardation factor.

The most likely migration pathways for contaminants at AOC 10 are discussed below.

- **Particulate Migration**. Particulate dispersion is a potential mechanism for transporting lead adsorbed to dust particles. Under normal conditions at AOC 10, particulate migration is not a primary transport pathway, since most of the AOC is covered by grass and the remainder is paved or covered by buildings; however, if the surface cover is disturbed, particulate migration could become significant.
- **Surface Water Runoff**. Lead adsorbed to soil particles may be mobilized by heavy rains or irrigation water and transported with surface water runoff. Under normal conditions at AOC 10, surface water runoff is not a primary transport pathway, since the elevated lead concentrations are under pavement. However, if the surface cover is disturbed, surface water runoff could become significant.

Section 6
LEAD EVALUATION

This section summarizes the human-health lead risk evaluation results for AOC 10. The human-health risk evaluation is focused on lead because the environmental concern at AOC 10 is LBP in soil. The health effects of lead are evaluated by comparing the exposure point concentration (EPC) to the site-specific PRGs for lead of 184 mg/kg (considering ingestion of homegrown produce) and 322 mg/kg (without considering ingestion of homegrown produce). See Section J1.3.4.3 in Appendix J for more details and EPC calculations.

6.1 DATA EVALUATION

Two sets of data were compiled for AOC 10 to compare sitewide risk to risk associated with lead concentrations above the NTCRA objective in a localized area:

- sitewide, 133 samples – a set including the lead NTCRA area that was excavated in the past and the RI new sampling locations within the hardscape cover
- localized area, 15 samples – a set from within the hardscape cover area that had concentrations close to or above the removal action objective of 199 mg/kg

6.2 EVALUATION OF LEAD EXPOSURE

The EPCs are 105 mg/kg for the sitewide data and 385 mg/kg for the area of higher impact. The sitewide concentrations are below the site-specific PRGs of 184 and 322 mg/kg with and without the homegrown produce pathway, respectively. The lead concentrations in the localized area are above both site-specific PRGs.

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Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at AOC 10, including the nature and extent of contamination and results of the human-health lead risk evaluation. Results form the basis of responses to the DQO decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendations presented below.

7.1 SUMMARY

The RI assessed the extent of lead remaining in soil at AOC 10 subsequent to an NTCRA conducted to remove soil contamination associated with LBP on the former radio antenna tower.

Results of RI samples, collected south of the previous lead removal action area, defined the extent of lead in soil to below the PSC. Concentrations above the lead removal action objective remain in shallow soil (0 to 1 foot bgs) outside the excavation area, in a limited area beneath the hardscape cover.

Results of the lead evaluation show that the EPC for the entire AOC of 105 mg/kg is below the site-specific PRGs of 184 and 322 mg/kg. However, the EPC calculated for the area with remaining lead in soil above the removal action objective of 199 mg/kg is 385 mg/kg, which is above the site-specific PRGs.

7.2 AOC 10 CONCLUSIONS AND RECOMMENDATIONS

The RI was conducted using the seven-step United States Environmental Protection Agency DQO process (U.S. EPA 2000); DQOs were developed for AOC 10 in the Work Plan (BEI 2006). The RI has addressed these DQOs, as summarized in Table 7-1.

The data collected during the RI were sufficient to characterize the nature and extent of contamination, perform a lead evaluation, and support decisions on the necessity for remedial actions at AOC 10. The extent of lead remaining in soil above the NTCRA removal action objective was defined.

An FS is recommended for the area of soil with elevated lead concentrations remaining in the upper 1 foot bgs at AOC 10. This is based on study area conditions, fate and transport analysis, and results of the lead risk evaluation. While the lead EPC for the entire AOC is below the site-specific PRGs, the EPC for the area with higher lead concentrations is above these values. No further action is recommended for groundwater beneath AOC 10 because contamination from LBP is generally not soluble or mobile and not expected to readily migrate to groundwater.

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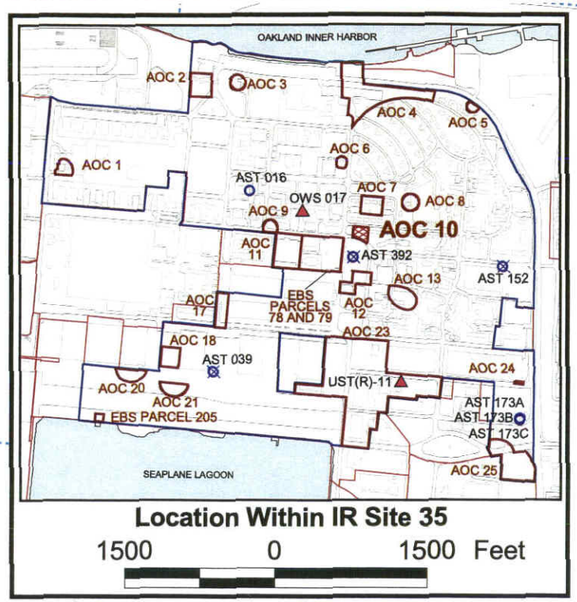
FIGURES



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- NTCRA REMOVAL LOCATION
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

N

WATER TANK/RADIO ANTENNA SOIL SAMPLING LOCATION WITH STATION ID
- METALS ANALYSIS ONLY

RI SOIL SAMPLING LOCATION WITH STATION ID
- METALS ANALYSIS ONLY

PAH STUDY SOIL SAMPLING LOCATION WITH STATION ID
- SVOCs ANALYSIS ONLY

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
NTCRA – NON-TIME-CRITICAL REMOVAL ACTION
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK

20 0 20 Feet

RI/FS Report for IR Site 35

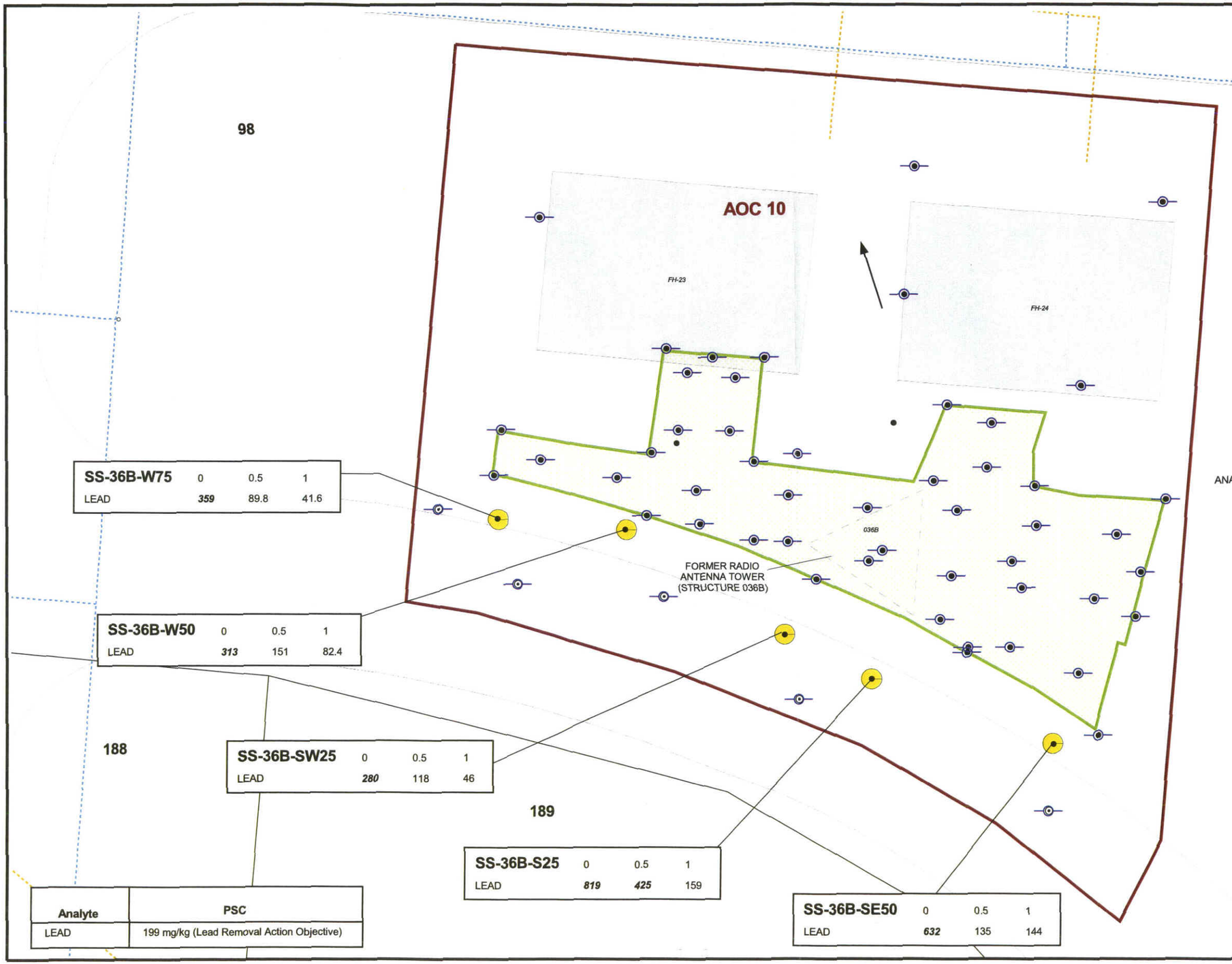
Figure 1-1

Study Area and Sampling Locations
Area of Concern 10

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 1/18/07
File No.: 077L14451
Job No.: 23818-077
Rev No.: D



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- NTCRA REMOVAL LOCATION
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL SOIL SAMPLING LOCATION
- RI SOIL SAMPLING LOCATION

N

SOIL SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC FOR :
- METALS

SOIL SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :
- METALS

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

SS-36B-SW25	0	0.5	1
LEAD	***280***	118	46

ANALYTE — CONCENTRATION in mg/kg

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
mg/kg – MILLIGRAMS PER KILOGRAM
NTCRA – NON-TIME-CRITICAL REMOVAL ACTION
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

20 0 20 Feet

RI/FS Report for IR Site 35

Figure 4-1

Soil Sampling Results for Analytes Above PSC – Area of Concern 10

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 12/6/06
File No.: 077L14478
Job No.: 23818-077
Rev No.: D

TABLES

Table 3-1
Sample Analysis Summary, AOC 10

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE						
				VOCs	SVOCs	PAHs	TPH*	Pest/PCBs	Metals	Lead
Soil										
32EDC-5-84	C032CB25	PAH Study	0.5–2			X				
32EDC-5-84	C032CB26	PAH Study	2–4			X				
32EDC-5-84	C032CB27	PAH Study	4–8			X				
Backfill Sample	88-001	Lead NTCRA 2003	0–1	X	X		X	X	X	
PARCEL 98 GRID 1	98-001(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 10	98-010(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 10	98-011(A-D) (FD)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 11	98-012(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 12	98-013(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 13	98-014(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 14	98-015(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 15	98-016(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 16	98-017(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 16	98-018(A-D) (FD)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 17	98-019(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 18	98-044(A-D)	Lead NTCRA 2003	2–2						X	
PARCEL 98 GRID 19	98-021(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 2	98-002(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 20	98-045(A-D)	Lead NTCRA 2003	2–2						X	
PARCEL 98 GRID 21	98-023(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 22	98-024(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 23	98-025(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 24	98-026(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 25	98-046(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 26	98-028(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 27	98-047(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 28	98-030(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 29	98-031(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 3	98-003(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 30	98-032(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 30	98-033(A-D) (FD)	Lead NTCRA 2003	1–1						X	

Table 3-1
Sample Analysis Summary, AOC 10

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE						
				VOCs	SVOCs	PAHs	TPH*	Pest/PCBs	Metals	Lead
PARCEL 98 GRID 31	98-034(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 32	98-035(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 33	98-036(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 34	98-037(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 35	98-038(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 35	98-039(A-D) (FD)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 36	98-040(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 37	98-048(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 38	98-042(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 4	98-004(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 5	98-005(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 6	98-006(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 7	98-043(A-D)	Lead NTCRA 2003	2–2						X	
PARCEL 98 GRID 8	98-008(A-D)	Lead NTCRA 2003	1–1						X	
PARCEL 98 GRID 9	98-009(A-D)	Lead NTCRA 2003	1–1							X
SS-36B-C00	SS-36B-C00-C	Lead NTCRA 2001	1–1.5							X
SS-36B-C00	SS-36B-C00-C (QC) (FD)	Lead NTCRA 2001	1–1.5							X
SS-36B-E25	SS-36B-E25-C	Lead NTCRA 2001	1–1.5							X
SS-36B-E50	SS-36B-E50-C	Lead NTCRA 2001	1–1.5							X
SS-36B-N25	SS-36B-N25-A	Lead NTCRA 2001	0–0.5							X
SS-36B-N25	SS-36B-N25-B	Lead NTCRA 2001	0.5–1							X
SS-36B-N25	SS-36B-N25-C	Lead NTCRA 2001	1–1.5							X
SS-36B-N50	SS-36B-N50-A	Lead NTCRA 2001	0–0.5							X
SS-36B-N50	SS-36B-N50-B	Lead NTCRA 2001	0.5–1							X
SS-36B-N50	SS-36B-N50-C	Lead NTCRA 2001	1–1.5							X
SS-36B-N75	SS-36B-N75-A	Lead NTCRA 2001	0–0.5							X
SS-36B-N75	SS-36B-N75-B	Lead NTCRA 2001	0.5–1							X
SS-36B-N75	SS-36B-N75-C	Lead NTCRA 2001	1–1.5							X
SS-36B-NE50	SS-36B-NE50-A	Lead NTCRA 2001	0–0.5							X
SS-36B-NE50	SS-36B-NE50-B	Lead NTCRA 2001	0.5–1							X
SS-36B-NE50	SS-36B-NE50-C	Lead NTCRA 2001	1–1.5							X
SS-36B-NE75	SS-36B-NE75-A	Lead NTCRA 2001	0–0.5							X

Table 3-1
Sample Analysis Summary, AOC 10

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE						
				VOCs	SVOCs	PAHs	TPH*	Pest/PCBs	Metals	Lead
SS-36B-NE75	SS-36B-NE75-B	Lead NTCRA 2001	0.5–1							X
SS-36B-NE75	SS-36B-NE75-C	Lead NTCRA 2001	1–1.5							X
SS-36B-NW25	SS-36B-NW25-A	Lead NTCRA 2001	0–0.5							X
SS-36B-NW25	SS-36B-NW25-B	Lead NTCRA 2001	0.5–1							X
SS-36B-NW25	SS-36B-NW25-C	Lead NTCRA 2001	1–1.5							X
SS-36B-NW50	SS-36B-NW50-C	Lead NTCRA 2001	1–1.5							X
SS-36B-NW75	SS-36B-NW75-A	Lead NTCRA 2001	0–0.5							X
SS-36B-NW75	SS-36B-NW75-A (QC) (FD)	Lead NTCRA 2001	0–0.5							X
SS-36B-NW75	SS-36B-NW75-B	Lead NTCRA 2001	0.5–1							X
SS-36B-NW75	SS-36B-NW75-B (QC) (FD)	Lead NTCRA 2001	0.5–1							X
SS-36B-NW75	SS-36B-NW75-C	Lead NTCRA 2001	1–1.5							X
SS-36B-NW75	SS-36B-NW75-C (QC) (FD)	Lead NTCRA 2001	1–1.5							X
SS-36B-S25	SS-36B-S25-A	Lead NTCRA 2001	0–0.5							X
SS-36B-S25	SS-36B-S25-A (QC) (FD)	Lead NTCRA 2001	0–0.5							X
SS-36B-S25	SS-36B-S25-B	Lead NTCRA 2001	0.5–1							X
SS-36B-S25	SS-36B-S25-B (QC) (FD)	Lead NTCRA 2001	0.5–1							X
SS-36B-S25	SS-36B-S25-C	Lead NTCRA 2001	1–1.5							X
SS-36B-S25	SS-36B-S25-C (QC) (FD)	Lead NTCRA 2001	1–1.5							X
SS-36B-SE25	SS-36B-SE25-C	Lead NTCRA 2001	1–1.5							X
SS-36B-SE50	SS-36B-SE50-A	Lead NTCRA 2001	0–0.5							X
SS-36B-SE50	SS-36B-SE50-B	Lead NTCRA 2001	0.5–1							X
SS-36B-SE50	SS-36B-SE50-C	Lead NTCRA 2001	1–1.5							X
SS-36B-SW25	SS-36B-SW25-A	Lead NTCRA 2001	0–0.5							X
SS-36B-SW25	SS-36B-SW25-B	Lead NTCRA 2001	0.5–1							X
SS-36B-SW25	SS-36B-SW25-C	Lead NTCRA 2001	1–1.5							X
SS-36B-W25	SS-36B-W25-C	Lead NTCRA 2001	1–1.5							X
SS-36B-W50	SS-36B-W50-A	Lead NTCRA 2001	0–0.5							X
SS-36B-W50	SS-36B-W50-B	Lead NTCRA 2001	0.5–1							X
SS-36B-W50	SS-36B-W50-C	Lead NTCRA 2001	1–1.5							X
SS-36B-W75	SS-36B-W75-A	Lead NTCRA 2001	0–0.5							X
SS-36B-W75	SS-36B-W75-B	Lead NTCRA 2001	0.5–1							X
SS-36B-W75	SS-36B-W75-C	Lead NTCRA 2001	1–1.5							X

Table 3-1
Sample Analysis Summary, AOC 10

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE						
				VOCs	SVOCs	PAHs	TPH*	Pest/PCBs	Metals	Lead
A10SB01	C077S151	Site 35 RI	1.5–2							X
A10SB01	C077S152	Site 35 RI	3.5–4							X
A10SB01	C077S153	Site 35 RI	7.5–8							X
A10SB02	C077S154	Site 35 RI	1–1.5							X
A10SB02	C077S155	Site 35 RI	2.5–3							X
A10SB02	C077S156	Site 35 RI	5.5–6							X
A10SB03	C077S157	Site 35 RI	1.5–2							X
A10SB03	C077S158	Site 35 RI	3–4							X
A10SB03	C077S159	Site 35 RI	7.5–8							X
A10SB04	C077S160	Site 35 RI	0.5–2							X
A10SB04	C077S161	Site 35 RI	3.5–4							X
A10SB04	C077S162	Site 35 RI	7–7.5							X
A10SB05	C077S163	Site 35 RI	1–1.5							X
A10SB05	C077S164	Site 35 RI	2.5–3							X
A10SB05	C077S165	Site 35 RI	4.5–5							X

References:
PAH Study (BEI 2005a)
Lead NTCRA 2003 (Shaw 2003)
Lead NTCRA 2001 (TtEMI 2002b)

Note:
* analyzed for gasoline-, diesel-, and motor oil–range TPH

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
FD – field duplicate
NTCRA – non-time-critical removal action
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
Pest – pesticides
QC – quality control
RI – remedial investigation
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 10

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
Fuels (µg/kg)										
diesel	1	1	100	0	1,700	1,700	1,700	—[c]	100,000	—
motor oil	1	1	100	0	14,000	14,000	14,000	—	500,000	—
Semivolatile Organic Compounds (µg/kg)										
acenaphthylene	3	1	33	No PSC	2.7	2.7	2.7	—	—	—
anthracene	3	1	33	0	3.8	3.8	3.8	22,000,000	—	—
benz(a)anthracene	3	2	67	0	5.1	24	42	620	—	—
benzo(b)fluoranthene	3	2	67	0	8.5	39	69	620	—	—
benzo(k)fluoranthene	3	2	67	0	6.4	29	51	380[d]	—	—
benzo(g,h,i)perylene	3	2	67	No PSC	15	68	120	—	—	—
benzo(a)pyrene	3	2	67	0	11	54	96	62	—	—
chrysene	3	2	67	0	6.2	29	51	3,800[d]	—	—
dibenz(a,h)anthracene	3	1	33	0	8.5	8.5	8.5	62	—	—
fluoranthene	3	2	67	0	12	52	92	2,300,000	—	—
indeno(1,2,3-cd)pyrene	3	2	67	0	14	62	110	620	—	—
naphthalene	3	1	33	0	6.1	6.1	6.1	1,700[d]	—	—
phenanthrene	3	2	67	No PSC	3.2	12	20	—	—	—
pyrene	3	2	67	0	18	79	140	2,300,000	—	—
Metals (mg/kg)										
arsenic	43	43	100	0	1.1	3.6	6.3	0.062[d]	—	9.14
barium	43	43	100	0	23	87	160	5,400	—	93.68
beryllium	43	38	48	0	0.51	0.51	0.51	150	—	1.27
cadmium	43	43	100	0	0.87	1.8	3.6	37	—	1.72
chromium	43	43	100	0	22	32	65	210	—	54.84
chromium, hexavalent	42	2	4.8	0	0.03	0.04	0.05	30	—	—
cobalt	43	43	100	0	3.6	7.1	14	900	—	14.30
copper	43	43	100	0	5.1	14	81	3,100	—	39.14
lead	107	106	99	7	1.4	67	819	199[e]	—	37.66
mercury	43	35	44	0	0.016	0.17	1	23	—	0.52
nickel	43	43	100	0	22	42	88	1,600	—	55.72
selenium	43	14	18	0	0.16	0.41	3	390	—	1.78
silver	43	15	19	0	0.087	0.19	0.63	390	—	2.22
thallium	43	3	3.8	0	0.17	1.4	3.7	5.2	—	0.50
vanadium	43	43	100	0	13	22	55	78	—	47.34
zinc	43	43	100	0	20	60	150	23,000	—	67.48

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

[e] non-time-critical removal action objective

Acronyms/Abbreviations:

AOC – area of concern
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
TPH – total petroleum hydrocarbons

Table 4-2
Soil Sampling Results, AOC 10

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Result Units	Station ID: 32EDC-5-84 / Sample: C032CB25 / [a]Depth Interval: 0.5 - 2 / Collection Date: 16-May-02	32EDC-5-84 / C032CB26 / 2 - 4 / 16-May-02	32EDC-5-84 / C032CB27 / 4 - 8 / 16-May-02	A10SB01 / C077S151 / 1.5 - 2 / 15-Dec-05	A10SB01 / C077S152 / 3.5 - 4 / 15-Dec-05	A10SB01 / C077S153 / 7.5 - 8 / 15-Dec-05	A10SB02 / C077S154 / 1 - 1.5 / 15-Dec-05	A10SB02 / C077S155 / 2.5 - 3 / 15-Dec-05	A10SB02 / C077S156 / 5.5 - 6 / 15-Dec-05	A10SB03 / C077S157 / 1.5 - 2 / 15-Dec-05	A10SB03 / C077S158 / 3 - 4 / 15-Dec-05	A10SB03 / C077S159 / 7.5 - 8 / 15-Dec-05
VOCs							NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons																		
diesel	—[b]	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																		
acenaphthylene	—	—	—	—	—	µg/kg	2.7 J	5.6 U	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	—	µg/kg	3.8 J	5.6 U	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	—	µg/kg	42 J	5.1 J	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	—	µg/kg	69 J	8.5 J	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	—	µg/kg	51 J	6.4 J	6 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	—	µg/kg	120	15	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	—	µg/kg	**96**[d]	11	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	51	6.2	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	—	µg/kg	8.5	5.6 U	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	—	µg/kg	92	12	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	—	µg/kg	110	14	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	—	µg/kg	6.1	5.6 U	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	—	µg/kg	20	3.2 J	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	—	µg/kg	140	18	6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs							NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																		
arsenic	0.39	0.062	—	9.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150[e]	—	37.66	199	mg/kg	NA	NA	NA	7.6	2.2	4	0.5 U	4.3	4.1	5.1	2.3	1.7
mercury	23	—	—	0.52	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 10

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	A10SB04 C077S160 0.5 - 2 16-Dec-05	A10SB04 C077S161 3.5 - 4 16-Dec-05	A10SB04 C077S162 7 - 7.5 16-Dec-05	A10SB05 C077S163 1 - 1.5 15-Dec-05	A10SB05 C077S164 2.5 - 3 15-Dec-05	A10SB05 C077S165 4.5 - 5 15-Dec-05	Backfill Sample 88-001 0 - 1 27-Jan-03	PARCEL 98 GRID 1 98-001(A-D) 1 - 1 22-Jan-03	PARCEL 98 GRID 10 98-010(A-D) 1 - 1 22-Jan-03
VOCs							NA	NA	NA	NA	NA	NA	ND	NA	NA
Petroleum Hydrocarbons															
diesel	—[b]	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	1700 J	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	14000	NA	NA
SVOCs															
acenaphthylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs							NA	NA	NA	NA	NA	NA	ND	NA	NA
Metals															
arsenic	0.39	0.062	—	9.14	—	mg/kg	NA	NA	NA	NA	NA	NA	**4.3**	**4.9**	**2**
barium	5,400	—	—	93.68	—	mg/kg	NA	NA	NA	NA	NA	NA	89	*130 J*[f]	46 J
beryllium	150	—	—	1.27	—	mg/kg	NA	NA	NA	NA	NA	NA	0.51	0.33 U	0.21 U
cadmium	37	—	—	1.72	—	mg/kg	NA	NA	NA	NA	NA	NA	*2*	*2*	1.4
chromium	210	—	—	54.84	—	mg/kg	NA	NA	NA	NA	NA	NA	30	46 J	29 J
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	0.06 U	0.06 U
cobalt	900	—	—	14.30	—	mg/kg	NA	NA	NA	NA	NA	NA	7.9	8.8	3.9
copper	3,100	—	—	39.14	—	mg/kg	NA	NA	NA	NA	NA	NA	8.8	23	7.7
lead	400	150[c]	—	37.66	199	mg/kg	6.7	1.4	2.8	6.6	7.7	3.6	11	*52*	*55*
mercury	23	—	—	0.52	—	mg/kg	NA	NA	NA	NA	NA	NA	0.053 U	0.029	0.023 U
nickel	1,600	—	—	55.72	—	mg/kg	NA	NA	NA	NA	NA	NA	43	*64*	28
selenium	390	—	—	1.78	—	mg/kg	NA	NA	NA	NA	NA	NA	0.27 UJ	0.28 UJ	0.27 UJ
silver	390	—	—	2.22	—	mg/kg	NA	NA	NA	NA	NA	NA	0.27 U	0.18 J	0.27 U
thallium	5.2	—	—	0.50	—	mg/kg	NA	NA	NA	NA	NA	NA	0.27 U	0.28 U	0.18 J
vanadium	78	—	—	47.34	—	mg/kg	NA	NA	NA	NA	NA	NA	24	24	15
zinc	23,000	—	—	67.48	—	mg/kg	NA	NA	NA	NA	NA	NA	35	*70*	*110*

Table 4-2
Soil Sampling Results, AOC 10

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Lead Removal Action Objective	Result Units	Station ID: PARCEL 98 GRID 10	PARCEL 98 GRID 11	PARCEL 98 GRID 12	PARCEL 98 GRID 13	PARCEL 98 GRID 14	PARCEL 98 GRID 15	PARCEL 98 GRID 16
Sample:							98-011(A-D) (FD)	98-012(A-D)	98-013(A-D)	98-014(A-D)	98-015(A-D)	98-016(A-D)	98-017(A-D)
[a] Depth Interval:							1 - 1	1 - 1	1 - 1	1 - 1	1 - 1	1 - 1	1 - 1
Collection Date:							22-Jan-03	22-Jan-03	22-Jan-03	22-Jan-03	22-Jan-03	22-Jan-03	22-Jan-03
VOCs							NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
diesel	—[b]	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs							NA	NA	NA	NA	NA	NA	NA
Metals													
arsenic	0.39	0.062	—	9.14	—	mg/kg	**1.9**	**3.8**	**1.4**	**1.9**	**2.1**	**2**	**3.8**
barium	5,400	—	—	93.68	—	mg/kg	54 J	47 J	36 J	43 J	*98 J*	82 J	*130 J*
beryllium	150	—	—	1.27	—	mg/kg	0.15 U	0.15 U	0.15 U	0.15 U	0.21 U	0.2 U	0.29 U
cadmium	37	—	—	1.72	—	mg/kg	1.5	1.5	1.1	1.1	1.2	1.1	1.7
chromium	210	—	—	54.84	—	mg/kg	27 J	26 J	25 J	22 J	30 J	26 J	41 J
chromium, hexavalent	30	—	—	—	—	mg/kg	0.05 J	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
cobalt	900	—	—	14.30	—	mg/kg	4.1	4.1	3.7	3.9	4.6	4.7	7.8
copper	3,100	—	—	39.14	—	mg/kg	6.9	12	6	9	12	13	20
lead	400	150[c]	—	37.66	199	mg/kg	22	24	7.3	26	34	*43*	*51*
mercury	23	—	—	0.52	—	mg/kg	0.019 U	0.075	0.021 U	0.034	0.027	0.083	0.064
nickel	1,600	—	—	55.72	—	mg/kg	28	29	26	24	33	28	*60*
selenium	390	—	—	1.78	—	mg/kg	0.27 UJ	0.24 UJ	0.25 UJ	0.22 UJ	0.26 UJ	0.23 UJ	0.24 UJ
silver	390	—	—	2.22	—	mg/kg	0.27 U	0.24 U	0.25 U	0.22 U	0.26 U	0.23 U	0.24 U
thallium	5.2	—	—	0.50	—	mg/kg	0.27 U	0.24 U	0.25 U	0.22 U	0.26 U	0.23 U	0.24 U
vanadium	78	—	—	47.34	—	mg/kg	15	16	15	14	17	19	22
zinc	23,000	—	—	67.48	—	mg/kg	*120*	*110*	49	*94*	54	49	*68*

Table 4-2
Soil Sampling Results, AOC 10

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Result Units	Station ID: PARCEL 98 GRID 16 / Sample: 98-018(A-D) (FD) / [a]Depth Interval: 1 - 1 / Collection Date: 22-Jan-03	Station ID: PARCEL 98 GRID 17 / Sample: 98-019(A-D) / Depth Interval: 1 - 1 / Collection Date: 22-Jan-03	Station ID: PARCEL 98 GRID 18 / Sample: 98-044(A-D) / Depth Interval: 2 - 2 / Collection Date: 12-Feb-03	Station ID: PARCEL 98 GRID 19 / Sample: 98-021(A-D) / Depth Interval: 1 - 1 / Collection Date: 22-Jan-03	Station ID: PARCEL 98 GRID 2 / Sample: 98-002(A-D) / Depth Interval: 1 - 1 / Collection Date: 22-Jan-03	Station ID: PARCEL 98 GRID 20 / Sample: 98-045(A-D) / Depth Interval: 2 - 2 / Collection Date: 12-Feb-03	Station ID: PARCEL 98 GRID 21 / Sample: 98-023(A-D) / Depth Interval: 1 - 1 / Collection Date: 22-Jan-03
VOCs							NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
diesel	—[b]	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs							NA	NA	NA	NA	NA	NA	NA
Metals													
arsenic	0.39	0.062	—	9.14	—	mg/kg	**3.7**	**2.5**	**1.7**	**2**	**3.1**	**1.1**	**3.2**
barium	5,400	—	—	93.68	—	mg/kg	*130 J*	*110 J*	40	62	89 J	37	*98*
beryllium	150	—	—	1.27	—	mg/kg	0.31 U	0.24 U	0.14 U	0.3 U	0.27 U	0.12 U	0.28 U
cadmium	37	—	—	1.72	—	mg/kg	1.7	1.3	1.3	1.4	*3.6*	0.87	*2*
chromium	210	—	—	54.84	—	mg/kg	42 J	30 J	24	28	42 J	25	36
chromium, hexavalent	30	—	—	—	—	mg/kg	0.06 U	0.06 U	0.05 U	0.06 U	0.06 U	0.05 U	0.06 U
cobalt	900	—	—	14.30	—	mg/kg	7.8	5.3	4.4	4.4	14	3.6	6
copper	3,100	—	—	39.14	—	mg/kg	20	17	6	10	*45*	5.1	31 J
lead	400	150[c]	—	37.66	199	mg/kg	*53*	*90*	13	*41*	*87*	3.9	*140 J*
mercury	23	—	—	0.52	—	mg/kg	0.12	0.43	0.037 U	0.08	0.082	0.021 U	*1*
nickel	1,600	—	—	55.72	—	mg/kg	*60*	36	25	29	*56*	24	39 J
selenium	390	—	—	1.78	—	mg/kg	0.25 UJ	0.22 UJ	0.19 J	0.26 UJ	0.26 UJ	0.23 UJ	0.23 J
silver	390	—	—	2.22	—	mg/kg	0.25 U	0.22 U	0.24 U	0.1 J	0.24 J	0.23 U	0.27 U
thallium	5.2	—	—	0.50	—	mg/kg	0.25 U	0.22 U	0.24 U	0.26 U	0.26 U	0.23 U	0.27 U
vanadium	78	—	—	47.34	—	mg/kg	23	18	16	17	*55*	14	20
zinc	23,000	—	—	67.48	—	mg/kg	55	64	36 J	61	*140*	20 J	*150 J*

Table 4-2
Soil Sampling Results, AOC 10

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Lead Removal Action Objective	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	PARCEL 98 GRID 22 98-024(A-D) 1 - 1 22-Jan-03	PARCEL 98 GRID 23 98-025(A-D) 1 - 1 22-Jan-03	PARCEL 98 GRID 24 98-026(A-D) 1 - 1 22-Jan-03	PARCEL 98 GRID 25 98-046(A-D) 1 - 1 12-Feb-03	PARCEL 98 GRID 26 98-028(A-D) 1 - 1 22-Jan-03	PARCEL 98 GRID 27 98-047(A-D) 1 - 1 12-Feb-03	PARCEL 98 GRID 28 98-030(A-D) 1 - 1 22-Jan-03
VOCs							NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
diesel	—[b]	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs							NA	NA	NA	NA	NA	NA	NA
Metals													
arsenic	0.39	0.062	—	9.14	—	mg/kg	**2.7**	**3.9**	**2.5**	**2.1**	**2.8**	**5.2**	**4.3**
barium	5,400	—	—	93.68	—	mg/kg	78	*130*	83	54	79	86	*150*
beryllium	150	—	—	1.27	—	mg/kg	0.28 U	0.36 U	0.26 U	0.16 U	0.23 U	0.18 U	0.37 U
cadmium	37	—	—	1.72	—	mg/kg	1.6	*1.9*	1.7	*1.8*	1.5	*2*	*2.2*
chromium	210	—	—	54.84	—	mg/kg	32	49	28	33	30	35	48
chromium, hexavalent	30	—	—	—	—	mg/kg	0.06 U	0.06 U	0.06 U	0.05 U	0.05 U	0.05 U	0.06 U
cobalt	900	—	—	14.30	—	mg/kg	5.2	9.3	6.5	5.4	4.9	5.9	8.7
copper	3,100	—	—	39.14	—	mg/kg	21 J	24 J	22	15	20 J	24	29 J
lead	400	150[c]	—	37.66	199	mg/kg	*110 J*	*41 J*	*110 J*	*87*	*130 J*	*120*	*160 J*
mercury	23	—	—	0.52	—	mg/kg	0.28	0.095	0.1	0.15	0.12	0.28	0.26
nickel	1,600	—	—	55.72	—	mg/kg	31 J	*71 J*	40 J	34	33 J	37	*66 J*
selenium	390	—	—	1.78	—	mg/kg	0.28 J	0.27 UJ	0.16 J	0.25 UJ	0.27 J	0.21 UJ	0.25 UJ
silver	390	—	—	2.22	—	mg/kg	0.27 U	0.27 U	0.087 J	0.25 U	0.25 U	0.21 U	0.15 J
thallium	5.2	—	—	0.50	—	mg/kg	0.27 U	0.27 U	0.25 U	0.25 U	0.25 U	0.21 U	0.25 U
vanadium	78	—	—	47.34	—	mg/kg	19	23	20	20	19	24	24
zinc	23,000	—	—	67.48	—	mg/kg	*120 J*	65 J	*78 J*	*86 J*	*83 J*	*76 J*	*110 J*

Table 4-2
Soil Sampling Results, AOC 10

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Lead Removal Action Objective	Result Units	Station ID: / Sample: / [a] Depth Interval: / Collection Date:	PARCEL 98 GRID 29 98-031(A-D) 1 - 1 22-Jan-03	PARCEL 98 GRID 3 98-003(A-D) 1 - 1 22-Jan-03	PARCEL 98 GRID 30 98-032(A-D) 1 - 1 22-Jan-03	PARCEL 98 GRID 30 98-033(A-D) (FD) 1 - 1 22-Jan-03	PARCEL 98 GRID 31 98-034(A-D) 1 - 1 22-Jan-03	PARCEL 98 GRID 32 98-035(A-D) 1 - 1 22-Jan-03	PARCEL 98 GRID 33 98-036(A-D) 1 - 1 22-Jan-03
VOCs								NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons														
diesel	—[b]	—	100,000	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
SVOCs														
acenaphthylene	—	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs								NA	NA	NA	NA	NA	NA	NA
Metals														
arsenic	0.39	0.062	—	9.14	—	mg/kg		**5.4**	**2.3**	**3.9**	**4.1**	**6.3**	**2.9**	**1.6**
barium	5,400	—	—	93.68	—	mg/kg		*160*	69 J	*110*	*110*	76	93	55
beryllium	150	—	—	1.27	—	mg/kg		0.47 U	0.23 U	0.4 U	0.41 U	0.43 U	0.25 U	0.2 U
cadmium	37	—	—	1.72	—	mg/kg		*2.6*	1.5	*1.9*	*1.9*	*1.9*	*2*	1.3
chromium	210	—	—	54.84	—	mg/kg		*65*	23 J	46	49	30	38	28
chromium, hexavalent	30	—	—	—	—	mg/kg		0.07 U	0.03 J	0.06 U	0.06 U	0.05 U	0.06 U	0.06 U
cobalt	900	—	—	14.30	—	mg/kg		12	7	8.8	8.8	6.2	6.2	4.2
copper	3,100	—	—	39.14	—	mg/kg		33 J	17	24 J	24 J	18 J	32 J	11 J
lead	400	150[e]	—	37.66	199	mg/kg		*110 J*	13	*83 J*	*77 J*	*56 J*	*110 J*	*41 J*
mercury	23	—	—	0.52	—	mg/kg		0.17	0.016 J	0.15	0.16	0.44	*0.6*	0.051
nickel	1,600	—	—	55.72	—	mg/kg		*88 J*	41	*58 J*	*60 J*	28 J	43 J	29 J
selenium	390	—	—	1.78	—	mg/kg		0.29 UJ	0.25 UJ	0.17 J	0.29 U	*3 J*	0.17 J	0.16 J
silver	390	—	—	2.22	—	mg/kg		0.14 J	0.25 U	0.11 J	0.11 J	0.63	0.12 J	0.22 U
thallium	5.2	—	—	0.50	—	mg/kg		0.29 U	0.25 U	0.28 U	0.29 U	*3.7*	0.28 U	0.22 U
vanadium	78	—	—	47.34	—	mg/kg		30	19	22	24	18	19	16
zinc	23,000	—	—	67.48	—	mg/kg		*100 J*	37	*99 J*	*100 J*	*78 J*	*120 J*	*72 J*

Table 4-2
Soil Sampling Results, AOC 10

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Result Units	Station ID: PARCEL 98 GRID 34	PARCEL 98 GRID 35	PARCEL 98 GRID 35	PARCEL 98 GRID 36	PARCEL 98 GRID 37	PARCEL 98 GRID 38	PARCEL 98 GRID 4
Sample:	98-037(A-D)	98-038(A-D)	98-039(A-D) (FD)	98-040(A-D)	98-048(A-D)	98-042(A-D)	98-004(A-D)
[a] Depth Interval:	1 - 1	1 - 1	1 - 1	1 - 1	1 - 1	1 - 1	1 - 1
Collection Date:	22-Jan-03	22-Jan-03	22-Jan-03	22-Jan-03	12-Feb-03	22-Jan-03	22-Jan-03
VOCs								NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons														
diesel	—[b]	—	100,000	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
SVOCs														
acenaphthylene	—	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs								NA	NA	NA	NA	NA	NA	NA
Metals														
arsenic	0.39	0.062	—	9.14	—	mg/kg		**1.8**	**1.8**	**1.6**	**3.6**	**5.2**	**3.6**	**2.7**
barium	5,400	—	—	93.68	—	mg/kg		83	72	77	*100*	*130*	*110*	77 J
beryllium	150	—	—	1.27	—	mg/kg		0.21 U	0.23 U	0.22 U	0.33 U	0.29 U	0.35 U	0.24 U
cadmium	37	—	—	1.72	—	mg/kg		1.7	1.3	1.3	*2*	*3*	*2.1*	1.4
chromium	210	—	—	54.84	—	mg/kg		31	29	29	45	*61*	43	35 J
chromium, hexavalent	30	—	—	—	—	mg/kg		0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
cobalt	900	—	—	14.30	—	mg/kg		4.6	4.2	3.8	7.9	11	8.5	6
copper	3,100	—	—	39.14	—	mg/kg		16 J	18 J	16 J	25 J	28	*81 J*	11
lead	400	150[c]	—	37.66	199	mg/kg		*130 J*	*87 J*	*120 J*	*93 J*	*64*	*72 J*	29
mercury	23	—	—	0.52	—	mg/kg		0.14	0.32	0.12	0.024 U	0.14	0.048	0.021 J
nickel	1,600	—	—	55.72	—	mg/kg		32 J	26 J	22 J	*58 J*	*79*	*56 J*	42
selenium	390	—	—	1.78	—	mg/kg		0.21 J	0.32 J	0.22 J	0.18 J	0.27 UJ	0.19 J	0.27 UJ
silver	390	—	—	2.22	—	mg/kg		0.26	0.17 J	0.14 J	0.2 J	0.27 U	0.22 J	0.27 U
thallium	5.2	—	—	0.50	—	mg/kg		0.24 U	0.26 U	0.28 U	0.31 U	0.27 U	0.28 U	0.27 U
vanadium	78	—	—	47.34	—	mg/kg		16	15	15	21	27	23	19
zinc	23,000	—	—	67.48	—	mg/kg		*110 J*	*93 J*	*96 J*	*110 J*	*82 J*	*88 J*	65

Table 4-2
Soil Sampling Results, AOC 10

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Result Units	Station ID: PARCEL 98 GRID 5 / Sample: 98-005(A-D) / [a]Depth Interval: 1 - 1 / Collection Date: 22-Jan-03	Station ID: PARCEL 98 GRID 6 / Sample: 98-006(A-D) / [a]Depth Interval: 1 - 1 / Collection Date: 22-Jan-03	Station ID: PARCEL 98 GRID 7 / Sample: 98-043(A-D) / [a]Depth Interval: 2 - 2 / Collection Date: 12-Feb-03	Station ID: PARCEL 98 GRID 8 / Sample: 98-008(A-D) / [a]Depth Interval: 1 - 1 / Collection Date: 22-Jan-03	Station ID: PARCEL 98 GRID 9 / Sample: 98-009(A-D) / [a]Depth Interval: 1 - 1 / Collection Date: 22-Jan-03	Station ID: SS-36B-C00 / Sample: SS-36B-C00-C / [a]Depth Interval: 1 - 1.5 / Collection Date: 02-Aug-01	Station ID: SS-36B-C00 / Sample: SS-36B-C00-C (QC) (FD) / [a]Depth Interval: 1 - 1.5 / Collection Date: 02-Aug-01
VOCs							NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
diesel	—[b]	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs							NA	NA	NA	NA	NA	NA	NA
Metals													
arsenic	0.39	0.062	—	9.14	—	mg/kg	**2.7**	**2.8**	**1.3**	**2.2**	**2.5**	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	78 J	*110 J*	23	51 J	78 J	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	0.23 U	0.29 U	0.14 U	0.22 U	0.24 U	NA	NA
cadmium	37	—	—	1.72	—	mg/kg	*1.8*	*1.9*	1.1	1.4	1.5	NA	NA
chromium	210	—	—	54.84	—	mg/kg	35 J	33 J	23	30 J	32 J	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	0.06 U	0.05 U	0.05 U	0.05 U	0.05 U	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	7.6	8	3.9	4.9	5.9	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	19	21	5.3	11	12	NA	NA
lead	400	150[e]	—	37.66	199	mg/kg	35	*38*	6.3	*59*	17	*60.3*	*52.6*
mercury	23	—	—	0.52	—	mg/kg	0.049	0.04	0.077 U	0.019 J	0.017 J	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	46	50	22	33	43	NA	NA
selenium	390	—	—	1.78	—	mg/kg	0.23 UJ	0.27 UJ	0.23 UJ	0.23 UJ	0.21 UJ	NA	NA
silver	390	—	—	2.22	—	mg/kg	0.23 U	0.27 U	0.23 U	0.23 U	0.21 U	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	0.23 U	0.17 J	0.23 U	0.23 U	0.21 U	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	26	25	13	17	18	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	*90*	60	27 J	*92*	43	NA	NA

Table 4-2
Soil Sampling Results, AOC 10

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Lead Removal Action Objective	Result Units	Station ID: SS-36B-E25	SS-36B-E50	SS-36B-N25	SS-36B-N25	SS-36B-N25	SS-36B-N50	SS-36B-N50	SS-36B-N50	SS-36B-N75	SS-36B-N75
Sample:							SS-36B-E25-C	SS-36B-E50-C	SS-36B-N25-A	SS-36B-N25-B	SS-36B-N25-C	SS-36B-N50-A	SS-36B-N50-B	SS-36B-N50-C	SS-36B-N75-A	SS-36B-N75-B
[a] Depth Interval:							1 - 1.5	1 - 1.5	0 - 0.5	0.5 - 1	1 - 1.5	0 - 0.5	0.5 - 1	1 - 1.5	0 - 0.5	0.5 - 1
Collection Date:							02-Aug-01	02-Aug-01	02-Aug-01	02-Aug-01	02-Aug-01	02-Aug-01	02-Aug-01	02-Aug-01	02-Aug-01	02-Aug-01
VOCs							NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons																
diesel	—[b]	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																
acenaphthylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs							NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																
arsenic	0.39	0.062	—	9.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150[c]	—	37.66	199	mg/kg	22.8	33.5	*187*	19.9	22.8	*128*	16.3	8.4	*155*	*45.8*
mercury	23	—	—	0.52	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 10

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Result Units	Station ID: SS-36B-N75 / Sample: SS-36B-N75-C / [a]Depth Interval: 1 - 1.5 / Collection Date: 02-Aug-01	SS-36B-NE50 / SS-36B-NE50-A / 0 - 0.5 / 02-Aug-01	SS-36B-NE50 / SS-36B-NE50-B / 0.5 - 1 / 02-Aug-01	SS-36B-NE50 / SS-36B-NE50-C / 1 - 1.5 / 02-Aug-01	SS-36B-NE75 / SS-36B-NE75-A / 0 - 0.5 / 02-Aug-01	SS-36B-NE75 / SS-36B-NE75-B / 0.5 - 1 / 02-Aug-01	SS-36B-NE75 / SS-36B-NE75-C / 1 - 1.5 / 02-Aug-01	SS-36B-NW25 / SS-36B-NW25-A / 0 - 0.5 / 02-Aug-01	SS-36B-NW25 / SS-36B-NW25-B / 0.5 - 1 / 02-Aug-01
VOCs							NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons															
diesel	—[b]	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs															
acenaphthylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs							NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals															
arsenic	0.39	0.062	—	9.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150[c]	—	37.66	199	mg/kg	28.8	*50.8*	*123*	22.6	*48.2*	*113*	*88.6*	*117*	16
mercury	23	—	—	0.52	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 10

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Result Units	Station ID: SS-36B-NW25 / Sample: SS-36B-NW25-C / [a]Depth Interval: 1 - 1.5 / Collection Date: 02-Aug-01	Station ID: SS-36B-NW50 / Sample: SS-36B-NW50-C / [a]Depth Interval: 1 - 1.5 / Collection Date: 02-Aug-01	Station ID: SS-36B-NW75 / Sample: SS-36B-NW75-A / [a]Depth Interval: 0 - 0.5 / Collection Date: 02-Aug-01	Station ID: SS-36B-NW75 / Sample: SS-36B-NW75-A (QC) (FD) / [a]Depth Interval: 0 - 0.5 / Collection Date: 02-Aug-01	Station ID: SS-36B-NW75 / Sample: SS-36B-NW75-B / [a]Depth Interval: 0.5 - 1 / Collection Date: 02-Aug-01	Station ID: SS-36B-NW75 / Sample: SS-36B-NW75-B (QC) (FD) / [a]Depth Interval: 0.5 - 1 / Collection Date: 02-Aug-01	Station ID: SS-36B-NW75 / Sample: SS-36B-NW75-C / [a]Depth Interval: 1 - 1.5 / Collection Date: 02-Aug-01
VOCs							NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
diesel	—[b]	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs							NA	NA	NA	NA	NA	NA	NA
Metals													
arsenic	0.39	0.062	—	9.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
lead	400	150[c]	—	37.66	199	mg/kg	24	*58*	*134*	*102*	*136*	*158*	21
mercury	23	—	—	0.52	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 10

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Result Units	Station ID: SS-36B-NW75 Sample: SS-36B-NW75-C (QC) (FD) [a]Depth Interval: 1 - 1.5 Collection Date: 02-Aug-01	SS-36B-S25 SS-36B-S25-A 0 - 0.5 02-Aug-01	SS-36B-S25 SS-36B-S25-A (QC) (FD) 0 - 0.5 02-Aug-01	SS-36B-S25 SS-36B-S25-B 0.5 - 1 02-Aug-01	SS-36B-S25 SS-36B-S25-B (QC) (FD) 0.5 - 1 02-Aug-01	SS-36B-S25 SS-36B-S25-C 1 - 1.5 02-Aug-01	SS-36B-S25 SS-36B-S25-C (QC) (FD) 1 - 1.5 02-Aug-01
VOCs							NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
diesel	—[b]	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
SVOCs													
acenaphthylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs							NA	NA	NA	NA	NA	NA	NA
Metals													
arsenic	0.39	0.062	—	9.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
lead	400	150[e]	—	37.66	199	mg/kg	*76.6*	*819*[e]	*221*	*425*	*103*	*159*	20.5
mercury	23	—	—	0.52	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 10

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Lead Removal Action Objective	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	SS-36B-SE25 SS-36B-SE25-C 1 - 1.5 02-Aug-01	SS-36B-SE50 SS-36B-SE50-A 0 - 0.5 02-Aug-01	SS-36B-SE50 SS-36B-SE50-B 0.5 - 1 02-Aug-01	SS-36B-SE50 SS-36B-SE50-C 1 - 1.5 02-Aug-01	SS-36B-SW25 SS-36B-SW25-A 0 - 0.5 02-Aug-01	SS-36B-SW25 SS-36B-SW25-B 0.5 - 1 02-Aug-01	SS-36B-SW25 SS-36B-SW25-C 1 - 1.5 02-Aug-01	SS-36B-W25 SS-36B-W25-C 1 - 1.5 02-Aug-01	SS-36B-W50 SS-36B-W50-A 0 - 0.5 02-Aug-01
VOCs							NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons															
diesel	—[b]	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs															
acenaphthylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs							NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals															
arsenic	0.39	0.062	—	9.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150[c]	—	37.66	199	mg/kg	*97.9*	*632*	*135*	*144*	*280*	*118*	*46*	25.2	*513*
mercury	23	—	—	0.52	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 10

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Lead Removal Action Objective	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	SS-36B-W50 SS-36B-W50-B 0.5 - 1 02-Aug-01	SS-36B-W50 SS-36B-W50-C 1 - 1.5 02-Aug-01	SS-36B-W75 SS-36B-W75-A 0 - 0.5 02-Aug-01	SS-36B-W75 SS-36B-W75-B 0.5 - 1 02-Aug-01	SS-36B-W75 SS-36B-W75-C 1 - 1.5 02-Aug-01
VOCs							NA	NA	NA	NA	NA
Petroleum Hydrocarbons											
diesel	—[b]	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA
SVOCs											
acenaphthylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA
Pesticides/PCBs							NA	NA	NA	NA	NA
Metals											
arsenic	0.39	0.062	—	9.14	—	mg/kg	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	—	mg/kg	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	NA	NA	NA	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	NA	NA	NA	NA	NA
lead	400	150[e]	—	37.66	199	mg/kg	*151*	*82.4*	**359**[d]	*89.8*	*41.6*
mercury	23	—	—	0.52	—	mg/kg	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	NA	NA	NA	NA	NA
silver	390	—	—	2.22	—	mg/kg	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	NA	NA	NA	NA	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[d] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL
[e] lead non-time-critical removal action objective of 199 mg/kg was used for the PSC for this study area
[f] italicized font indicates result above background
[g] shaded cell indicates result above the lead removal action objective

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
ND – not detected
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 5-1
Estimates of Mobility [a] for Lead, AOC 10

Analyte	K_d [b] (L/kg)	Percent Sorbed [a]	R [c] (unitless)
lead	11,000	100	115

Notes:
[a] mobility is proportional to percent sorbed; percent sorbed = $K_d / (1 + K_d) \times 100$ (Karickhoff et al. 1979)
[b] RAIS 2006
[c] retardation factor calculated as described in Section 5 of the main RI/FS Report

Acronyms/Abbreviations:
AOC – area of concern
K_d – soil water partition coefficient
L/kg – liters per kilogram
R – retardation factor

Table 7-1
Summary of RI Results and Recommendations, AOC 10

DQO Problem	DQO Decision Questions	Nature and Extent	Risk Assessment	Recommendation
Locations with lead reported at concentrations exceeding the removal action objective are situated along the southern perimeter of the excavation area; these locations were not excavated due to hardscape cover.	Have the nature and extent of contamination been defined?	Yes. RI samples collected south of the previous lead soil removal action area defined the extent to below the PSC. Previous investigations defined the vertical extent.	NA	Conduct an FS for the area where elevated lead concentrations remain in shallow soil. See Sections 8 through 11 of the main RI/FS Report.
	Are contaminants present in soil or groundwater at concentrations that pose unacceptable risk to potential future residents?	NA	The lead risk evaluation showed that the EPC for the entire AOC is below the site-specific PRGs calculated using LeadSpread 7 (184 and 322 mg/kg). However, the EPC calculated for the area with remaining lead in soil above the removal action objective is 385 mg/kg, which is above the site-specific PRGs. Based on fate and transport characteristics and the shallow occurrence of remaining elevated concentrations in soil, groundwater would not be expected to be impacted by lead from previous site activities at AOC 10.	See above.
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?	NA	NA. Pathway was not evaluated for AOC 10, located approximately 1,600 feet from the nearest water body.	See above.

Acronyms/Abbreviations:
AOC – area of concern
DQO – data quality objective
EPC – exposure point concentration
FS – feasibility study
LeadSpread – Lead Risk Assessment Spreadsheet
mg/kg – milligrams per kilogram
NA – not applicable
PRG – preliminary remediation goal
PSC – preliminary screening criterion
RI – remedial investigation

ATTACHMENT K

AREA OF CONCERN 11 AND EBS PARCELS 78–79

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT ATTACHMENT K, AREA OF CONCERN 11 AND EBS PARCELS 78–79 IR SITE 35, TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

Prepared by:

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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 11 and Environmental Baseline Survey (EBS) Parcels 78–79. These study areas were addressed separately in the RI Work Plan and field effort. However, they have been combined in one attachment because their boundaries are physically contiguous, and they are being addressed as a single study area for risk assessment purposes. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station Alameda), Alameda, California (Figure 1-1).

Figures and tables are presented at the end of the attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 PRELIMINARY SCREENING CRITERIA AND BACKGROUND METALS

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this study area are the following:

- Soil
  - residential preliminary remediation goals (PRGs) (U.S. EPA 2004b), except polynuclear aromatic hydrocarbons (PAHs) classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (µg/kg) (DON 2001a)
  - environmental screening levels (ESLs) for total petroleum hydrocarbons (TPH) – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)
- Groundwater
  - maximum contaminant levels (MCLs) and advisory level for lead (U.S. EPA 2002, DHS 2006)
  - ESLs for TPH (current or potential source of drinking water) (RWQCB 2005)

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being assessed. For example, groundwater concentrations from all study areas were compared to MCLs, whether or not the groundwater was considered a potential drinking water source in that area. Chemicals of potential concern (COPCs) identified in the health risk evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs.

In addition to the above PSCs, metals concentrations in soil and groundwater were compared to the following Alameda Point background concentrations to help discriminate between site-related and naturally occurring metals:

- Alameda Point background soil concentrations (95th percentile of the pink data set; Appendix E of the final RI Report of Operable Unit [OU]-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)
- Alameda Point background groundwater concentrations (95th percentile; Appendix E of the final RI Report of OU-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)

For ease of discussion in this report, the Alameda Point 95th percentile concentrations for metals in soil (pink background data set) and groundwater are referred to as "background."

Section 4.3 of the main RI/FS Report provides further discussion regarding the occurrence and interpretation of metals concentrations in soil and groundwater at IR Site 35.

1.2 AOC 11

The following are summaries of background, historical use, and previous investigations pertinent to AOC 11.

1.2.1 Background

AOC 11 is an approximately 2-acre area in the west-central portion of Transfer Parcel Economic Development Conveyance (EDC)-5 (Figure 1-1) and has boundaries identical to those of EBS Parcel 77. AOC 11 currently consists of the concrete foundation of former Building 101, landscaped open space, and paved vehicle parking. The open space covers approximately 40 percent of AOC 11; the foundation of former Building 101 (Photograph 1-1) covers the remaining 60 percent. AOC 11 is located immediately east of IR Site 8, an area of known contamination from pesticides, metals, and PAHs in soil, and benzene and chlorinated hydrocarbons in groundwater.

1.2.2 Historical Use

Building 101 at EBS Parcel 77 was historically used as a heating plant and for public works maintenance storage, administration, and academic instruction.

Past uses may have included ammunition storage (IT 2001a). General cleaning supplies, oil, and hazardous waste were stored in the building. Historical activities conducted in the open space included material storage, equipment parking, training, and vehicle parking (IT 2001a). During the EBS inspection, splatter marks from unknown substances were observed in and around the deep sink in Building 101, and various stains were also observed; the location of the deep sink could not be identified during an August 2005 site visit by Bechtel Environmental, Inc. One gallon of hydraulic fluid was stored in a Conex box located in the open space (IT 2001a).

Photograph 1-1
Building Pad of Former Building 101, View to South

1.2.3 Previous Investigations

During two previous investigations at AOC 11, soil and/or groundwater samples were collected, and results are summarized below. Locations sampled in AOC 11 are shown on Figure 1-1. Analytical results for soil and groundwater samples collected within AOC 11 are provided in Appendix B.

1.2.3.1 OPERABLE UNIT 1 REMEDIAL INVESTIGATION REPORT

One groundwater sample (S08-HP-06) was collected along the western boundary of AOC 11 as part of the follow-on sampling conducted at IR Site 8 in 1998 for the OU-1 RI Report. The groundwater sample was analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX). These volatile organic compounds (VOCs) were reported in the groundwater sample at concentrations below PSCs (TtEMI 2002c).

1.2.3.2 2002 POLYNUCLEAR AROMATIC HYDROCARBON STUDY

One soil boring (32EDC-5-57) was advanced in AOC 11 during the 2002 PAH study (BEI 2005a). Samples were collected from four depth intervals between 0 and 8 feet below ground surface (bgs) and analyzed for PAHs. B(a)P equivalent concentrations were below the PSC (620 µg/kg).

1.3 EBS PARCELS 78–79

The following are summaries of background, historical use, and previous investigations pertinent to EBS Parcels 78–79.

1.3.1 Background

EBS Parcels 78–79 are data gap areas in the central portion of Transfer Parcel EDC-5. EBS Parcel 78 is an approximately 1.5-acre area and EBS Parcel 79 is an approximately 1.7-acre area (Figure 1-1).

Four buildings (former Buildings 73A, 73B, 131, and Building 607) were historically located in EBS Parcel 78. Currently, two buildings are located in EBS Parcel 78. Building 607 presently houses the Alameda Point Collaborative (Photograph 1-2). A modular building for Alameda Head Start (an active child care facility) is located where former Building 73B used to be (Photograph 1-3).

Two structures (Structures 36A and 624) were historically located in EBS Parcel 79. Structure 36A was a 150-foot radio tower that was removed in November 2002 (Shaw 2003); a new cell tower is now in place at this location (Photograph 1-4). Structure 624 is still present, but its current use is unknown. The remainder of the parcel is currently an asphalt-paved parking area and a playground.

Photograph 1-2
EBS Parcel 78, Alameda Point Collaborative, View to Southwest

Photograph 1-3
EBS Parcel 78, Alameda Head Start Day Care Center, View to Southwest

Photograph 1-4
EBS Parcel 79, Building 624 and Parking Lot, and Cell Tower, View to South

EBS Parcels 78–79 were identified as data gap areas in response to a request from the Alameda Point Collaborative to United States Environmental Protection Agency (U.S. EPA).

1.3.2 Historical Use

EBS Parcel 78 was historically used as the location of a parking lot, for navigational training, for arts and crafts, and as a hobby shop specifically for ceramics and woodworking. Chemicals stored at EBS Parcel 78 included paint, general cleaning supplies, wood finish, ceramic glaze, antifreeze, fuel, and lubricants. All chemicals were stored indoors; no stains were noted during the EBS. The open space consisted of paved and grassy areas. Only a 1-square-foot stain and minor stains associated with vehicle parking were observed. A leak from the air compressor was also observed during the EBS. No potential release areas were identified.

EBS Parcel 79 was historically used as the location of a communications center (Building 624) and a radio tower (Structure 36A). During the EBS, no chemical storage was observed at the parcel; only minor stains associated with vehicle parking were observed, and no potential release areas were identified.

1.3.3 Previous Investigations

During two previous investigations, soil samples were collected at EBS Parcels 78–79, and results are summarized below. Locations sampled in EBS Parcels 78–79 are shown on Figure 1-1. Analytical results for soil samples collected within EBS Parcels 78–79 are provided in Appendix B.

1.3.3.1 2002 POLYNUCLEAR AROMATIC HYDROCARBON STUDY

One soil boring (32EDC-5-70) was advanced in EBS Parcel 79 during the 2002 PAH study (BEI 2005a). Samples were collected from four depth intervals between 0 and 8 feet bgs and analyzed for PAHs. B(a)P equivalent concentrations were below the PSC (620 µg/kg).

1.3.3.2 LEAD REMOVAL ACTION

Based on potential historical use of lead-based paint (LBP) and elevated lead concentrations in soil samples collected near two water towers near EBS Parcels 78–79, an investigation was conducted to determine the extent of lead contamination surrounding a number of structures, including the radio antenna tower (Structure 36A) located in EBS Parcel 79 (TtEMI 2002b).

The investigation included one composite soil sample collected adjacent to former Structure 36A (removed during a subsequent removal action and thus not shown on Figure 1-1) and two additional soil samples from EBS Parcel 78 (SS-73B-E and SS-607-E), immediately west of EBS Parcel 79. Results from these samples were analyzed during the engineering evaluation/cost analysis (EE/CA) in 2002 (TtEMI 2002b).

The EE/CA presented a framework for evaluating the best remedial technologies to address LBP on the antenna tower and lead-impacted soil near Structure 36A. During the EE/CA, a site-specific human-health removal action objective was developed for lead using the Lead Risk Assessment Spreadsheet (LeadSpread) 7 model from the California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control. This objective (199 milligrams per kilogram [mg/kg]) was compared to the reported concentrations of lead; the concentration of lead in the sample collected adjacent to former Structure 36A in EBS Parcel 79 was above the objective; lead concentrations reported in the two samples collected in EBS Parcel 78 were below it.

A lead non-time-critical removal action (NTCRA) was conducted by the Navy between November 2002 and July 2003 (Shaw 2003). During this NTCRA, soil was removed from the area around former Structure 36A in EBS Parcel 79. The roughly triangular removal area measured approximately 36 feet on each side and extended to approximately 2 feet bgs. Approximately 21 cubic yards of soil were removed. Confirmation sampling was conducted during the NTCRA. Shallow soil samples were collected from these borings to approximately 1 foot bgs and analyzed for metals. Nine confirmation soil borings distributed around former Structure 36A outside the removal area are shown on Figure 1-1 (Parcel 79 Grid 1 through 9). The results of confirmation sampling indicated that lead concentrations subsequent to the NTCRA were below the removal action objective. As a result, no additional action was recommended for EBS Parcel 79.

1.4 ADJACENT SITES

IR Site 8 is adjacent to the west side of AOC 11 and is known as a pesticide storage area. The Navy Public Works Center operated the site as the center for weed and pest control for the base. Activities previously conducted at the site include pesticide storage and mixing, paint stripping, public works maintenance and storage, sandblasting, carpentry, equipment cleaning, and painting. The primary source of contamination on-site was likely to be historical activities that included the disposal of wastes in sinks and floor drains that flowed through leaking sewer lines. The RI for OU-1 (TtEMI 2004) identified Aroclor 1260 (northeastern corner of the site), B(a)P, and lead as the primary chemicals of concern in soil, as well as benzene and trichloroethene (TCE) in groundwater. There is a low likelihood that the plume extends beyond this site. AOC 11 is located crossgradient from IR Site 8.

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Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, geology, and potential groundwater beneficial use at AOC 11/EBS Parcels 78–79. These study areas are grouped together because they are contiguous and evaluated together in the baseline human-health risk assessment (HHRA).

Topography at AOC 11/EBS Parcels 78–79 is relatively flat. The average ground elevation, based on elevation data from the 12 borings (A11SB01 through A11SB04, D78SB01 through D78SB04, and D79SB01 through D79SB04) advanced during the RI is 12 feet above mean sea level (MSL). The depth to water in the borings ranged from about 5.5 to 6.5 feet bgs. Groundwater depth was measured in temporary casings prior to groundwater sample collection. Total dissolved solids (TDS) concentrations measured in groundwater samples collected from borings A11SB01, A11SB02, D78SB01 through D78SB04, and D79SB01 through D79SB04 ranged from 1,010 to 7,720 milligrams per liter (mg/L), and the average TDS concentration was 3,754 mg/L.

The groundwater monitoring well nearest to AOC 11/EBS Parcels 78–79 is M08-04, located adjacent to the northwest corner of AOC 11, and approximately 300 feet west of EBS Parcels 78–79. A review of groundwater depths in this well over time (September 1991 through April 2004) shows a range in depth to water from approximately 3 to 6.5 feet bgs. The deepest historical groundwater measured in this well is approximately 3 feet above MSL. This value, if subtracted from the ground elevation at AOC 11/EBS Parcels 78–79, would suggest groundwater in the vicinity of this AOC may have been as deep as 9 feet bgs.

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is northwest at AOC 11/EBS Parcels 78–79. Groundwater flow direction across IR Site 35 was interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Tidal influence at AOC 11/EBS Parcels 78–79, located approximately 1,700 feet from both Seaplane Lagoon and Oakland Inner Harbor, is expected to be negligible based on tidal studies performed at other Alameda Point sites.

Soil encountered in 12 RI borings at AOC 11/EBS Parcels 78–79 consisted of fill material to 7 to 10 feet bgs composed predominantly of sandy silt, silty sand, silty sand with gravel, poorly graded sand with silt, and poorly graded sand. Coarse-grained bay sediment consisting of poorly graded sand and poorly graded sand with silt was encountered from 7 to 12 feet bgs. Fine-grained bay sediment (Young Bay Mud) consisting of lean clay was encountered between 7.7 feet bgs (boring A11SB02 at AOC 11) to 10.5 feet bgs (borings D78SB01 at EBS Parcel 78). The lean clay continued to the total boring depths (10 to 13 feet bgs).

Contacts for the fill material and the Bay Sediment Unit including that with the Young Bay Mud for AOC 11/EBS Parcels 78–79 are shown on cross section D-D′ on Figure 2-8 of the main RI/FS Report. RI boring logs for this study area are presented in Appendix D.

As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust may be located beneath AOC 11/EBS Parcels 78–79; however, it was not encountered in borings advanced to 13 feet bgs during the RI.

Two geotechnical soil samples were collected from the vadose zone (artificial fill) at AOC 11 at depths of 2.5 to 4 feet bgs and 6.5 to 8 feet bgs. The soil in both samples was classified as poorly graded sand to silty sand. The average fraction organic carbon in the soil samples from AOC 11 is 0.005. Geotechnical results for samples collected at AOC 11 are presented in Table 3-5 of the main RI/FS Report.

AOC 11/EBS Parcels 78–79 is located in the central groundwater region of Alameda Point. The groundwater in the central region is considered a Class II potential drinking water source based on TDS concentrations and groundwater yield, although the Alameda Point groundwater beneficial use evaluation considered use of groundwater as a drinking water source unlikely (TtEMI 2000b). Based on the TDS concentrations in samples from AOC 11/EBS Parcels 78–79, groundwater may meet state exemption criteria (3,000 mg/L) for the municipal and domestic water supply designation in the California State Water Resources Control Board source of drinking water policy Resolution (Res.) 88-63 (SWRCB 1988) and California Regional Water Quality Control Board Res. 89-39 (RWQCB 2003).

Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for AOC 11/EBS Parcels 78–79. The RI was conduced in accordance with the sitewide data quality objectives (DQOs) for the evaluation of AOCs presented in Table 3-1 of the main RI/FS Report.

3.1 APPROACH

The sampling plan for AOC 11 addressed chemical storage at EBS Parcel 77 and stains observed at Building 101 during the EBS. Limited sampling had been performed in AOC 11; therefore, soil and groundwater samples were collected beneath and around Building 101 to assess whether contaminants from site activities impacted soil and groundwater. One boring was also advanced in the northwest corner of AOC 11, near the IR Site 8 boundary, to evaluate pesticides associated with that site.

The sampling design at EBS Parcels 78–79 was developed to address issues raised by the Alameda Point Collaborative. Sampling locations were placed in an unbiased modified grid pattern, although no release other than the LBP (addressed in the NTCRA) to soil or groundwater is known to have occurred at EBS Parcels 78–79.

3.2 SCOPE

Soil and grab groundwater samples were collected during the 2005 RI sampling from four borings at AOC 11 and eight borings at EBS Parcels 78–79. Soil and groundwater samples were analyzed for VOCs, semivolatile organic compounds (SVOCs), PAHs, pesticides/polychlorinated biphenyls (PCBs), and metals. Additionally, soil and groundwater samples at EBS Parcels 78–79 were analyzed for TPH (purgeable and extractable ranges). Two soil samples from one boring at AOC 11 were submitted for geotechnical analysis. Groundwater samples were also analyzed for TDS.

Tables 3-1 and 3-2 include summaries of samples collected during the RI and previous investigations at AOC 11 and EBS Parcels 78–79, respectively. Figure 1-1 shows sampling locations from all investigations.

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Section 4
NATURE AND EXTENT OF CONTAMINATION

This section presents the analytical results from previous investigations and from the RI and presents the concentration ranges and spatial distributions of the analytes identified at AOC 11/EBS Parcels 78–79. Soil and groundwater samples were collected at 26 locations during the PAH study (BEI 2005a), the OU-1 RI (TtEMI 2002c), the lead NTCRA (Shaw 2003), the lead removal action (TtEMI 2002b), and the RI (Tables 3-1 and 3-2 and Figure 1-1). Metals reported in soil and groundwater at concentrations above background are discussed in detail in Section 4.3.3 of the main RI/FS Report. Metals discussion in this section focuses primarily on concentrations above PSCs. Regardless of concentration, all reported metals (except required human trace nutrients) were included in the risk evaluation (Section 6).

Statistical summaries of soil and groundwater results are presented in Tables 4-1 and 4-2, and soil and groundwater analytical results are summarized in Tables 4-3a and 4-3b, and 4-4a and 4-4b. Distributions of analytes reported at concentrations above PSCs are illustrated on Figures 4-1 and 4-2, for soil and groundwater, respectively. Complete analytical results for historical and RI samples from AOC 11/EBS Parcels 78–79 are included in Appendices B and G, respectively.

4.1 SOIL SAMPLING RESULTS

Analytical soil sampling results are summarized below for each class of chemicals investigated at AOC 11/EBS Parcels 78–79 (Figure 4-1).

4.1.1 Volatile Organic Compounds

At AOC 11, acetone was reported in soil from boring A11SB04, and methylene chloride was reported in soil from borings A11SB01 and A11SB03. One sample of fill soil (88-001) was analyzed for VOCs, and concentrations were below PSCs.

At EBS Parcel 78, 2-butanone was reported in soil from boring D78SB03. At EBS Parcel 79, one or more of the following VOCs were reported in soil from borings D79SB01 through D79SB04: acetone, benzene, 2-butanone, cis-1,2-dichloroethene, methyl tert-butyl ether, tetrachloroethene, toluene, and/or m,p-xylene. Reported VOC concentrations were below PSCs.

4.1.2 Polynuclear Aromatic Hydrocarbons

Nineteen PAHs were reported in soil at AOC 11 from borings 32EDC-5-57 and A11SB01 through A11SB04; and at EBS Parcels 78–79 from borings 32EDC-5-70, D78SB01 through D78SB03, D79SB01 through D79SB04, and 88-001. Reported B(a)P equivalent concentrations were below the PSC. One sample of fill soil (88-001) was analyzed for SVOCs; one SVOC was reported at a concentration below the PSC.

4.1.3 Total Petroleum Hydrocarbons

Diesel-, gasoline-, and motor oil–range TPH was reported in soil from borings D78SB01 through D78SB03, D79SB01 through D79SB03, and 88-001. The sample from boring

88-001 was collected from soil that was subsequently used as fill material in the area as part of the lead NTCRA. Diesel-range TPH was reported at concentrations of 150, 460, and 390 mg/kg in the surface samples (0 to 1 foot bgs) collected from borings D78SB01, D79SB02, and D79SB03, respectively. These concentrations were above the PSC (ESL of 100 mg/kg), and appear to be randomly distributed across EBS Parcels 78–79 with limited lateral extent. TPH was vertically defined by deeper soil samples. Soil samples collected at AOC 11 were not analyzed for TPH. One sample of fill soil (88-001) was analyzed for TPH and concentrations were not above PSCs.

4.1.4 Pesticides and Polychlorinated Biphenyls

Pesticide concentrations were not reported above laboratory detection limits in samples collected from the boring closest to IR Site 8 at AOC 11 or in samples collected at EBS Parcel 79. The pesticides alpha-chlordane, gamma-chlordane, 4,4'-dichlorodiphenyl-dichloroethene (DDE), and 4,4'-dichlorodiphenyltrichloroethane (DDT) were reported in soil from boring D78SB03 at EBS Parcel 78. One sample of fill soil (88-001) was analyzed for pesticides and PCBs, and concentrations were below detection limits.

4.1.5 Metals

Twenty-three metals were reported in soil at concentrations below PSCs from RI borings A11SB01 through A11SB04; and at EBS Parcels 78–79 from borings D78SB01 through D78SB04, D79SB01 through D79SB04, Parcel 79 Grid 1, and 88-001 at AOC 11. Iron and vanadium were the only metals reported in soil samples at concentrations above PSCs at AOC 11/EBS Parcels 78–79. Metals reported at concentrations above PSCs and above background but below PSCs are discussed below.

Arsenic was reported above the PSC (4.3 mg/kg) in the fill soil sample (88-001); however, this concentration is below background.

4.1.5.1 METALS ABOVE PRELIMINARY SCREENING CRITERIA

Iron was reported at concentrations from 23,100 to 29,900 mg/kg in the 1- to 2-foot-bgs soil samples from borings A11SB02 and A11SB03 at AOC 11. These concentrations were above the PSC (residential PRG of 23,000 mg/kg) and the background concentration of 22,280 mg/kg.

Iron and vanadium were reported at concentrations above PSCs at EBS Parcel 78. Iron concentrations above the PSC ranged from 23,900 to 49,500 mg/kg in the 0- to 5-foot-bgs soil samples from borings D78SB01, D78SB02, and D78SB03. Vanadium was reported at a concentration of 110 mg/kg in the 1- to 2-foot-bgs soil sample from boring D78SB03. This concentration was above the PSC (residential PRG of 78 mg/kg) and the background concentration of 47.34 mg/kg.

All reported metals concentrations for soil samples collected at EBS Parcel 79 were below PSCs.

Additionally, arsenic was reported above the PSC (4.3 mg/kg) in the fill soil sample (88-001); however, this concentration is below background (9.14 mg/kg). This fill soil

was used to backfill the excavation created as part of the NTCRA conducted at EBS Parcel 79.

Metals concentrations above background and PSCs appear to be randomly distributed across AOC 11/EBS Parcels 78–79. As discussed in Section 4.3 of the main RI/FS Report, iron and vanadium are believed to be naturally occurring and not representative of releases from activities conducted when the base was active. Iron is the only metal above background that contributes to the hazard index (HI) at AOC 11/EBS Parcels 78–79 (iron had a hazard quotient [HQ] of 1). A further indication that iron is naturally occurring at AOC 11/EBS Parcels 78–79 is that four of the five samples with iron concentrations above background also had concentrations of manganese above background. As discussed in Section 4.3.1 of the main RI/FS Report, iron and manganese concentrations throughout IR Site 35 show significant positive correlation, thus providing evidence that these metals are naturally occurring.

While not above PSCs, lead and zinc concentrations above background were most commonly not associated with elevated iron concentrations. No concentrations of lead and two of nine concentrations of zinc above background were associated with iron concentrations above background. The samples with these concentrations of lead and zinc above background were collected near the former communications antenna structure, where an NTCRA was performed to address LBP in soil.

4.2 GROUNDWATER SAMPLING RESULTS

Analytical groundwater sampling results are summarized below for each class of chemicals investigated at AOC 11/EBS Parcels 78–79 (Figure 4-2).

4.2.1 Volatile Organic Compounds

Benzene, carbon disulfide, 1,3-dichlorobenzene, cis-1,2-dichloroethene (DCE), trans-1,2-DCE, toluene, TCE, 1,2,4-trimethylbenzene, and m,p-xylene were reported in groundwater from borings D78SB02 through D78SB04 and D79SB01 through D79SB04 at EBS Parcels 78–79, respectively. The VOC 2-butanone was reported in groundwater from A11SB01 at AOC 11. VOC concentrations were below PSCs.

4.2.2 Semivolatile Organic Compounds

Pyrene was the only SVOC reported at the study areas. Pyrene was reported in groundwater from borings D78SB01 and D78SB02 at EBS Parcel 78. Pyrene concentrations were below the PSC.

4.2.3 Total Petroleum Hydrocarbons

TPH was not reported above laboratory detection limits in groundwater from AOC 11/ EBS Parcels 78–79.

4.2.4 Pesticides and Polychlorinated Biphenyls

Pesticides and PCBs were not reported above laboratory detection limits in samples collected at AOC 11.

Aroclor 1260, alpha-benzene hexachloride (BHC), gamma-BHC (lindane), alpha-chlordane, gamma-chlordane, 4,4'-DDE, 4,4'-DDT, dieldrin, endosulfan I, endosulfan II, endosulfan sulfate, endrin aldehyde, heptachlor, and heptachlor epoxide were reported in groundwater from boring D79SB01 at EBS Parcel 79. PCB and pesticide concentrations were below PSCs. PSCs (MCLs) have not been established for 4,4'-DDE, 4,4'-DDT, endosulfan I, endosulfan II, endosulfan sulfate, and endrin aldehyde.

As discussed in Section 6, PCBs and pesticides in groundwater are risk drivers at this study area. The low concentrations (relative to PSCs) reported in the one groundwater sample likely represents an artifact of sampling (associated with suspended material) rather than dissolved concentrations. Because of their low solubility and tendency to sorb to organic matter in soil, PCBs and pesticides are typically not found dissolved in groundwater.

4.2.5 Metals

Eleven metals were reported in groundwater from RI borings at AOC 11/EBS Parcels 78–79 at concentrations below PSCs. Statistical analysis was performed on selected metals in groundwater (Appendix H). Results indicated that arsenic, iron, and manganese concentrations in groundwater were not statistically different from those in the background data set, suggesting that there has not been a release of metals.

Arsenic was the only metal reported at concentrations above the PSC in three samples. Arsenic was reported at concentrations of 17.5, 14.7, and 21.3 micrograms per liter (µg/L) in the groundwater samples from borings A11SB02, D79SB03, and D79SB04, respectively. These concentrations were above the MCL of 10 µg/L. The 21.3 µg/L concentration was above background but below the maximum background concentration of 40.7 µg/L. However, as mentioned above, additional statistical analysis (Appendix H) indicates that the concentrations of arsenic in groundwater are consistent with background.

Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for AOC 11/EBS Parcels 78–79. It discusses the conceptual site model, the physical and chemical changes that might occur to contaminants present at AOC 11/EBS Parcels 78–79, and the mechanisms that could potentially transfer the contaminants from the study area. The conceptual site model facilitates understanding of the present conditions by integrating study area-specific physical characteristics with the nature and extent of contaminants in the physical systems. Section 5.2 includes an evaluation of the mobility and persistence of compounds above PSCs not attributable to background and of risk drivers at AOC 11/EBS Parcels 78–79. Section 5.3 discusses potential migration pathways.

5.1 AOC 11 / EBS PARCELS 78–79 CONCEPTUAL SITE MODEL

AOC 11/EBS Parcels 78–79 is located in the central portion of IR Site 35, east of Saratoga Street. Topography at the study area is flat and mostly paved or covered by the foundation of former Building 101 or current buildings. The remainder is landscaped. The area is approximately 1,700 feet from both Oakland Inner Harbor and Seaplane Lagoon.

Based on a review of boring logs for AOC 11/EBS Parcels 78–79, subsurface lithology consists of generally homogeneous coarse-grained material (poorly graded sand and some silty sand) with some siltier material in the upper 3 feet bgs beneath EBS Parcel 78. This is underlain by silty clay of the Young Bay Mud. Shallow groundwater of the first water-bearing zone beneath this study area occurs in the coarse-grained material; the underlying Young Bay Mud would be expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. The Marsh Crust was not encountered in the 12 RI borings, although it may be present.

Groundwater flow direction is approximately northwest, and depth to water is approximately 5.5 to 6.5 feet bgs but may have historically been as deep as 9 feet bgs. Negligible tidal influence is expected at AOC 11/EBS Parcels 78–79 because of its distance from Oakland Inner Harbor and Seaplane Lagoon. This study area is within the central groundwater region of Alameda Point (TtEMI 2000b). While considered unlikely that groundwater in this region would be used as a drinking water source, it is classified as a potential drinking water source based on TDS and yield. However, TDS concentrations measured during the RI suggest that groundwater in this area may meet the San Francisco Bay Regional Water Quality Control Board's exemption criteria for municipal and domestic water supply designation.

TPH as diesel and metals (iron and vanadium) were reported in soil at concentrations above PSCs, and arsenic was reported in groundwater at one location above both the PSC and background. Diesel-range TPH was reported in surface samples at three isolated locations. The extent of TPH is defined vertically and appears to be limited laterally.

Iron and vanadium were reported in soil at concentrations above PSCs and are believed to be naturally occurring rather than results of Navy releases. The one groundwater arsenic

concentration reported above background was below the maximum background groundwater concentration, and is also believed to be naturally occurring.

The baseline HHRA (Section 6) identified several additional compounds as risk drivers (contributing 10^{-6} or more to the cancer risk and 0.8 or more to the hazard index [HI]) at AOC 11/EBS Parcels 78–79. They are TCE, Aroclor 1260, seven pesticides, and manganese in groundwater. Cadmium was also identified as a risk driver in soil. Arsenic and iron are risk drivers in soil and groundwater. The metals reported in soil and groundwater are believed to be naturally occurring.

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in the environment tends to remain in place. The tendency toward immobility and persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Section 5 of the main RI/FS Report discusses the physical and chemical properties of contaminants, and their chemical class (e.g., pesticides), that affect their transport and persistence in the environment. Also discussed in Section 5 of the main RI/FS Report are mobility and persistence of naturally occurring metals. This section discusses the mobility and persistence of TCE, pesticides, Aroclor 1260, and diesel-range TPH.

5.2.1 Trichloroethene

TCE is a chlorinated VOC. Chlorinated VOCs generally have low-to-moderate solubilities, high volatilities, low-to-moderate partition coefficients, high mobilities, and, except for vinyl chloride, product densities greater than water. Because of its density, TCE tends to coalesce and migrate as an immiscible dense nonaqueous-phase liquid (DNAPL) when present in groundwater at concentrations exceeding its water solubility. The maximum concentration of TCE reported in groundwater at AOC 11/EBS Parcels 78–79 is 1.1 µg/L; the water solubility of TCE is 1,100,000 µg/L. The concentrations reported in groundwater at AOC 11/EBS Parcels 78–79 are much lower than those that would be expected if DNAPL were present in the subsurface.

Chlorinated VOCs tend to adsorb weakly to clay-size particles and organics in soil, and under suitable conditions, they are relatively easily leached from soil into groundwater. In the subsurface, depending on conditions (the presence of nutrients, microorganisms, a reducing environment, etc.), chlorinated VOCs typically undergo reductive dechlorination, a biological process that breaks down chlorinated ethenes in groundwater. For example, PCE and TCE degrade in reducing environments to form 1,2-DCE or 1,1-DCE (with the most common intermediate being cis-1,2-DCE), and vinyl chloride. However, degradation does not always occur, and the time required for each dechlorination step may be widely variable. The presence of both cis-1,2-DCE and trans-1,2-DCE in the groundwater at low concentrations at the study area suggests that the TCE has degraded in the subsurface.

Estimates of mobility and persistence for TCE are summarized in Table 5-1. Because it tends to adsorb weakly to clay-size particles and organics in soils, TCE is only slightly retarded relative to groundwater flow, with a retardation factor ranging from 7 to 11 (depending on the organic carbon partition coefficient [K_{oc}] used in the calculation). Additionally, as indicated by the estimated percent adsorbed to soil, much of the mass of TCE will be present either in the groundwater or in the vapor phase. A modified classification scheme has been suggested by Dragun (1988). It is based on the K_{oc} values for constituents with a K_{oc} less than 50, 50 to 150, and 150 to 500, representing constituents that are considered very mobile, mobile, and intermediately mobile, respectively. Using this classification, TCE would be classified as mobile in the subsurface.

5.2.2 Pesticides

Characteristics of most organochlorine pesticides are low water solubility, propensity for sorption to organic matter, and high persistence in the environment, as well as relatively high volatilization from soil surface or water. Pesticides have high K_{oc} values, causing them to be relatively immobile and resistant to transformation processes in the environment that can degrade some chemicals, causing pesticides to persist in soil. Table 5-1 provides estimates of mobility and persistence for the seven pesticides reported at AOC 11/EBS Parcels 78–79. The low solubility and mobility exhibited by these compounds retard their migration to groundwater, as indicated by the calculated estimate of percent sorbed to soil in Table 5-1: over 84 percent of the pesticides will tend to remain sorbed to soil. Only four of the seven pesticides reported in groundwater were reported in soil collected from the study area. The seven pesticides reported in groundwater all were from the same sample (D79SB01 up to 0.011J µg/L), and likely represent an artifact of sampling (associated with suspended) rather than dissolved concentrations. None of the other groundwater samples had reported concentrations of pesticides.

Two mechanisms allow pesticides to change in the environment: degradation and weathering. Under normal conditions, pesticides biodegrade very slowly in soil, atmosphere, and animal tissues, occurring more rapidly under anaerobic conditions. The soil half-life is a measure of the persistence of a pesticide in soil. They can be categorized on the basis of their half-life as nonpersistent, moderately persistent, or persistent (Kerle et al. 1994). All of the pesticides reported in groundwater and soil at AOC 11/EBS Parcels 78–79 are classified as persistent. The dominant fate processes of organochlorine pesticides in aquatic environments are volatilization and sorption to biota and sediment, with the importance of sorption being determined by the amount of suspended particulate available in the water body. The ultimate fate is generally biodegradation via microbiological processes in soil and water (ATSDR 2005b).

5.2.3 Aroclor 1260

The most important property of PCBs in relation to mobility and persistence is their general inertness, as they resist both acids and alkalis and have thermal stability. PCBs

have large molecular structures and typically bind to soil (clay-size particles and) based on their size and physical characteristics. PCBs have high K_{oc} values, causing them to be relatively immobile and resistant to transformation processes that can degrade some chemicals, causing them to persist in soil. Table 5-1 provides estimates of mobility and persistence for Aroclor 1260. The low solubility and mobility exhibited by these compounds retard their migration to groundwater as indicated by the estimate that all of Aroclor 1260 will remain sorbed to soil and organic matter in soil. Therefore, PCBs are rarely found dissolved in groundwater. Aroclor 1260 was not reported in any soil samples collected from AOC 11/EBS Parcels 78–79. It was reported in only one grab groundwater sample at a low concentration (below the MCL) of 0.18 J µg/L, which likely represents an artifact of sampling (associated with suspended material) rather than a dissolved concentration.

Two mechanisms allow PCBs to change in the environment: degradation and weathering. Under normal conditions, PCBs degrade slowing in soil, with degradation occurring more rapidly in anaerobic systems than in aerobic systems. Aroclors are mixtures of PCB congeners whose names reflect the percent chlorine (by weight) of the mixture; Aroclor 1260 is 60 percent chlorine by weight. The more chlorinated mixtures are the most persistent and toxic. Individual congeners present in the Aroclor 1260 mixture are subject to different rates of microbial degradation. Microbial degradation depends on the position of the chlorine atom on the biphenyl molecule and the degree of chlorination. Higher chlorinated congeners (those with five or more chlorine atoms) are more persistent in the environment and are not readily transformed by bacteria. Approximately 99 percent of the Aroclor 1260 mixture consists of congeners with five or more chlorine atoms (ATSDR 2000).

5.2.4 Diesel-Range Total Petroleum Hydrocarbons

TPH is generally composed of a spectrum of hydrocarbon molecule sizes, from the short-chain volatiles (e.g., BTEX and naphthalene) to long-chain oils. TPH is subject to volatilization and biodegradation in the subsurface, with constituents that comprise the lighter-end of fuels (gasoline and BTEX) being more readily biodegradable under aerobic conditions. These constituents also tend to be more volatile, more soluble, more mobile, and generally more toxic than the longer-chain hydrocarbons. Heavier fuels (motor oil and heavier end of diesel spectrum) do not typically have appreciable amounts of soluble constituents and tend to adhere to soil particles or other organic matter in the subsurface, thus being less mobile. Aging or weathering of TPH will remove the light-end hydrocarbons, including volatiles, first. The lack of appreciable fuel-related volatile constituents reported in soil and the low concentrations reported in groundwater indicate that the TPH present in the subsurface at AOC 11/EBS Parcels 78–79 has been subject to weathering and is not a significant source of soluble or volatile constituents to groundwater or air. Additionally, the laboratory qualified two of the diesel-range TPH concentrations with a note indicating that the concentration represents higher-boiling-point hydrocarbons such as waste oil, motor oil, weathered diesel, and hydraulic fluid.

5.3 MIGRATION PATHWAYS

The migration pathways evaluated for relevance to AOC 11/EBS Parcels 78–79 include atmospheric transport (i.e., vapors and airborne fugitive dust), transport via surface water runoff, and groundwater transport. TCE, pesticides, Aroclor 1260, and diesel-range TPH are the contaminants identified at AOC 11/EBS Parcels 78–79 whose source may be Navy activities. Metals reported in soil and groundwater at concentrations above PSCs or background are believed to be naturally occurring.

The volatility of analytes reported in soil and groundwater at concentrations above PSCs is extremely low. With the exception of TCE, the risk drivers identified at AOC 11/EBS Parcels 78–79 are also not very volatile. Reported TCE concentrations are low, and significant migration of TCE from groundwater to air is not expected. Most of the study area is paved or covered with buildings, so significant transport by airborne dust or by surface water runoff is unlikely. The risk drivers identified in groundwater are of low solubility and are not likely to migrate significant distances, as supported by the retardation factors presented in Table 5-1.

Significant transport pathways were not identified at AOC 11/EBS Parcels 78–79 for the following reasons.

- Vapor migration of VOCs from soil or groundwater is not considered a significant transport mechanism due to the low concentrations of VOCs.
- Particulate dispersion (either by wind or surface water) is not a primary transport mechanism because most of AOC 11/EBS Parcels 78–79 is paved or covered with buildings. However, if the surface cover at the study area is disturbed or removed during and after redevelopment, particulate dispersion from soil is considered a possible transport pathway for nonvolatile compounds in surface soil.
- Transport due to groundwater flow is not considered a significant transport mechanism because pesticides, PCBs, and diesel-range TPH are retarded significantly relative to groundwater flow.
- Seasonal fluctuations of the groundwater table are not considered a significant mechanism for transport of analytes from soil to groundwater because none of the analytes, other than diesel-range TPH and naturally occurring metals, are present in soil at concentrations above PSCs. Weathered diesel-range TPH has low water solubility and exhibits low mobility in soil.

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Section 6
HUMAN-HEALTH RISK ASSESSMENT

This section summarizes the baseline HHRA results for AOC 11/EBS Parcels 78–79. These study areas have been combined because their boundaries are physically contiguous. In the baseline HHRA, risk for a residential exposure scenario is assessed with the assumption that no remedial action would take place at the study area. Baseline risks were evaluated for reasonable maximum exposure (RME). This section also presents a qualitative uncertainty evaluation that identifies and characterizes the effects of uncertainties on the risk results.

The HHRA calculates total cumulative risk values and was conducted in accordance with guidelines published by the U.S. EPA in the Risk Assessment Guidance for Superfund Part A (U.S. EPA 1989), Part B (U.S. EPA 1991), and Part E (U.S. EPA 2004a) and supporting documents and guidelines published by the Cal/EPA (1993, 1994, 1999, 2005). The approach used to calculate risk is described in Section 6 of the main RI/FS Report. HHRA information is provided in Appendix J.

Cancer risk and noncancer values for AOC 11/EBS Parcels 78–79 are shown in Table 6-1. Risk drivers for cancer and noncancer risk are presented in Table 6-2.

6.1 COPC IDENTIFICATION

The data selection and identification of COPCs are based on a compilation of all usable data for soil and groundwater. All chemicals reported in at least one sample collected during the RI and/or included in the historical data were included as HHRA COPCs. The HHRA included PAHs in soil, except calcium, magnesium, potassium, and sodium, which are known to be required human trace nutrients. All metals were included in the list of HHRA COPCs regardless of whether the concentrations were above or below background.

The identification of HHRA COPCs in soil was based on the results from analyses of samples collected from 0 to 10 feet bgs or to groundwater if depth to groundwater is less than 10 feet bgs.

There are 53 COPCs in soil at AOC 11/EBS Parcels 78–79: 18 VOCs based on 35 to 53 samples, 10 SVOCs based on 44 to 52 samples, 4 pesticides based on 35 to 44 samples, and 21 metals based on 35 to 53 samples except hexavalent chromium based on 9 samples and molybdenum based on 18 samples.

There are 31 COPCs in groundwater at AOC 11/EBS Parcels 78–79: 9 VOCs based on nine or ten samples, 14 pesticides/PCBs based on ten samples, and 8 metals based on ten samples.

Antimony, arsenic, beryllium, mercury, molybdenum, selenium, silver, and thallium have concentrations in soil below background. In groundwater, concentrations of barium, beryllium, and vanadium are below background. Additional statistical analysis indicated that concentrations of cadmium in soil and those for arsenic, iron, and manganese in groundwater are below background (Appendix H).

6.2 RISK CHARACTERIZATION

This section presents the results of the U.S. EPA and Cal/EPA cancer risk calculations, noncancer hazard values, and the evaluation of lead. For cancer risk, specific exposure pathways are discussed in the following sections. Results are presented in terms of three exposure groups:

- **Exposure Group 1**. All soil and groundwater exposure pathways (includes residential use of groundwater)
- **Exposure Group 2**. Exposure pathways for soil and vapors from VOCs in groundwater (does not include residential use of groundwater)
- **Exposure Group 3**. Exposure pathways for residential use of groundwater

Two results are presented for each exposure group, the total risk and a second value that does not include risk associated with metals concentrations that are below background.

6.2.1 Cancer Risk

The total U.S. EPA and Cal/EPA RME cancer risks (including background) at AOC 11/ EBS Parcels 78–79 are 3×10^{-3} and 8×10^{-3}, respectively. The total RME cancer risks rank-ordered by exposure pathway for U.S. EPA and Cal/EPA, respectively, are as follows:

- residential use of groundwater (3×10^{-3} and 8×10^{-3})
- direct contact with soil (9×10^{-6} and 5×10^{-5})
- ingestion of homegrown produce (5×10^{-6} and 3×10^{-5})
- inhalation of vapors in indoor air from soil and groundwater (3×10^{-6} and 5×10^{-7})
- inhalation of particulates and vapors in outdoor air (2×10^{-7} and 3×10^{-7})

For residential use of groundwater, the cancer risks without metals below background are above the risk management range. The cancer risk drivers for residential use of groundwater, in descending order, are as follows:

- PCBs (Aroclor 1260) reported in one of ten samples. PCBs are rarely found in groundwater because these chemicals are immobilized in soil. This suggests that this reported value is an artifact of the sampling.
- Pesticides reported in one of ten samples. These pesticides are not generally found in groundwater except at locations where pesticides are used heavily, such as farming areas in pesticide-mixing zones. This suggests that these reported values are an artifact of the sampling.
- VOCs reported with varying frequency in the groundwater samples.

For current and reasonable future use exposure pathways via soil and vapors from groundwater to indoor air and without metals below background, the cancer risk drivers, in descending order, are as follows:

- U.S. EPA cancer risk of 4×10^{-6} is associated with TCE in groundwater to indoor air.
- U.S. EPA and Cal/EPA cancer risks associated with PAHs are 1×10^{-6} and 2×10^{-6}, respectively.

The U.S. EPA and Cal/EPA current and reasonable future use cancer risks without PAHs and metals below background are 4×10^{-6} and 1×10^{-6}, respectively. The U.S. EPA cancer risk above 1×10^{-6} is due to TCE in groundwater at the maximum concentration reported in three of nine samples (1.1 µg/L, which is below the MCL of 5 µg/L).

6.2.2 Noncancer Hazard

The noncancer HI value at AOC 11/EBS Parcels 78–79 is 233 for all exposure pathways. The risk drivers are PCBs in groundwater. As noted earlier, PCBs are rarely found in groundwater because these chemicals are immobilized in soil. This suggests that this reported value is anomalous or an artifact of the sampling.

For current and reasonable future use exposure pathways via soil and vapors from groundwater to indoor air without PAHs or metals below background, the HI is 2; however, the majority of the risk is associated with iron (HI of 1). As discussed in Section J1.2.4 of Appendix J, health effects for iron and manganese are not considered additive with other chemicals.

The maximum concentration of lead in soil of 150 mg/kg is equal to the generic lead PRG of 150 mg/kg and below the site-specific PRGs of 184 mg/kg including ingestion of homegrown produce and 322 mg/kg without ingestion of homegrown produce. Lead was not reported above detection limits in groundwater.

6.3 UNCERTAINTY ANALYSIS

There is a high level of confidence that the risks estimated for AOC 11/EBS Parcels 78–79 are not underestimated. The data are considered adequate for this approximately 5.2-acre site. There are 35 to 53 samples for most parameters in soil and 9 or 10 samples of groundwater.

6.4 CONCLUSIONS

For AOC 11/EBS Parcels 78–79, the U.S. EPA and Cal/EPA total cancer risks including metals below background are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 3×10^{-3} and 8×10^{-3}, respectively

  Without metals below background: 2×10^{-3} and 5×10^{-3}, respectively
- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 2×10^{-5} and 8×10^{-5}, respectively

Without metals below background: 5×10^{-6} and 3×10^{-6}, respectively

Without metals below background and PAHs in soil: 4×10^{-6} and 1×10^{-6}, respectively

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 3×10^{-3} and 8×10^{-3}, respectively

  Without metals below background: 2×10^{-3} and 5×10^{-3}, respectively

The noncancer hazard values including metals below background are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 233

  Without metals below background: 222

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 2

  Without metals below background: 2

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 231

  Without metals below background: 220

For Exposure Groups 1 and 3, the majority of the cancer and noncancer risk is associated with ingestion of PCBs in groundwater based on the reported concentration of PCBs in one possibly anomalous sample of ten groundwater samples.

For Exposure Group 2, the majority of the cancer risk is due to the potential vapor migration of TCE in groundwater to indoor air. The HI value without iron is 1.

The EPC for lead of 27.8 mg/kg in soil is below site-specific PRGs of 184 and 322 mg/kg with and without homegrown produce, respectively.

Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at AOC 11/EBS Parcels 78–79. Included are summaries of the nature and extent of contamination and results of the baseline HHRA. Results form the basis of responses to the DQO decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendation presented below.

7.1 SUMMARY

One boring was advanced in the northwest corner of AOC 11 near the IR Site 8 boundary to evaluate pesticides associated with that area. At EBS Parcels 78–79, the RI sampling was in response to an agency request for sampling on behalf of the Alameda Point Collaborative to further assess soil and groundwater quality at these parcels due to their being used by the community; although no release other than the release of LBP (addressed in the NTCRA) to soil or groundwater is known to have occurred.

The only analytes reported above PSCs were metals (iron and vanadium) and diesel-range TPH in soil samples; however, they were not reported in groundwater at concentrations above PSCs. Metals concentrations are believed to be naturally occurring rather than a result of Navy releases. Iron and vanadium were reported above PSCs in soil at six borings; however, these metals are not believed to be associated with Navy activities based on the evaluation in Section 4.3 of the main RI/FS Report. Arsenic was reported above the PSC in three groundwater samples; however, additional analysis shows that the concentrations are below background (Appendix H). TPH concentrations above PSCs appeared to be distributed randomly, were in the upper 1 foot of soil, and were defined to below detection limits vertically by deeper samples. Results of RI samples indicate that AOC 11 is not impacted by pesticides from IR Site 8.

TDS measurements from eight groundwater samples ranged from 1,010 to 7,720 mg/L, and the average TDS concentration was 3,754 mg/L.

Results of the baseline HHRA show a U.S. EPA and Cal/EPA total cancer risk of 3×10^{-3} and 8×10^{-3}, respectively (above the risk management range), with an HI of 233. Without metals below background (arsenic, cadmium, and iron in soil and arsenic, iron, and manganese in groundwater), U.S. EPA and Cal/EPA cancer risk is 2×10^{-3} and 5×10^{-3}, respectively, with an HI of 222. The cancer risk and HI are largely due to a single detection of Aroclor 1260 in ten samples at a concentration in groundwater below the PSC, and likely represents an artifact of sampling (associated with suspended material) rather than a dissolved concentration. Because of their low solubility and tendency to sorb to organic matter and clay-size particles in soil, PCBs are rarely found dissolved in groundwater. Without metals below background, residential use of groundwater, and PAHs in soil, U.S. EPA and Cal/EPA risks are 4×10^{-6} and 1×10^{-6}, respectively, with an HI of 2. The U.S. EPA cancer risk is due to potential migration of TCE in groundwater to indoor air. The HI above 1 is mostly due to iron (HQ of 1) in soil. There are no chemicals with a hazard value greater than 1, and the health effects of iron are not considered additive with other chemicals.

7.2 AOC 11 AND EBS PARCELS 78–79 CONCLUSIONS AND RECOMMENDATIONS

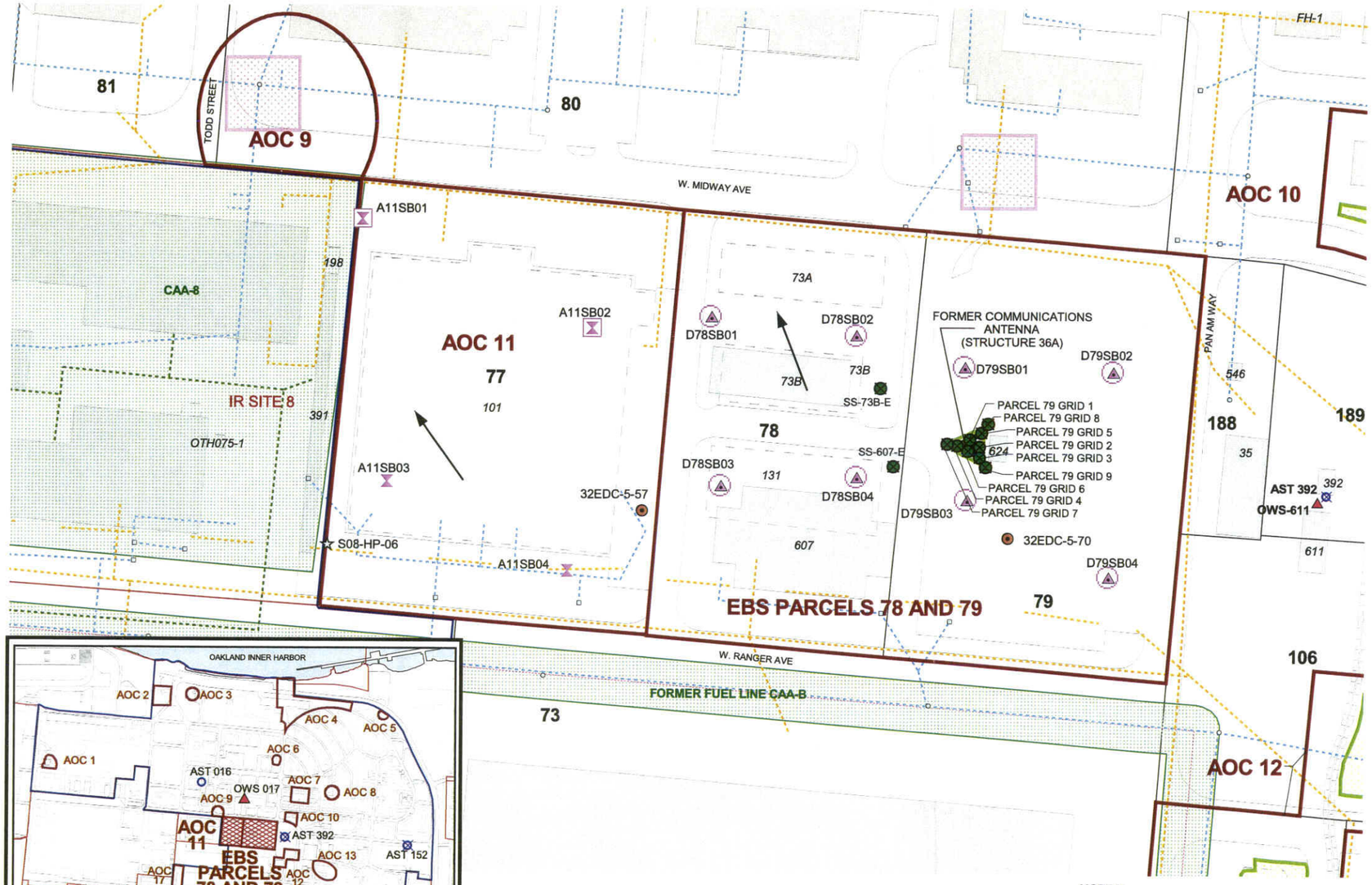
The RI was conducted using the seven-step DQO process (U.S. EPA 2000); DQOs were developed for AOC 11/EBS Parcels 78–79 in the Work Plan (BEI 2006). The RI has addressed these DQOs, as summarized in Table 7-1.

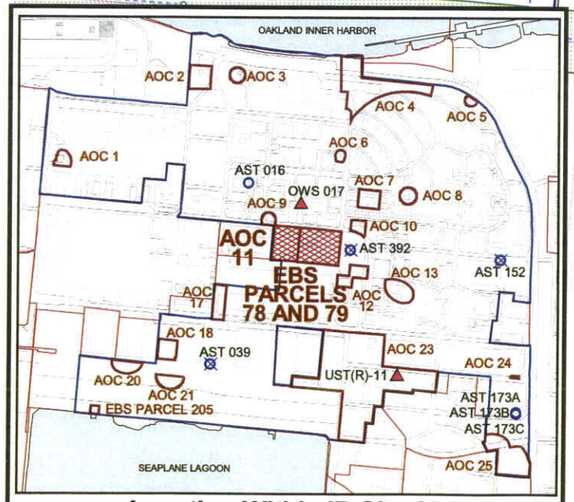
The data collected during previous investigations and the RI adequately defined the nature and extent of contamination, and were sufficient to perform a baseline HHRA and support decisions on the necessity for remedial action at AOC 11/EBS Parcels 78–79.

No further action is recommended for AOC 11/EBS Parcels 78–79. Further evaluation of the extent of TPH and metals in soil and metals, PCBs, pesticides, and TCE in groundwater is not recommended for the following reasons.

- Diesel-range TPH in soil above the PSC appears to be limited in extent laterally and is defined vertically. Additionally, it is not providing a significant, if any, source of soluble constituents to groundwater.
- Aroclor 1260 in groundwater, the primary risk-driver at the study area, was reported in only one in ten samples, and the concentration was below the PSC (MCL). Aroclor 1260 is likely an artifact of sampling (associated with suspended material) rather than dissolved concentrations. Because of their low solubility and tendency to sorb to clay-size particles and organic matter in soil, PCBs and pesticides are not typically found dissolved in groundwater.
- The cancer risk and HI above the risk management levels are largely due to a single report of Aroclor 1260 at a concentration below the MCL in only one of ten groundwater samples. The Aroclor groundwater concentration is likely an artifact of sampling (associated with suspended material due to turbidity). Without Aroclor 1260 and metals below background, the HI above 1 is due to iron (HI of 1) in soil. The health effects of iron are not considered additive with other chemicals.
- TCE was reported in four groundwater samples at concentrations below the PSC (MCL) and risk results indicated that U.S. EPA and Cal/EPA cancer risks associated with TCE were within the risk management range.
- Metals in soil in the area where an NTCRA was performed for LBP in soil are not risk drivers. The other metals above background in soil at AOC 11/EBS Parcels 78–79 are evenly distributed and associated with iron and manganese, and there are no unusually high concentrations suggesting a release. As discussed in Section 4.3.2 of the main RI/FS Report, a strong positive correlation with iron suggests that the concentrations of metals are naturally occurring. In groundwater, there is no indication of a release of metals.

FIGURES





Location Within IR Site 35

1500 0 1500 Feet

LEGEND

- AOC AND DATA GAP BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- NTCRA REMOVAL LOCATION
- CORRECTIVE ACTION AREA (CAA)
- SWMU LOCATION
- ABOVEGROUND STORAGE TANK (REMOVED)
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- FUEL LINE (REMOVED)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

N

PAH STUDY SOIL SAMPLING LOCATION WITH STATION ID
- SVOCs ANALYSIS ONLY

RI SOIL SAMPLING LOCATION WITH STATION ID
- VOCs, SVOCs, PESTICIDES/PCBs, AND METALS ANALYSES ONLY
- VOCs, SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY

RI GROUNDWATER SAMPLING LOCATION WITH STATION ID
- VOCs, SVOCs, PESTICIDES/PCBs, AND METALS ANALYSES ONLY
- VOCs, SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY

WATER TANK/RADIO ANTENNA SOIL SAMPLING LOCATION WITH STATION ID
- METALS ANALYSIS ONLY

FOLLOW ON RI GROUNDWATER SAMPLING LOCATION WITH STATION ID
- VOCs ANALYSIS ONLY

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
NTCRA – NON-TIME-CRITICAL REMOVAL ACTION
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOCs – VOLATILE ORGANIC COMPOUNDS

100 0 100 Feet

RI/FS Report for IR Site 35

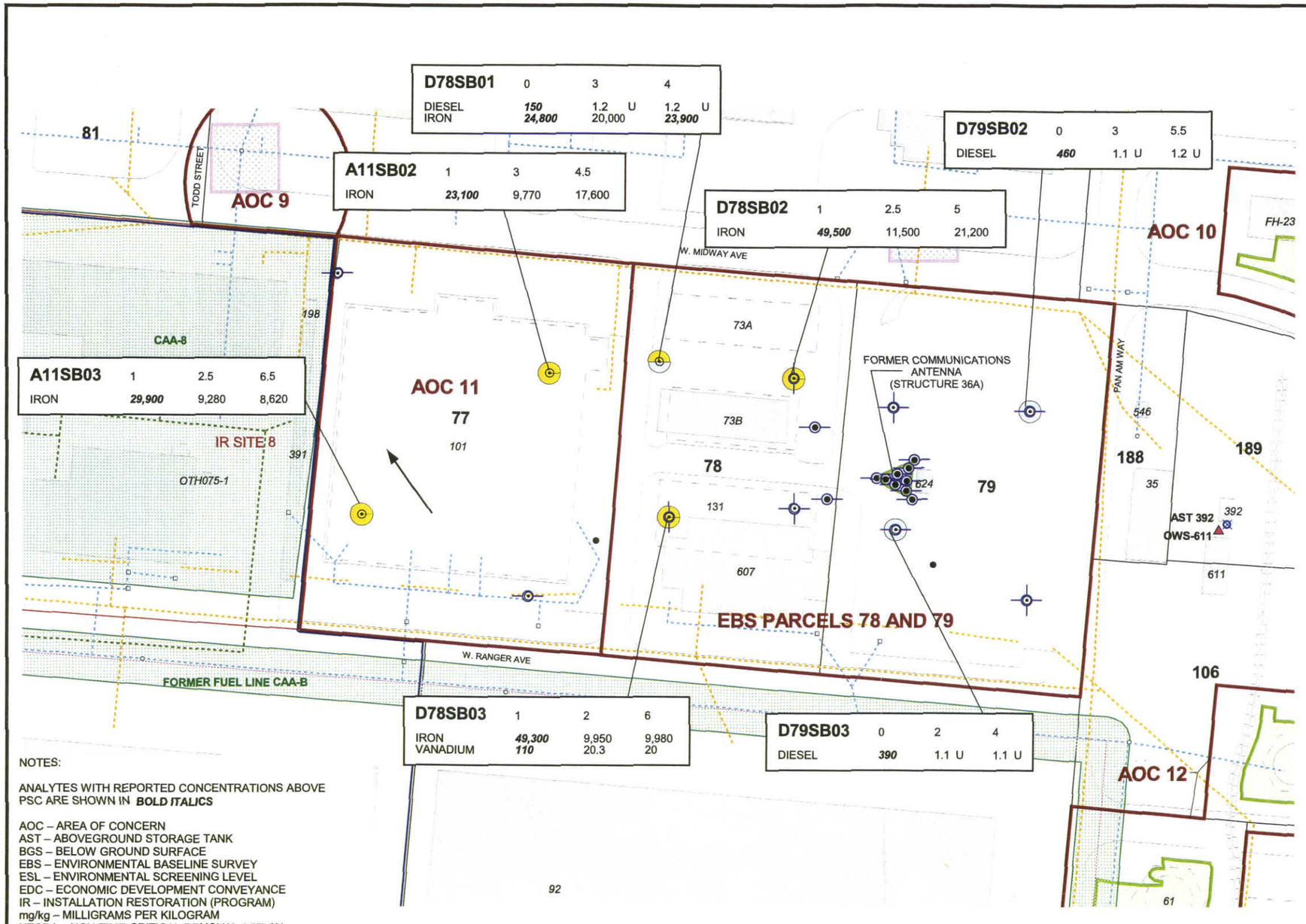
Figure 1-1

Study Area and Sampling Locations
Area of Concern 11 and EBS Parcels 78–79

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 1/18/07
File No.: 077L14452
Job No.: 23818-077
Rev No.: C



LEGEND

- AOC AND DATA GAP BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- NTCRA REMOVAL LOCATION
- CORRECTIVE ACTION AREA (CAA)
- SWMU LOCATION
- ABOVEGROUND STORAGE TANK (REMOVED)
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- FUEL LINE (REMOVED)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL SOIL SAMPLING LOCATION
- RI SOIL SAMPLING LOCATION

SOIL SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC FOR :
- METALS
- FUELS

SOIL SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :
- METALS
- FUELS

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

D79SB03	0	2	4
DIESEL	390	1.1 U	1.1 U

ANALYTE — REVIEW QUALIFIER — CONCENTRATION in mg/kg

N

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
ESL – ENVIRONMENTAL SCREENING LEVEL
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
mg/kg – MILLIGRAMS PER KILOGRAM
NTCRA – NON-TIME-CRITICAL REMOVAL ACTION
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PRG – PRELIMINARY REMEDIATION GOAL
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
TPH – TOTAL PETROLEUM HYDROCARBONS
U – THE ANALYTE WAS NOT REPORTED ABOVE THE DETECTION LIMIT. THE ASSOCIATED NUMERICAL VALUE IS THE REPORTING LIMIT

Analyte	PSC
DIESEL	100 mg/kg (TPH Residential Soil ESL)
IRON	23,000 mg/kg (Federal Residential PRG)
VANADIUM	78 mg/kg (Federal Residential PRG)

RI/FS Report for IR Site 35

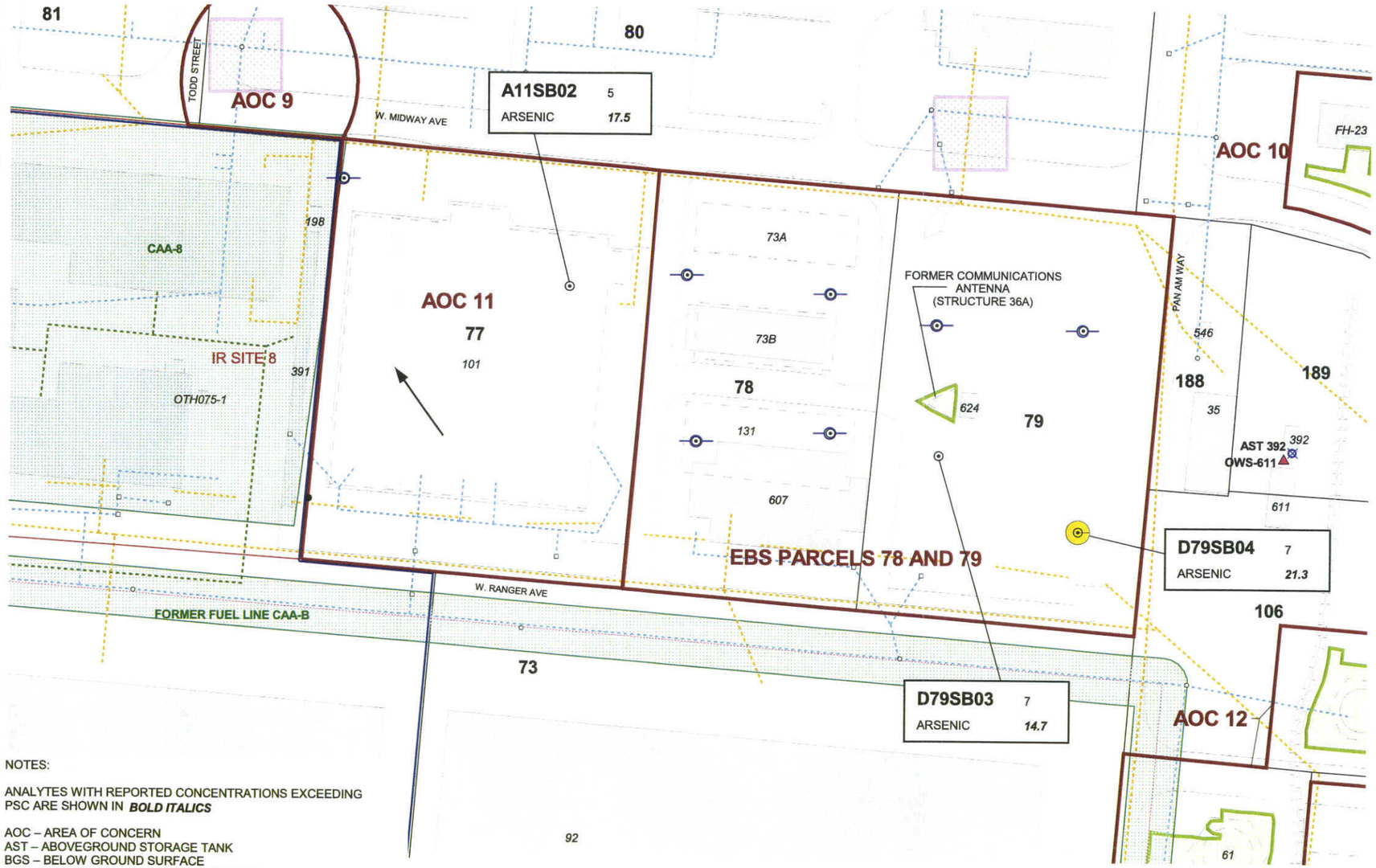
Figure 4-1

Soil Sampling Results for Analytes Above PSC
Area of Concern 11 and EBS Parcels 78–79

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/16/07
File No.: 077L14488
Job No.: 23818-077
Rev No.: E



LEGEND

- AOC AND DATA GAP BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- NTCRA REMOVAL LOCATION
- CORRECTIVE ACTION AREA (CAA)
- SWMU LOCATION
- ABOVEGROUND STORAGE TANK (REMOVED)
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- FUEL LINE (REMOVED)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL GROUNDWATER SAMPLING LOCATION
- RI GROUNDWATER SAMPLING LOCATION

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC AND GREATER THAN BACKGROUND FOR :

- METALS

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :

- METALS

N

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

A11SB02 5
ARSENIC 17.5

ANALYTE — CONCENTRATION in µg/L

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS EXCEEDING PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
MCL – MAXIMUM CONTAMINANT LEVEL
µg/L – MICROGRAMS PER LITER
NTCRA – NON-TIME-CRITICAL REMOVAL ACTION
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PSC – PRELIMINARY SREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT

Analyte	PSC	Background 95th Percentile
ARSENIC	10 µg/L (Federal MCL)	20.72 µg/L

RI/FS Report for IR Site 35

Figure 4-2

Groundwater Sampling Results for Analytes Above PSC – Area of Concern 11 and EBS Parcels 78–79

Alamedo, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/26/07
File No.: 077L14489
Job No.: 23818-077
Rev No.: D

TABLES

Table 3-1
Sample Analysis Summary, AOC 11

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTES						
				VOCs	SVOCs	PAHs	Pest/PCBs	Metals	Geotechnical Parameters*	TDS
Soil										
32EDC-5-57	C032CA05	PAH Study	0–0.5			X				
32EDC-5-57	C032CA06	PAH Study	0.5–2			X				
32EDC-5-57	C032CA07	PAH Study	2–4			X				
32EDC-5-57	C032CA08	PAH Study	4–8			X				
A11SB01	C077S171	Site 35 RI	0.75–1.75	X	X	X	X	X		
A11SB01	C077S172	Site 35 RI	2.5–4	X	X	X	X	X		
A11SB01	C077S173	Site 35 RI	7–8	X	X	X	X	X		
A11SB02	C077S174	Site 35 RI	1–2	X	X	X	X	X		
A11SB02	C077S175	Site 35 RI	3–4	X	X	X	X	X		
A11SB02	C077S176	Site 35 RI	4.5–6		X	X	X	X		
A11SB03	C077S177	Site 35 RI	1–2	X	X	X	X	X		
A11SB03	C077S178	Site 35 RI	2.5–4	X	X	X	X	X	X	
A11SB03	C077S179	Site 35 RI	6.5–8	X	X	X	X	X	X	
A11SB04	C077S180	Site 35 RI	0.1–1.1	X	X	X	X	X		
A11SB04	C077S181	Site 35 RI	3–4	X	X	X	X	X		
A11SB04	C077S182	Site 35 RI	6–7	X	X	X	X	X		
Groundwater										
S08-HP-06	122-S08-005	OU-1 RI	7–9	X						
A11SB01	C077G051	Site 35 RI	7–12	X	X	X	X	X		X
A11SB01	C077G052 (FD)	Site 35 RI	7–12				X			
A11SB02	C077G053	Site 35 RI	5–10	X	X	X	X	X		X
A11SB02	C077G054 (FD)	Site 35 RI	5–10	X						

References:
OU-1 RI (TtEMI 2002c)
PAH Study (BEI 2005a)

Note:
* see Appendix E for a list of geotechnical parameters and results

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
FD – field duplicate
OU – operable unit
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
Pest – pesticides
RI – remedial investigation
SVOC – semivolatile organic compound
TDS – total dissolved solids
VOC – volatile organic compound

Table 3-2
Sample Analysis Summary, EBS 78–79

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE							
				VOCs	SVOCs	PAHs	TPH	Pest/PCBs	Metals	Lead	TDS
Soil											
32EDC-5-70	C032CA62	PAH Study	0–0.5			X					
32EDC-5-70	C032CA63	PAH Study	0.5–2			X					
32EDC-5-70	C032CA64	PAH Study	2–4			X					
32EDC-5-70	C032CA65	PAH Study	4–8			X					
32EDC-5-70	C032CA66 (FD)	PAH Study	4–8			X					
PARCEL 79 GRID 1	88-001	Lead NTCRA	0–1	X	X		X[a]	X	X		
PARCEL 79 GRID 1	79-001(A-D)	Lead NTCRA	1–1						X		
PARCEL 79 GRID 2	88-001	Lead NTCRA	0–1	X	X		X[a]	X	X		
PARCEL 79 GRID 2	79-002(A-D)	Lead NTCRA	1–1						X		
PARCEL 79 GRID 2	79-003(A-D) (FD)	Lead NTCRA	1–1						X		
PARCEL 79 GRID 3	88-001	Lead NTCRA	0–1	X	X		X[a]	X	X		
PARCEL 79 GRID 3	79-004(A-D)	Lead NTCRA	1–1						X		
PARCEL 79 GRID 4	88-001	Lead NTCRA	0–1	X	X		X[a]	X	X		
PARCEL 79 GRID 4	79-005(A-D)	Lead NTCRA	1–1						X		
PARCEL 79 GRID 5	88-001	Lead NTCRA	0–1	X	X		X[a]	X	X		
PARCEL 79 GRID 5	79-006(A-D)	Lead NTCRA	1–1						X		
PARCEL 79 GRID 6	88-001	Lead NTCRA	0–2	X	X		X[a]	X	X		
PARCEL 79 GRID 6	79-011(A-D)	Lead NTCRA	2–2						X		
PARCEL 79 GRID 7	88-001	Lead NTCRA	0–1	X	X		X[a]	X	X		
PARCEL 79 GRID 7	79-008(A-D)	Lead NTCRA	1–1						X		
PARCEL 79 GRID 8	88-001	Lead NTCRA	0–1	X	X		X[a]	X	X		
PARCEL 79 GRID 8	79-012(A-D)	Lead NTCRA	1–1						X		
PARCEL 79 GRID 9	88-001	Lead NTCRA	0–1	X	X		X[a]	X	X		
PARCEL 79 GRID 9	79-010(A-D)	Lead NTCRA	1–1						X		
SS-607-E	SS-607-E-COMP	Lead Removal Action	0–0.5							X	
SS-73B-E	SS-73B-E-COMP	Lead Removal Action	0–0.5							X	
D78SB01	C077S501	Site 35 RI	0–1	X	X		X[b]	X	X		
D78SB01	C077S502	Site 35 RI	3–4	X	X		X[b]	X	X		
D78SB01	C077S503	Site 35 RI	4–5	X	X		X[b]	X	X		
D78SB02	C077S504	Site 35 RI	1–2	X	X		X[b]	X	X		

Table 3-2
Sample Analysis Summary, EBS 78–79

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE							
				VOCs	SVOCs	PAHs	TPH	Pest/PCBs	Metals	Lead	TDS
D78SB02	C077S505	Site 35 RI	2.5–3.5	X	X		X[b]	X	X		
D78SB02	C077S506	Site 35 RI	5–6	X	X		X[b]	X	X		
D78SB03	C077S507	Site 35 RI	1–2	X	X		X[b]	X	X		
D78SB03	C077S508	Site 35 RI	2–3	X	X		X[b]	X	X		
D78SB03	C077S509	Site 35 RI	6–7.5	X	X		X[b]	X	X		
D78SB04	C077S510	Site 35 RI	0.5–1.6	X							
D78SB04	C077S511	Site 35 RI	2–3	X	X		X[b]	X	X		
D78SB04	C077S512	Site 35 RI	5–6.5	X	X		X[b]	X	X		
D79SB01	C077S521	Site 35 RI	1–2	X	X		X[b]	X	X		
D79SB01	C077S522	Site 35 RI	3–4	X	X		X[b]	X	X		
D79SB01	C077S523	Site 35 RI	4.5–5.5	X	X		X[b]	X	X		
D79SB02	C077S524	Site 35 RI	0–1	X	X		X[b]	X	X		
D79SB02	C077S525	Site 35 RI	3–4	X	X		X[b]	X	X		
D79SB02	C077S526	Site 35 RI	5.5–6.5	X	X		X[b]	X	X		
D79SB03	C077S527	Site 35 RI	0–1	X	X		X[b]	X	X		
D79SB03	C077S528	Site 35 RI	2–3	X	X		X[b]	X	X		
D79SB03	C077S529	Site 35 RI	4–5.5	X	X		X[b]	X	X		
D79SB04	C077S530	Site 35 RI	1–2	X	X		X[b]	X	X		
D79SB04	C077S531	Site 35 RI	2–3	X	X		X[b]	X	X		
D79SB04	C077S532	Site 35 RI	6.5–8	X	X		X[b]	X	X		
Groundwater											
D78SB01	C077G181	Site 35 RI	6.5–11.5	X	X		X[b]	X	X		X
D78SB01	C077G182 (FD)	Site 35 RI	6.5–11.5				X[c]				
D78SB02	C077G183	Site 35 RI	6.5–11.5	X	X		X[b]	X	X		X
D78SB02	C077G184 (FD)	Site 35 RI	6.5–11.5				X[d]				
D78SB03	C077G185	Site 35 RI	8–13	X	X		X[b]	X	X		X
D78SB03	C077G186 (FD)	Site 35 RI	8–13	X							
D78SB04	C077G187	Site 35 RI	7–12	X	X		X[b]	X	X		X
D78SB04	C077G188 (FD)	Site 35 RI	7–12	X							
D79SB01	C077G191	Site 35 RI	6.5–11.5	X	X		X[b]	X	X		X
D79SB01	C077G192 (FD)	Site 35 RI	6.5–11.5				X[c]	X			
D79SB02	C077G193	Site 35 RI	7–12	X	X		X[b]	X	X		X

Table 3-2
Sample Analysis Summary, EBS 78–79

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE							
				VOCs	SVOCs	PAHs	TPH	Pest/PCBs	Metals	Lead	TDS
D79SB03	C077G194	Site 35 RI	7–12	X	X		X[d]	X	X		X
D79SB03	C077G195 (FD)	Site 35 RI	7–12		X		X[c]				
D79SB04	C077G196	Site 35 RI	7–12	X	X		X[b]	X	X		X

References:
PAH Study (BEI 2005a)
Lead NTCRA (Shaw 2003)
Lead Removal Action (TtEMI 2002b)

Notes:
[a] analyzed for gasoline-, diesel-, and motor oil–range TPH
[b] analyzed for gasoline-, diesel-, JP-5–, and motor oil–range TPH
[c] analyzed for gasoline-range TPH
[d] analyzed for diesel-, JP-5–, and motor oil–range TPH

Acronyms/Abbreviations:
bgs – below ground surface
EBS – environmental baseline survey
FD – field duplicate
JP-5 – jet propellant grade 5
NTCRA – non-time-critical removal action
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
Pest – pesticide
RI – remedial investigation
SVOC – semivolatile organic compound
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 11/EBS 78–79

Analyte Name	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
Volatile Organic Compounds (µg/kg)										
acetone	36	3	6.8	0	22	50	95	14,000,000	—[c]	—
benzene	36	1	2.3	0	0.79	0.79	0.79	640	—	—
2-butanone	36	3	6.8	0	1.9	2.2	2.7	22,000,000	—	—
cis-1,2-dichloroethene	36	3	6.8	0	0.42	1.1	1.7	43,000	—	—
methyl tert-butyl ether	36	1	2.3	0	2.1	2.1	2.1	17,000	—	—
methylene chloride	36	6	14	0	11	23	60	9,100	—	—
tetrachloroethene	36	1	2.3	0	2.5	2.5	2.5	480	—	—
toluene	36	1	2.3	0	0.95	0.95	0.95	520,000	—	—
xylenes, total	36	1	2.3	0	5.5	5.5	5.5	270,000	—	—
Fuels (µg/kg)										
diesel	24	12	63	3	1,700	56,000	460,000	—	100,000	—
gasoline	25	2	6.1	0	460	1,200	2,000	—	100,000	—
motor oil	24	12	63	0	11,000	58,000	420,000	—	500,000	—
Semivolatile Organic Compounds (µg/kg)										
acenaphthene	54	4	6.5	0	1.5	5.7	15	3,700,000	—	—
acenaphthylene	54	6	9.7	No PSC	2.8	6.8	13	—	—	—
anthracene	54	11	18	0	0.5	5.3	20	22,000,000	—	—
benz(a)anthracene	54	24	39	0	1.4	24	120	620	—	—
benzo(b)fluoranthene	54	23	37	0	1.8	43	290	620	—	—
benzo(k)fluoranthene	54	19	31	0	2.9	28	120	380[d]	—	—
benzo(g,h,i)perylene	54	22	35	No PSC	2.9	41	180	—	—	—
benzo(a)pyrene	54	21	34	0	1.8	38	190	62	—	—
bis(2-ethylhexyl)phthalate	36	3	6.8	0	160	440	610	35,000	—	—
chrysene	54	21	47	0	2.2	19	140	3,800[d]	—	—
dibenz(a,h)anthracene	54	11	18	0	1.1	8.7	22	62	—	—
di-n-butyl phthalate	36	10	23	0	97	180	480	6,100,000	—	—
fluoranthene	54	23	37	0	2.4	44	310	2,300,000	—	—
fluorene	54	3	4.8	0	1.4	2.7	3.8	2,700,000	—	—
indeno(1,2,3-cd)pyrene	54	20	32	0	1.4	32	200	620	—	—
2-methylnaphthalene	45	5	9.4	No PSC	0.67	1.5	3.5	—	—	—
naphthalene	54	13	21	0	0.48	4.5	18	1,700[d]	—	—
phenanthrene	54	15	24	No PSC	2.4	27	200	—	—	—
pyrene	54	25	40	0	2	53	380	2,300,000	—	—
Pesticides/Polychlorinated Biphenyls (µg/kg)										
alpha-chlordane	36	1	2.3	0	2.6	2.6	2.6	1,600	—	—
gamma-chlordane	27	1	2.9	0	4.9	4.9	4.9	1,600	—	—
4,4'-DDE	36	1	2.3	0	60	60	60	1,700	—	—
4,4'-DDT	36	1	2.3	0	43	43	43	1,700	—	—
Metals (mg/kg)										
aluminum	35	35	100	0	2,650	7,600	33,000	76,000	—	13,960
antimony	46	2	3.7	0	1.2	1.3	1.4	31	—	9.50
arsenic	46	44	96	0	0.6	2.5	5.1	0.062[d]	—	9.14
barium	46	46	100	0	14.4	58	386	5,400	—	93.68
beryllium	46	32	74	0	0.053	0.24	0.51	150	—	1.27
cadmium	46	16	44	0	0.076	1.3	2	37	—	1.72

Table 4-1

Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 11/EBS 78–79

Analyte Name	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
calcium	35	35	100	No PSC	1,150	4,300	45,300	—	—	16,800
chromium	46	46	100	0	3.7	30	113	210	—	54.84
chromium, hexavalent	10	4	40	0	0.04	0.065	0.12	30	—	—
cobalt	46	46	100	0	2.4	5.9	18.5	900	—	14.30
copper	46	46	100	0	3	10	93.8	3,100	—	39.14
iron	35	35	100	5	7,210	15,000	49,500	23,000	—	22,280
lead	48	47	98	0	1.1	13	150	150 [d]	—	37.66
magnesium	35	35	100	No PSC	1,630	3,600	14,900	—	—	7,304
manganese	35	35	100	0	76.2	230	1,160	1,800	—	383.0
mercury	46	11	20	0	0.0068	0.052	0.16	23	—	—
molybdenum	11	1	5.3	0	0.23	0.23	0.23	390	—	5.20
nickel	46	46	100	0	1.6	29	59	1,600	—	55.72
potassium	35	35	100	No PSC	311	780	2,130	—	—	1,232
selenium	46	5	9.3	0	0.13	0.3	0.42	390	—	1.78
silver	46	9	17	0	0.33	0.48	0.84	390	—	2.22
sodium	35	14	40	No PSC	127	390	973	—	—	1,230
thallium	46	2	3.7	0	0.14	0.15	0.15	5.2	—	0.50
vanadium	46	46	100	1	9.3	25	110	78	—	47.34
zinc	46	46	100	0	7.8	43	270	23,000	—	67.48

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

Acronyms/Abbreviations:

AOC – area of concern
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
TPH – total petroleum hydrocarbons

Table 4-2
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, AOC 11 / EBS 78–79

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background	Minimum[a]	Average[a]	Maximum[a]	California MCL	Background (95th percentile)
Volatile Organic Compounds (µg/L)									
benzene	12	1	8.3	0	0.42	0.42	0.42	1	—[b]
2-butanone	11	1	9.1	No PSC	200	200	200	—	—
carbon disulfide	11	6	55	No PSC	0.45	1.7	6.5	—	—
1,3-dichlorobenzene	11	1	9.1	No PSC	0.11	0.11	0.11	—	—
cis-1,2-dichloroethene	11	5	45	0	0.28	1.4	3.9	6	—
trans-1,2-dichloroethene	11	1	9.1	0	0.41	0.41	0.41	10	—
toluene	12	4	33	0	0.19	0.31	0.39	150	—
trichloroethene	11	4	36	0	0.45	0.86	1.1	5	—
1,2,4-trimethylbenzene	11	1	9.1	No PSC	0.33	0.33	0.33	—	—
xylenes, total	12	2	17	0	0.7	0.78	0.86	1,800	—
Semivolatile Organic Compounds (µg/L)									
pyrene	11	2	18	No PSC	0.14	0.16	0.17	—	—
Pesticides/Polychlorinated Biphenyls (µg/L)									
Aroclor 1260	12	1	8.3	0	0.18	0.18	0.18	0.5	—
alpha-BHC	12	1	8.3	No PSC	0.006	0.006	0.006	—	—
gamma-BHC (lindane)	12	1	8.3	0	0.007	0.007	0.007	0.2	—
alpha-chlordane	12	1	8.3	0	0.009	0.009	0.009	0.1	—
gamma-chlordane	12	1	8.3	0	0.009	0.009	0.009	0.1	—
4,4'-DDE	12	1	8.3	No PSC	0.009	0.009	0.009	—	—
4,4'-DDT	12	1	8.3	No PSC	0.01	0.01	0.01	—	—
dieldrin	12	1	8.3	No PSC	0.009	0.009	0.009	—	—
endosulfan I	12	1	8.3	No PSC	0.01	0.01	0.01	—	—
endosulfan II	12	1	8.3	No PSC	0.008	0.008	0.008	—	—
endosulfan sulfate	12	1	8.3	No PSC	0.007	0.007	0.007	—	—
endrin aldehyde	12	1	8.3	No PSC	0.011	0.011	0.011	—	—
heptachlor	12	1	8.3	0	0.01	0.01	0.01	0.01	—
heptachlor epoxide	12	1	8.3	0	0.009	0.009	0.009	0.01	—
Metals (µg/L)									
arsenic	11	4	36	1	3.4	14	21.3	10[c]	20.72
barium	11	11	100	0	209	360	567	1,000	569.5
beryllium	11	1	9.1	0	0.27	0.27	0.27	4	2.50
calcium	11	11	100	No PSC	32,900	71,000	135,000	—	—
chromium	11	10	91	0	2	7	20	50	12.45
iron	11	11	100	No PSC	1,080	4,900	15,400	—	6,586
magnesium	11	11	100	No PSC	37,500	89,000	251,000	—	—
manganese	11	11	100	No PSC	237	650	2,410	—	1,741
potassium	11	11	100	No PSC	23,500	47,000	88,000	—	—
selenium	11	4	36	0	7	13	23	50	8.58
sodium	11	11	100	No PSC	344,000	1,300,000	2,720,000	—	—
vanadium	11	7	64	No PSC	1	4	8	—	26.27
General Chemistry (µg/L)									
solids, total dissolved	10	10	100	No PSC	1,010,000	3,800,000	7,720,000	—	—

Notes:
[a] data review qualifiers are not included in this table
[b] dash indicates not applicable or not established
[c] Federal MCL

Acronyms/Abbreviations:
AOC – area of concern
BHC – benzene hexachloride
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EBS – environmental baseline survey
µg/L – micrograms per liter
MCL – maximum contaminant level
PSC – preliminary screening criterion (MCL)

Table 4-3a
Soil Sampling Results, AOC 11

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: 32EDC-5-57	32EDC-5-57	32EDC-5-57	32EDC-5-57	A11SB01	A11SB01	A11SB01	A11SB02	A11SB02	A11SB02	A11SB03
						Sample: C032CA05	C032CA06	C032CA07	C032CA08	C077S171	C077S172	C077S173	C077S174	C077S175	C077S176	C077S177
						[a] Depth Interval: 0 - 0.5	0.5 - 2	2 - 4	4 - 8	0.75 - 1.75	2.5 - 4	7 - 8	1 - 2	3 - 4	4.5 - 6	1 - 2
						Collection Date: 22-May-02	22-May-02	22-May-02	22-May-02	13-Dec-05	13-Dec-05	13-Dec-05	13-Dec-05	13-Dec-05	13-Dec-05	13-Dec-05
VOCs																
acetone	14,000,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	100 U	100 U	100 U	100 U	100 U	NA	100 U
methylene chloride	9,100	—	—	—	µg/kg	NA	NA	NA	NA	14 J	14 J	14 J	60 U	60 U	NA	22 J
SVOCs																
acenaphthene	3,700,000	—	—	—	µg/kg	5.4 U	5.4 U	5.5 U	5.8 U	1.5 J	5 U	6 U	6 U	6 U	6 U	6 U
acenaphthylene	—	—	—	—	µg/kg	5.4 U	5.4 U	5.5 U	5.8 U	5.6 J	5 U	3.8 J	6 U	6 U	6 U	6 U
anthracene	22,000,000	—	—	—	µg/kg	1.8 J	5.4 U	5.5 U	5.8 U	4.6 J	5 U	4.2 J	3.1 J	6 U	6 U	6 U
benz(a)anthracene	620[c]	—	—	—	µg/kg	16	1.4 J	2.7 J	5.8 U	44 J	5 U	30 J	44 J	6 U	28 J	6 U
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	23	1.8 J	4.5 J	5.8 U	84 J	5 UJ	69 J	97 J	6 U	30 J	6 U
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	16	5.4 U	2.9 J	5.8 U	15 J	5 UJ	7.8 J	61 J	6 U	7.5 J	6 U
benzo(g,h,i)perylene	—	—	—	—	µg/kg	42	2.9 J	8.4	5.8 U	77	5 U	67	84	6 U	7	6 U
benzo(a)pyrene	62[c]	—	—	—	µg/kg	27	2.3 J	5.4 J	5.8 U	**66**[d]	5 U	57	60 J	6 U	7.8 J	6 U
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	36	5.4 U	6	5.8 U	17 J	5 U	10 J	21	6 U	4 J	6 U
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	4.3 J	5.4 U	5.5 U	5.8 U	4.1 J	5 U	2.9 J	11 J	6 U	6 U	6 U
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	NA	NA	NA	300 U	97 J	400 U	400 U	400 U	400 U	130 J
fluoranthene	2,300,000	—	—	—	µg/kg	28	2.8 J	4.3 J	5.8 U	74 J	5 U	54 J	43 J	6 U	8.7 J	6 U
fluorene	2,700,000	—	—	—	µg/kg	1.4 J	5.4 U	5.5 U	5.8 U	6 U	5 U	6 U	6 U	6 U	6 U	6 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	32	2.6 J	6.5	1.4 J	45 J	5 U	40 J	58 J	6 U	4.9 J	6 U
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	5.4 U	5.4 U	5.5 U	5.8 U	5.8 J	5 U	7 J	7.2	6 U	6 U	6 U
phenanthrene	—	—	—	—	µg/kg	23	5.4 U	3.7 J	5.8 U	24 J	5 U	18 J	11 J	6 U	3.5 J	6 U
pyrene	2,300,000	—	—	—	µg/kg	43	3.9 J	6.7	2 J	100 J	5 UJ	86 J	77 J	6 U	12 J	6 U
Pesticides/PCBs						NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND
Metals																
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	7,400	5,330	4,550	8,360	4,720	10,700	*15,000*[c]
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	**2.9**	**2.4**	**1.6**	**1.6**	**2.1**	**3.3**	**4**
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	*357 J*	36.2 J	31.6 J	24.8 J	30.2 J	*123 J*	25 J
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	0.17 J	0.16 J	0.15 J	0.21 J	0.16 J	0.29 J	0.26
cadmium	37	—	—	1.72	mg/kg	NA	NA	NA	NA	0.58 J	0.5 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	3,970	2,350	2,160	1,850	2,030	2,850	8,010
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	38.3	32.4	28.6	3.7	28.5	47.6	22.6
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	5.6 J	4.7 J	4.3 J	4.3 J	4.2 J	8.4 J	9.2 J
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	15.2	7	5.7	8.1	6.3	12	27
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	11,200	10,100	8,950	***23,100***	9,770	17,600	***29,900***
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	*69.6*	4.4	3.4	22.6	2.3	3.8	1.8
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	2,440	2,510	2,250	2,840	2,750	4,450	6,270
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	168 J	114 J	78.3 J	*950 J*	97.8 J	143 J	*616 J*
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	20.7	25.6	24.8	1.6	30.1	52.4	19.8
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	1,080 J	750 J	643 J	311 J	809 J	*1,410 J*	478 J
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	163 U	83.4 U	98.8 U	453	242 U	323 U	496
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	22.7	22.2	19.4	18.6	20	34.2	*58.3*
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	*98.4*	21.7	21	65	20.7	24.4	47.7

Table 4-3a
Soil Sampling Results, AOC 11

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: A11SB03	A11SB03	A11SB04	A11SB04	A11SB04
						Sample: C077S178	C077S179	C077S180	C077S181	C077S182
						[a] Depth Interval: 2.5 - 4	6.5 - 8	0.1 - 1.1	3 - 4	6 - 7
						Collection Date: 13-Dec-05	13-Dec-05	13-Dec-05	13-Dec-05	13-Dec-05
VOCs										
acetone	14,000,000	—[b]	—	—	µg/kg	100 U	100 U	22 J	100 U	100 U
methylene chloride	9,100	—	—	—	µg/kg	60	11 J	60 U	60 U	60 U
SVOCs										
acenaphthene	3,700,000	—	—	—	µg/kg	6 U	6 U	6 U	5 U	6 U
acenaphthylene	—	—	—	—	µg/kg	6 U	6 U	6 U	5 U	6 U
anthracene	22,000,000	—	—	—	µg/kg	6 U	6 U	6 U	5 U	6 U
benz(a)anthracene	620[c]	—	—	—	µg/kg	6 U	6 U	6 U	24 J	25 J
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	6 U	6 U	6 U	23 J	21 J
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	6 U	6 U	6 U	2.9 J	6 U
benzo(g,h,i)perylene	—	—	—	—	µg/kg	6 U	6 U	6 U	9.4	6 U
benzo(a)pyrene	62[c]	—	—	—	µg/kg	6 U	6 U	6 U	7.5 J	1.8 J
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	6 U	6 U	6 U	3 J	6 U
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	6 U	6 U	6 U	5 U	6 U
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	300 U	400 U	300 U	300 U	400 U
fluoranthene	2,300,000	—	—	—	µg/kg	6 U	6 U	6 U	6.6 J	6 U
fluorene	2,700,000	—	—	—	µg/kg	6 U	6 U	6 U	5 U	6 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	6 U	6 U	6 U	5.5 J	6 U
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	6 U	6 U	6 U	5 U	6 U
phenanthrene	—	—	—	—	µg/kg	6 U	6 U	6 U	5 U	6 U
pyrene	2,300,000	—	—	—	µg/kg	6 U	6 U	6 U	8.8 J	2.3 J
Pesticides/PCBs						ND	ND	ND	ND	ND
Metals										
aluminum	76,000	—	—	13,960	mg/kg	4,440	4,110	8,520	5,080	3,380
arsenic	0.39	0.062	—	9.14	mg/kg	**1.7**	**2.2**	**3.7**	**2.1**	**2.6**
barium	5,400	—	—	93.68	mg/kg	24.2 J	37.9 J	59.2 J	31.7 J	25.4 J
beryllium	150	—	—	1.27	mg/kg	0.14 J	0.15 J	0.25	0.14 J	0.11 J
cadmium	37	—	—	1.72	mg/kg	0.6 U	0.6 U	0.17 J	0.6 U	0.6 U
calcium	—	—	—	16,800	mg/kg	1,870	1,960	*45,300*	2,370	1,710
chromium	210	—	—	54.84	mg/kg	28.3	29.1	25.6	28.1	29
cobalt	900	—	—	14.30	mg/kg	4.4 J	3.9 J	12.2 J	4.3 J	4 J
copper	3,100	—	—	39.14	mg/kg	6.1	5.3	10.3	5.9	5
iron	23,000	—	—	22,280	mg/kg	9,280	8,620	10,800	9,620	7,970
lead	400	150	—	37.66	mg/kg	2.4	3.5	6	2.9	3.2
magnesium	—	—	—	7,304	mg/kg	2,600	2,000	3,290	2,470	1,760
manganese	1,800	—	—	383.0	mg/kg	92.7 J	80.7 J	128 J	110 J	95.8 J
nickel	1,600	—	—	55.72	mg/kg	28.8	23.7	19.7	25.8	22.2
potassium	—	—	—	1,232	mg/kg	745 J	606 J	1,120 J	700 J	548 J
sodium	—	—	—	1,230	mg/kg	267 U	191 U	519	150 U	139 U
vanadium	78	—	—	47.34	mg/kg	19.5	19.5	25.1	20.1	17
zinc	23,000	—	—	67.48	mg/kg	16.9	14.2	25.5	15.8	14.8

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[d] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL
[e] italicized font indicates result above background

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
ND – not detected
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 4-3b
Soil Sampling Results, EBS 78–79

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Result Units	Station ID: 32EDC-5-70	32EDC-5-70	32EDC-5-70	32EDC-5-70	32EDC-5-70	D78SB01	D78SB01	D78SB01	D78SB02	D78SB02	D78SB02
Sample:							C032CA62	C032CA63	C032CA64	C032CA65	C032CA66 (FD)	C077S501	C077S502	C077S503	C077S504	C077S505	C077S506
[a] Depth Interval:							0 - 0.5	0.5 - 2	2 - 4	4 - 8	4 - 8	0 - 1	3 - 4	4 - 5	1 - 2	2.5 - 3.5	5 - 6
Collection Date:							15-May-02	15-May-02	15-May-02	15-May-02	15-May-02	03-Dec-05	03-Dec-05	03-Dec-05	03-Dec-05	03-Dec-05	03-Dec-05
VOCs																	
acetone	14,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	100 U	100 U	100 UJ	100 U	100 U	100 U
benzene	640	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	5 U	6 U	6 U	6 U	5 U	6 U
2-butanone	22,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	100 U	100 U	100 U	100 U	100 U	100 U
cis-1,2-dichloroethene	43,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	5 U	6 U	6 UJ	6 U	5 U	6 U
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	40 U	50 U	50 U	40 U	40 U	40 U
tetrachloroethene	480	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	5 U	6 U	6 U	6 U	5 U	6 U
toluene	520,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	5 U	6 U	6 U	6 U	5 U	6 U
m-, p-xylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	5 U	6 U	6 U	6 U	5 U	6 U
Petroleum Hydrocarbons																	
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	**150000**[c]	1200 U	1200 U	14000	12000	8900
gasoline	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	150000	12000 U	12000 U	14000	16000	11000
SVOCs																	
acenaphthene	3,700,000	—	—	—	—	µg/kg	10 UJ	5.4 U	11 UJ	5.7 U	15	5 U	6 U	6 U	6 U	5 U	6 U
acenaphthylene	—	—	—	—	—	µg/kg	10 UJ	5.4 U	11 UJ	2.8 J	13	5 U	6 U	6 U	6 U	5 U	6 U
anthracene	22,000,000	—	—	—	—	µg/kg	1.1 J	0.5 J	11 UJ	2.1 J	20	5 U	6 U	6 U	6 U	5 U	6 U
benz(a)anthracene	620[d]	—	—	—	—	µg/kg	13 J	5.5	3.5 J	17	120	11	2.2 J	6 U	20	5.4	6 U
benzo(b)fluoranthene	620[d]	—	—	—	—	µg/kg	22 J	6.8 J	6.8 J	20	120	5 U	5.5 J	6 U	6 U	15 J	1.8 J
benzo(k)fluoranthene	6,200[d]	380[d]	—	—	—	µg/kg	14 J	6.9 J	6.1 J	20	120	5 U	5.3 J	6 U	6 U	14 J	6 U
benzo(g,h,i)perylene	—	—	—	—	—	µg/kg	43 J	12 J	11 J	38	180	7.2	6 U	6 U	18	12	3.4 J
benzo(a)pyrene	62[d]	—	—	—	—	µg/kg	24 J	10 J	7.9 J	30	**180**	5 U	2.5 J	6 U	6 U	12	6 U
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	300 U	400 U	400 U	300 U	300 U	300 U
chrysene	62,000[d]	3,800[d]	—	—	—	µg/kg	24 J	6.3	6.6 J	19	130	5 U	6 U	6 U	6 U	4.5 J	6 U
dibenz(a,h)anthracene	62[d]	—	—	—	—	µg/kg	8 J	1.1 J	2.6 J	4.1 J	22 J	5 U	6 U	6 U	6 U	5 U	6 U
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	130 J	130 J	110 J	240 J	180 J	160 J
fluoranthene	2,300,000	—	—	—	—	µg/kg	22 J	12	6.6 J	47	310	5 U	3.3 J	6 U	6 U	8.7	2.4 J
fluorene	2,700,000	—	—	—	—	µg/kg	10 UJ	5.4 U	11 UJ	5.7 U	3.8 J	5 U	6 U	6 U	6 U	5 U	6 U
indeno(1,2,3-cd)pyrene	620[d]	—	—	—	—	µg/kg	23 J	12 J	8.1 J	40	200	5 U	6 U	6 U	6 U	6	6 U
2-methylnaphthalene	—	—	—	—	—	µg/kg	0.67 J	5.4 U	11 UJ	5.7 U	0.93 J	5 U	6 U	6 U	6 U	5 U	6 U
naphthalene	56,000[d]	1,700[d]	—	—	—	µg/kg	0.72 J	0.48 J	11 UJ	1.1 J	6	5 U	6 U	6 U	6 U	1.1 J	6 U
phenanthrene	—	—	—	—	—	µg/kg	7.3 J	3 J	2.5 J	17	200	5 U	6 U	6 U	6 U	2.4 J	6 U
pyrene	2,300,000	—	—	—	—	µg/kg	26 J	17	8.8 J	59	380	5 U	4.1 J	6 U	6 U	16	3.6 J
Pesticides/PCBs																	
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	5 U	6 U	6 U	6 U	5 U	6 U
gamma-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	5 U	6 U	6 U	6 U	5 U	6 U
4,4'-DDE	1,700	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	5 U	6 U	6 U	6 U	5 U	6 U
4,4'-DDT	1,700	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	5 U	6 U	6 U	6 U	5 U	6 U
Metals																	
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	*15100*[e]	11900	10200	*33000*	6170	10300
antimony	31	—	—	9.50	—	mg/kg	NA	NA	NA	NA	NA	0.5 U	0.6 U	0.6 U	0.6 U	0.5 U	0.6 U
arsenic	0.39	0.062	—	9.14	—	mg/kg	NA	NA	NA	NA	NA	**1.5**	**1.3**	**0.6 U**[f]	**3.6**	**1.6**	**0.6**
barium	5,400	—	—	93.68	—	mg/kg	NA	NA	NA	NA	NA	81.7	40.9	28.1	81.9	41.3	52.4
beryllium	150	—	—	1.27	—	mg/kg	NA	NA	NA	NA	NA	0.2 U	0.23 J	0.14 J	0.26	0.057 J	0.14 J

Table 4-3b
Soil Sampling Results, EBS 78–79

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Lead Removal Action Objective	Result Units	Station ID: 32EDC-5-70	32EDC-5-70	32EDC-5-70	32EDC-5-70	32EDC-5-70	D78SB01	D78SB01	D78SB01	D78SB02	D78SB02	D78SB02
							Sample: C032CA62	C032CA63	C032CA64	C032CA65	C032CA66 (FD)	C077S501	C077S502	C077S503	C077S504	C077S505	C077S506
							[a] Depth Interval: 0 - 0.5	0.5 - 2	2 - 4	4 - 8	4 - 8	0 - 1	3 - 4	4 - 5	1 - 2	2.5 - 3.5	5 - 6
							Collection Date: 15-May-02	15-May-02	15-May-02	15-May-02	15-May-02	03-Dec-05	03-Dec-05	03-Dec-05	03-Dec-05	03-Dec-05	03-Dec-05
Metals (continued)																	
cadmium	37	—	—	1.72	—	mg/kg	NA	NA	NA	NA	NA	0.5 U	0.6 U	0.6 U	0.15 J	0.5 U	0.6 U
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	8450	4300	3060	*17700*	2940	2780
chromium	210	—	—	54.84	—	mg/kg	NA	NA	NA	NA	NA	44.5	*58.8*	15.8	12.5	37	23.3
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	NA	NA	NA	NA	NA	11.6	8.3	5.8	14	4.7	5.7
copper	3,100	—	—	39.14	—	mg/kg	NA	NA	NA	NA	NA	28.7	11.3	5	*41.9*	7	10.9
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	***24800***	20000	***23900***	***49500***	11500	21200
lead	400	150	—	37.66	199	mg/kg	NA	NA	NA	NA	NA	3.2	3.8	1.1	2.5	2.3	1.1
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	*8890*	4640	4900	*9060*	2790	4800
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	*703*	185	226	*1090*	128	204
mercury	23	—	—	0.52	—	mg/kg	NA	NA	NA	NA	NA	0.083 J	0.026 U	0.1 U	0.043 U	0.02 U	0.037 U
molybdenum	390	—	—	5.20	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	NA	NA	NA	NA	NA	53.3	54.3	12.4	13	29.8	23.4
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	1090	*2130*	1000	519	936	1140
selenium	390	—	—	1.78	—	mg/kg	NA	NA	NA	NA	NA	0.5 U	0.6 U	0.6 U	0.6 U	0.5 U	0.6 U
silver	390	—	—	2.22	—	mg/kg	NA	NA	NA	NA	NA	0.47	0.33	0.58	0.84	0.56	0.39
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	251	127	605	973	167	847
thallium	5.2	—	—	0.50	—	mg/kg	NA	NA	NA	NA	NA	*2 U* [f]	*3 U* [f]	*3 U* [f]	*2 U* [f]	*2 U* [f]	*2 U* [f]
vanadium	78	—	—	47.34	—	mg/kg	NA	NA	NA	NA	NA	43.5	34.3	22.4	*76.6*	26.4	30
zinc	23,000	—	—	67.48	—	mg/kg	NA	NA	NA	NA	NA	32.7	32	14.7	*71.9*	16.6	17.8

Table 4-3b
Soil Sampling Results, EBS 78–79

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Result Units	Station ID: D78SB03 / Sample: C077S507 / [a] Depth Interval: 1 - 2 / Collection Date: 03-Dec-05	D78SB03 / C077S508 / 2 - 3 / 03-Dec-05	D78SB03 / C077S509 / 6 - 7.5 / 03-Dec-05	D78SB04 / C077S510 / 0.5 - 1.5 / 03-Dec-05	D78SB04 / C077S511 / 2 - 3 / 03-Dec-05	D78SB04 / C077S512 / 5 - 6.5 / 03-Dec-05	D79SB01 / C077S521 / 1 - 2 / 03-Dec-05	D79SB01 / C077S522 / 3 - 4 / 03-Dec-05	D79SB01 / C077S523 / 4.5 - 5.5 / 03-Dec-05	D79SB02 / C077S524 / 0 - 1 / 05-Dec-05	D79SB02 / C077S525 / 3 - 4 / 05-Dec-05	D79SB02 / C077S526 / 5.5 - 6.5 / 05-Dec-05
VOCs																		
acetone	14,000,000	—[b]	—	—	—	µg/kg	100 U	100 U	100 U	100 U	100 U	100 U	32 J	100 U	100 U	95 J	100 U	100 U
benzene	640	—	—	—	—	µg/kg	6 U	5 U	5 U	5 U	5 U	5 U	6 UJ	6 U	6 U	5 U	5 U	6 U
2-butanone	22,000,000	—	—	—	—	µg/kg	2.7 J	2 J	100 U	100 U	100 U	100 U	1.9 J	100 U	100 U	100 U	100 U	100 U
cis-1,2-dichloroethene	43,000	—	—	—	—	µg/kg	6 U	5 U	5 U	5 U	5 U	5 U	6 U	6 U	6 U	1.7 J	5 U	6 U
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	40 U	40 U	40 U	40 U	40 U	40 U	40 U	50 U	40 U	2.1 J	40 U	50 U
tetrachloroethene	480	—	—	—	—	µg/kg	6 U	5 U	5 U	5 U	5 U	5 U	6 UJ	6 U	6 U	2.5 J	5 U	6 U
toluene	520,000	—	—	—	—	µg/kg	6 U	5 U	5 U	5 U	5 U	5 U	6 UJ	6 U	6 U	0.95 J	5 U	6 U
m-, p-xylene	—	—	—	—	—	µg/kg	6 U	5 U	5 U	5 U	5 U	5 U	6 UJ	6 U	6 U	0.5 J	5 U	6 U
Petroleum Hydrocarbons																		
diesel	—	—	100,000	—	—	µg/kg	10000	14000	1100 U	NA	1000 U	1100 U	19000	12000	10000	**460000**	1100 U	1200 U
gasoline	—	—	100,000	—	—	µg/kg	2000	460 J	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
motor oil	—	—	500,000	—	—	µg/kg	14000	14000	11000 U	NA	10000 U	11000 U	26000	15000	13000	420000	11000 U	12000 U
SVOCs																		
acenaphthene	3,700,000	—	—	—	—	µg/kg	6 U	5 U	5 U	NA	5 U	5 U	3.7 J	2.7 J	6 U	5 U	5 U	6 U
acenaphthylene	—	—	—	—	—	µg/kg	6 U	5 U	5 U	NA	5 U	5 U	11	4.7 J	6 U	5 U	5 U	6 U
anthracene	22,000,000	—	—	—	—	µg/kg	6 U	5 U	5 U	NA	5 U	5 U	13	6.1	6 U	2.3 J	5 U	6 U
benz(a)anthracene	620[d]	—	—	—	—	µg/kg	6 U	3.5 J	5 U	NA	5 U	5 U	98	33	6 U	16	5 U	6 U
benzo(b)fluoranthene	620[d]	—	—	—	—	µg/kg	4.1 J	4.1 J	5 U	NA	5 U	5 U	290	93 J	6 U	44 J	5 U	6 U
benzo(k)fluoranthene	6,200[d]	380[d]	—	—	—	µg/kg	4 J	5 U	5 U	NA	5 U	5 U	87	89 J	6 U	43 J	5 U	6 U
benzo(g,h,i)perylene	—	—	—	—	—	µg/kg	6 U	5.6	5 U	NA	5 U	5 U	170	69	6.4	24 J	5 UJ	6 UJ
benzo(a)pyrene	62[d]	—	—	—	—	µg/kg	6 U	5.5	5 U	NA	5 U	5 U	**190**	**68**	6 U	27	5 U	6 U
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	300 U	300 U	300 U	NA	300 U	300 U	300 U	400 U	300 U	160 J	300 U	300 U
chrysene	62,000[d]	3,800[d]	—	—	—	µg/kg	2.2 J	2.8 J	5 U	NA	5 U	5 U	140	34	6 U	18	5 U	6 U
dibenz(a,h)anthracene	62[d]	—	—	—	—	µg/kg	6 U	5 U	5 U	NA	5 U	5 U	15	21	6 U	5 UJ	5 UJ	6 UJ
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	300 UJ	300 UJ	300 UJ	NA	300 UJ	300 UJ	300 UJ	120 J	300 UJ	300 U	300 U	300 U
fluoranthene	2,300,000	—	—	—	—	µg/kg	3.3 J	5.3	5 U	NA	5 U	5 U	230	89	6 U	33	5 U	6 U
fluorene	2,700,000	—	—	—	—	µg/kg	6 U	5 U	5 U	NA	5 U	5 U	2.9 J	6 U	6 U	5 U	5 U	6 U
indeno(1,2,3-cd)pyrene	620[d]	—	—	—	—	µg/kg	6 U	2.7 J	5 U	NA	5 U	5 U	98	36	2.3 J	9.3 J	5 UJ	6 UJ
2-methylnaphthalene	—	—	—	—	—	µg/kg	6 U	5 U	5 U	NA	5 U	5 U	3.5 J	1.5 J	6 U	0.98 J	5 U	6 U
naphthalene	56,000[d]	1,700[d]	—	—	—	µg/kg	6 U	5 U	5 U	NA	5 U	5 U	18	5.2 J	6 U	3.6 J	5 U	6 U
phenanthrene	—	—	—	—	—	µg/kg	6 U	5 U	5 U	NA	5 U	5 U	56	20	6 U	9	5 U	6 U
pyrene	2,300,000	—	—	—	—	µg/kg	3 J	6.2	5 U	NA	5 U	5 U	280	110	6 U	48	5 U	6 U
Pesticides/PCBs																		
alpha-chlordane	1,600	—	—	—	—	µg/kg	6 U	2.6 J	5 U	NA	5 U	5 U	6 U	6 U	6 U	5 U	5 U	6 U
gamma-chlordane	1,600	—	—	—	—	µg/kg	6 U	4.9 J	5 U	NA	5 U	5 U	6 U	6 U	6 U	5 U	5 U	6 U
4,4'-DDE	1,700	—	—	—	—	µg/kg	6 U	60	5 U	NA	5 U	5 U	6 U	6 U	6 U	5 U	5 U	6 U
4,4'-DDT	1,700	—	—	—	—	µg/kg	6 U	43	5 U	NA	5 U	5 U	6 U	6 U	6 U	5 U	5 U	6 U
Metals																		
aluminum	76,000	—	—	13,960	—	mg/kg	*23400*	4690	4890	NA	4090	5170	8180	5270	5860	4270	3720	4890
antimony	31	—	—	9.50	—	mg/kg	1.4 J	0.5 UJ	0.5 UJ	NA	0.5 UJ	0.5 UJ	0.6 U	0.6 U	0.6 U	0.5 U	0.23 U	0.6 U
arsenic	0.39	0.062	—	9.14	—	mg/kg	**4.1**	**1.5**	**1.4**	NA	**1.2**	**1.4**	**1.8**	**1**	**0.9**	**1.7**	**2**	**1.8**
barium	5,400	—	—	93.68	—	mg/kg	*386*	35	22.3	NA	23.3	24.9	41.6	35.4	26.3	39.3	18.9	43.1
beryllium	150	—	—	1.27	—	mg/kg	0.33	0.061 J	0.075 J	NA	0.053 J	0.091 J	0.16 J	0.064 J	0.078 J	0.082 U	0.13 U	0.16 J

Table 4-3b
Soil Sampling Results, EBS 78–79

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Lead Removal Action Objective	Result Units	Station ID: D78SB03 / Sample: C077S507 / [a]Depth Interval: 1 - 2 / Collection Date: 03-Dec-05	D78SB03 / C077S508 / 2 - 3 / 03-Dec-05	D78SB03 / C077S509 / 6 - 7.5 / 03-Dec-05	D78SB04 / C077S510 / 0.5 - 1.5 / 03-Dec-05	D78SB04 / C077S511 / 2 - 3 / 03-Dec-05	D78SB04 / C077S512 / 5 - 6.5 / 03-Dec-05	D79SB01 / C077S521 / 1 - 2 / 03-Dec-05	D79SB01 / C077S522 / 3 - 4 / 03-Dec-05	D79SB01 / C077S523 / 4.5 - 5.5 / 03-Dec-05	D79SB02 / C077S524 / 0 - 1 / 05-Dec-05	D79SB02 / C077S525 / 3 - 4 / 05-Dec-05	D79SB02 / C077S526 / 5.5 - 6.5 / 05-Dec-05
Metals (continued)																		
cadmium	37	—	—	1.72	—	mg/kg	1.2	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.6 U	0.6 U	0.6 U	0.5 U	0.5 U	0.6 U
calcium	—	—	—	16,800	—	mg/kg	3620	2810	2130	NA	2100	1630	2820	2550	2230	2100	1750	1900
chromium	210	—	—	54.84	—	mg/kg	*113*	30.6	29.9	NA	28.2	31.1	39.1	30.9	28.2	35.7	31.4	30.6
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	*18.5 J*	4.2 J	4.1 J	NA	3.7 J	4.6 J	8.9	4.1	5.9	4.3	3.7	4.7
copper	3,100	—	—	39.14	—	mg/kg	*93.8*	8.9	6	NA	5.3	8.2	10.7	5.9	7	6.3	4.9	6.9
iron	23,000	—	—	22,280	—	mg/kg	***49300***	9950	9980	NA	8180	8790	14300	9960	11200	8950	7880	9830
lead	400	150	—	37.66	199	mg/kg	8.9	7.8	1.8	NA	1.9	4.5	6.7	2.1	3.7	5.6 J	1.7 J	2.2 J
magnesium	—	—	—	7,304	—	mg/kg	*14900*	2800	2450	NA	2210	2390	3550	2550	2810	2480	2150	2960
manganese	1,800	—	—	383.0	—	mg/kg	*1160 J*	121 J	116 J	NA	94.2 J	118 J	194	107	107	106 J	86 J	103 J
mercury	23	—	—	0.52	—	mg/kg	0.11	0.037 U	0.1 U	NA	0.1 U	0.026 U	0.1	0.022 U	0.03 U	0.039 U	0.024 U	0.022 U
molybdenum	390	—	—	5.20	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	*59*	25.3	27.5	NA	23.8	26.8	33.7	25.3	22	25.9	23.9	31
potassium	—	—	—	1,232	—	mg/kg	874	549	550	NA	497	567	1120	833	807	609	567	799
selenium	390	—	—	1.78	—	mg/kg	0.6 U	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.6 U	0.6 U	0.6 U	0.5 U	0.29 J	0.6 U
silver	390	—	—	2.22	—	mg/kg	0.1 U	0.19 U	0.21 U	NA	0.18 U	0.18 U	0.39	0.38	0.36	0.12 U	0.1 U	0.1 U
sodium	—	—	—	1,230	—	mg/kg	463	133	79.9 U	NA	58 U	92.4 U	139	129	177	87.6 U	68.9 U	217 U
thallium	5.2	—	—	0.50	—	mg/kg	*2 U* [f]	*2 U* [f]	*2 U* [f]	NA	*2 U* [f]	*2 U* [f]	*2 U* [f]	*3 U* [f]	*2 U* [f]	*2 U* [f]	*2 U* [f]	*2 U* [f]
vanadium	78	—	—	47.34	—	mg/kg	***110***	20.3	20	NA	18.4	16.8	28.4	22	22.4	17.9	17	19.4
zinc	23,000	—	—	67.48	—	mg/kg	*132*	30.1	14.4	NA	12.4	16	26	14	15.4	18.1	14.5	19.3

Table 4-3b
Soil Sampling Results, EBS 78–79

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Result Units	Station ID: D79SB03	D79SB03	D79SB03	D79SB04	D79SB04	D79SB04	PARCEL 79 GRID 1	BACKFILL SAMPLE	PARCEL 79 GRID 2
Sample:							C077S527	C077S528	C077S529	C077S530	C077S531	C077S532	79-001(A-D)	88-001	79-002(A-D)
[a] Depth Interval:							0 - 1	2 - 3	4 - 5.5	1 - 2	2 - 3	6.5 - 8	1 - 1	0 - 1	1 - 1
Collection Date:							05-Dec-05	05-Dec-05	05-Dec-05	05-Dec-05	05-Dec-05	05-Dec-05	09-Dec-02	27-Jan-03	09-Dec-02
VOCs															
acetone	14,000,000	—[b]	—	—	—	µg/kg	100 U	100 U	100 U	100 UJ	100 U	100 U	NA	20 U	NA
benzene	640	—	—	—	—	µg/kg	5 U	5 U	6 U	5 UJ	5 U	0.79 J	NA	4.9 U	NA
2-butanone	22,000,000	—	—	—	—	µg/kg	100 U	100 U	100 U	100 UJ	100 U	100 U	NA	9.9 U	NA
cis-1,2-dichloroethene	43,000	—	—	—	—	µg/kg	1.1 J	5 U	0.42 J	5 UJ	5 U	6 U	NA	4.9 U	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	40 U	40 U	40 U	40 UJ	40 U	50 U	NA	4.9 U	NA
tetrachloroethene	480	—	—	—	—	µg/kg	5 U	5 U	6 U	5 UJ	5 U	6 U	NA	4.9 U	NA
toluene	520,000	—	—	—	—	µg/kg	5 U	5 U	6 U	5 UJ	5 U	6 U	NA	4.9 U	NA
m-, p-xylene	—	—	—	—	—	µg/kg	5 U	5 U	6 U	5 UJ	5 U	6 U	NA	NA	NA
Petroleum Hydrocarbons															
diesel	—	—	100,000	—	—	µg/kg	**390000**	1100 U	1100 U	1100 U	1100 U	1200 U	NA	1700 J	NA
gasoline	—	—	100,000	—	—	µg/kg	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	NA	210 U	NA
motor oil	—	—	500,000	—	—	µg/kg	350000	11000 U	11000 U	11000 U	11000 U	12000 U	NA	14000	NA
SVOCs															
acenaphthene	3,700,000	—	—	—	—	µg/kg	5 U	5 U	6 U	5 U	5 U	6 U	NA	5.6 U	NA
acenaphthylene	—	—	—	—	—	µg/kg	5 U	5 U	6 U	5 U	5 U	6 U	NA	5.6 U	NA
anthracene	22,000,000	—	—	—	—	µg/kg	5 U	5 U	6 U	5 U	5 U	6 U	NA	5.6 U	NA
benz(a)anthracene	620[d]	—	—	—	—	µg/kg	2.4 J	5 U	6 U	3.4 J	5 U	6 U	NA	5.6 U	NA
benzo(b)fluoranthene	620[d]	—	—	—	—	µg/kg	5 U	5 U	6 U	12 J	5 U	6 U	NA	5.6 U	NA
benzo(k)fluoranthene	6,200[d]	380[d]	—	—	—	µg/kg	5 U	5 U	6 U	12 J	5 U	6 U	NA	5.6 U	NA
benzo(g,h,i)perylene	—	—	—	—	—	µg/kg	5 UJ	5 UJ	6 UJ	6.8 UJ	5 UJ	6 UJ	NA	370 U	NA
benzo(a)pyrene	62[d]	—	—	—	—	µg/kg	5 U	5 U	6 U	7.3	5 U	6 U	NA	5.6 U	NA
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	550	300 U	300 U	610	300 U	400 U	NA	370 U	NA
chrysene	62,000[d]	3,800[d]	—	—	—	µg/kg	2.6 J	5 U	6 U	3.5 J	5 U	6 U	NA	6	NA
dibenz(a,h)anthracene	62[d]	—	—	—	—	µg/kg	5 UJ	5 UJ	6 UJ	5 UJ	5 UJ	6 UJ	NA	5.6 U	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	300 U	300 U	480	300 U	300 U	400 U	NA	370 U	NA
fluoranthene	2,300,000	—	—	—	—	µg/kg	3.8 J	5 U	6 U	5.9	5 U	6 U	NA	5.6 U	NA
fluorene	2,700,000	—	—	—	—	µg/kg	5 U	5 U	6 U	5 U	5 U	6 U	NA	5.6 U	NA
indeno(1,2,3-cd)pyrene	620[d]	—	—	—	—	µg/kg	5 UJ	5 UJ	6 UJ	5 UJ	5 UJ	6 UJ	NA	370 U	NA
2-methylnaphthalene	—	—	—	—	—	µg/kg	5 U	5 U	6 U	5 U	5 U	6 U	NA	370 U	NA
naphthalene	56,000[d]	1,700[d]	—	—	—	µg/kg	1 J	5 U	6 U	0.99 J	5 U	6 U	NA	370 U	NA
phenanthrene	—	—	—	—	—	µg/kg	5 U	5 U	6 U	5 U	5 U	6 U	NA	5.6 U	NA
pyrene	2,300,000	—	—	—	—	µg/kg	5.9	5 U	6 U	10	5 U	6 U	NA	370 U	NA
Pesticides/PCBs															
alpha-chlordane	1,600	—	—	—	—	µg/kg	5 U	5 U	6 U	5 U	5 U	6 U	NA	1.9 U	NA
gamma-chlordane	1,600	—	—	—	—	µg/kg	5 UJ	5 UJ	6 UJ	5 UJ	5 UJ	6 UJ	NA	NA	NA
4,4'-DDE	1,700	—	—	—	—	µg/kg	5 UJ	5 UJ	6 UJ	5 UJ	5 UJ	6 UJ	NA	3.7 U	NA
4,4'-DDT	1,700	—	—	—	—	µg/kg	5 UJ	5 UJ	6 UJ	5 UJ	5 UJ	6 UJ	NA	3.7 UJ	NA
Metals															
aluminum	76,000	—	—	13,960	—	mg/kg	3940	3830	6050	4010	2650	3950	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	0.5 U	0.33 U	0.6 U	0.5 U	0.6 U	0.6 U	1.2 J	3.3 UJ	2.7 U
arsenic	0.39	0.062	—	9.14	—	mg/kg	**2**	**2.1**	**1.6**	**2**	**1.1 U**[f]	**1.9**	**2.1**	**4.3**	**1.5**
barium	5,400	—	—	93.68	—	mg/kg	41.3	26	22.7	30.8	14.4	47.6	38	89	39
beryllium	150	—	—	1.27	—	mg/kg	0.14 J	0.13 U	0.19 J	0.14 J	0.091 U	0.15 J	0.16	0.51	0.15 U

Table 4-3b
Soil Sampling Results, EBS 78–79

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Lead Removal Action Objective	Result Units	Station ID: D79SB03	D79SB03	D79SB03	D79SB04	D79SB04	D79SB04	PARCEL 79 GRID 1	BACKFILL SAMPLE	PARCEL 79 GRID 2
Sample:							C077S527	C077S528	C077S529	C077S530	C077S531	C077S532	79-001(A-D)	88-001	79-002(A-D)
[a] Depth Interval:							0 - 1	2 - 3	4 - 5.5	1 - 2	2 - 3	6.5 - 8	1 - 1	0 - 1	1 - 1
Collection Date:							05-Dec-05	05-Dec-05	05-Dec-05	05-Dec-05	05-Dec-05	05-Dec-05	09-Dec-02	27-Jan-03	09-Dec-02
Metals (continued)															
cadmium	37	—	—	1.72	—	mg/kg	0.076 J	0.5 U	0.6 U	0.5 U	0.6 U	0.6 U	0.88	*2*	1.3
calcium	—	—	—	16,800	—	mg/kg	2130	1870	2120	2000	1150	1450	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	35.5	28.2	14.5	26.4	11.2	23.6	27	30	45
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	0.12	NA	0.05 U
cobalt	900	—	—	14.30	—	mg/kg	5	3.8	4.2	3.9	2.4	4	4.3	7.9	4.2
copper	3,100	—	—	39.14	—	mg/kg	6.3	5	13.3	5.5	3	5.1	6	8.8	8.1
iron	23,000	—	—	22,280	—	mg/kg	8530	8540	15500	8220	7210	7410	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	7.3 J	2.1 J	4.6 J	1.9 J	1.1 UJ	2.1 J	15	11	*150*
magnesium	—	—	—	7,304	—	mg/kg	2330	2190	4120	2170	1630	2090	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	110 J	89.5 J	214 J	92.3 J	78.1 J	76.2 J	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	0.021 U	0.1 U	0.028 U	0.1 U	0.025 U	0.1 U	0.16	0.053 U	0.011 J
molybdenum	390	—	—	5.20	—	mg/kg	NA	NA	NA	NA	NA	NA	0.23 J	1.1 U	0.9 U
nickel	1,600	—	—	55.72	—	mg/kg	26.5	23.7	13.7	24.2	9.9	23.6	25	43	23
potassium	—	—	—	1,232	—	mg/kg	582	511	673	544	348	687	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	0.36 J	0.5 U	0.6 U	0.5 U	0.6 U	0.3 J	0.42	0.27 UJ	0.35 U
silver	390	—	—	2.22	—	mg/kg	0.06 U	0.1 U	0.1 U	0.072 U	0.1 U	0.1 U	0.25 U	0.27 U	0.22 U
sodium	—	—	—	1,230	—	mg/kg	120 U	69.7 U	466 U	71.6 U	51.2 U	354 U	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	*2 U* [f]	*2 U* [f]	*2 U* [f]	*2 U* [f]	*2 U* [f]	*2 U* [f]	0.25 U	0.27 U	0.14 J
vanadium	78	—	—	47.34	—	mg/kg	18.8	17.4	22.8	17.1	9.3	16	20	24	19
zinc	23,000	—	—	67.48	—	mg/kg	21.5	13.9	20.6	15	7.8	14.9	49	35	*170*

Table 4-3b
Soil Sampling Results, EBS 78–79

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	PARCEL 79 GRID 2 79-003(A-D) (FD) 1 - 1 09-Dec-02	PARCEL 79 GRID 3 79-004(A-D) 1 - 1 09-Dec-02	PARCEL 79 GRID 4 79-005(A-D) 1 - 1 09-Dec-02	PARCEL 79 GRID 5 79-006(A-D) 1 - 1 09-Dec-02	PARCEL 79 GRID 6 79-011(A-D) 2 - 2 16-Jan-03	PARCEL 79 GRID 7 79-008(A-D) 1 - 1 09-Dec-02
VOCs												
acetone	14,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
benzene	640	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
2-butanone	22,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
cis-1,2-dichloroethene	43,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
tetrachloroethene	480	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
toluene	520,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
m-, p-xylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons												
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA
gasoline	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA
SVOCs												
acenaphthene	3,700,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
acenaphthylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[d]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[d]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[d]	380[d]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[d]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
chrysene	62,000[d]	3,800[d]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[d]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
fluorene	2,700,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[d]	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
2-methylnaphthalene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
naphthalene	56,000[d]	1,700[d]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Pesticides/PCBs												
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
gamma-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
4,4'-DDE	1,700	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
4,4'-DDT	1,700	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Metals												
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	2.8 U	3 U	3 U	2.5 U	3 UJ	3 U
arsenic	0.39	0.062	—	9.14	—	mg/kg	**1.4**	**3.5**	**1.8**	**2**	**5.1**	**1.8**
barium	5,400	—	—	93.68	—	mg/kg	30	27	32	43	48	31
beryllium	150	—	—	1.27	—	mg/kg	0.15 U	0.14 U	0.16 U	0.16 U	0.18 U	0.16 U

Table 4-3b
Soil Sampling Results, EBS 78–79

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Lead Removal Action Objective	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	PARCEL 79 GRID 2 79-003(A-D) (FD) 1 - 1 09-Dec-02	PARCEL 79 GRID 3 79-004(A-D) 1 - 1 09-Dec-02	PARCEL 79 GRID 4 79-005(A-D) 1 - 1 09-Dec-02	PARCEL 79 GRID 5 79-006(A-D) 1 - 1 09-Dec-02	PARCEL 79 GRID 6 79-011(A-D) 2 - 2 16-Jan-03	PARCEL 79 GRID 7 79-008(A-D) 1 - 1 09-Dec-02
Metals (continued)												
cadmium	37	—	—	1.72	—	mg/kg	1.2	0.54	1.1	1	1.2	*1.8*
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	25	22	27	28	25	27
chromium, hexavalent	30	—	—	—	—	mg/kg	0.04 J	0.04 J	0.05 U	0.05 U	0.06	0.05 U
cobalt	900	—	—	14.30	—	mg/kg	3.8	3.3	4.2	4.3	4.1	4
copper	3,100	—	—	39.14	—	mg/kg	5.1	4.2	7.2	7.8	9.2	5.4
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	13	7.6	10	12	17	*81*
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	0.018 J	0.016 J	0.031	0.02	0.021 U	0.014 J
molybdenum	390	—	—	5.20	—	mg/kg	0.94 U	1 U	1 U	0.84 U	1 U	1 U
nickel	1,600	—	—	55.72	—	mg/kg	23	20	24	26	25	22
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	0.3 U	0.38 U	0.33 U	0.38 U	0.25 UJ	0.3 U
silver	390	—	—	2.22	—	mg/kg	0.24 U	0.25 U	0.25 U	0.21 U	0.25 U	0.25 U
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	0.24 U	0.25 U	0.25 U	0.21 U	0.25 U	0.25 U
vanadium	78	—	—	47.34	—	mg/kg	16	15	20	21	17	17
zinc	23,000	—	—	67.48	—	mg/kg	*270*	25	*86*	*95*	*140*	*150*

Table 4-3b
Soil Sampling Results, EBS 78–79

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	PARCEL 79 GRID 8 79-012(A-D) 1 - 1 21-Jan-03	PARCEL 79 GRID 9 79-010(A-D) 1 - 1 09-Dec-02	SS-607-E SS-607-E-COMP 0 - 0.5 02-Aug-01	SS-73B-E SS-73B-E-COMP 0 - 0.5 02-Aug-01
VOCs										
acetone	14,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA
benzene	640	—	—	—	—	µg/kg	NA	NA	NA	NA
2-butanone	22,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA
cis-1,2-dichloroethene	43,000	—	—	—	—	µg/kg	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA
tetrachloroethene	480	—	—	—	—	µg/kg	NA	NA	NA	NA
toluene	520,000	—	—	—	—	µg/kg	NA	NA	NA	NA
m-, p-xylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA
Petroleum Hydrocarbons										
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA
gasoline	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA
SVOCs										
acenaphthene	3,700,000	—	—	—	—	µg/kg	NA	NA	NA	NA
acenaphthylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA
benz(a)anthracene	620[d]	—	—	—	—	µg/kg	NA	NA	NA	NA
benzo(b)fluoranthene	620[d]	—	—	—	—	µg/kg	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[d]	380[d]	—	—	—	µg/kg	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	—	µg/kg	NA	NA	NA	NA
benzo(a)pyrene	62[d]	—	—	—	—	µg/kg	NA	NA	NA	NA
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA
chrysene	62,000[d]	3,800[d]	—	—	—	µg/kg	NA	NA	NA	NA
dibenz(a,h)anthracene	62[d]	—	—	—	—	µg/kg	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA
fluorene	2,700,000	—	—	—	—	µg/kg	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[d]	—	—	—	—	µg/kg	NA	NA	NA	NA
2-methylnaphthalene	—	—	—	—	—	µg/kg	NA	NA	NA	NA
naphthalene	56,000[d]	1,700[d]	—	—	—	µg/kg	NA	NA	NA	NA
phenanthrene	—	—	—	—	—	µg/kg	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	—	µg/kg	NA	NA	NA	NA
Pesticides/PCBs										
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA
gamma-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA
4,4'-DDE	1,700	—	—	—	—	µg/kg	NA	NA	NA	NA
4,4'-DDT	1,700	—	—	—	—	µg/kg	NA	NA	NA	NA
Metals										
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	2.7 UJ	3.1 U	NA	NA
arsenic	0.39	0.062	—	9.14	—	mg/kg	**3.1**	**1.5**	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	26	25	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	0.22 U	0.17 U	NA	NA

Table 4-3b
Soil Sampling Results, EBS 78–79

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Lead Removal Action Objective	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	PARCEL 79 GRID 8 79-012(A-D) 1 - 1 21-Jan-03	PARCEL 79 GRID 9 79-010(A-D) 1 - 1 09-Dec-02	SS-607-E SS-607-E-COMP 0 - 0.5 02-Aug-01	SS-73B-E SS-73B-E-COMP 0 - 0.5 02-Aug-01
Metals (continued)										
cadmium	37	—	—	1.72	—	mg/kg	0.9	0.7	NA	NA
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	22	25	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	0.05 U	0.05 U	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	3.9	3.6	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	5.6 J	5	NA	NA
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	5	6.2	*43*	*67.5*
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	0.024 U	0.0068 J	NA	NA
molybdenum	390	—	—	5.20	—	mg/kg	0.91 U	1 U	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	21 J	22	NA	NA
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	0.13 J	0.26 U	NA	NA
silver	390	—	—	2.22	—	mg/kg	0.23 U	0.26 U	NA	NA
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	0.23 U	0.15 J	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	16	16	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	18 J	26	NA	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL
[d] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[e] italicized font indicates result above background
[f] detection limit is above criteria

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Acronyms/Abbreviations:
B(a)P – benzo(a)pyrene
Cal – California
EBS – environmental baseline survey
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-4a
Groundwater Sampling Results, AOC 11

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	A11SB01 C077G051 7 - 12 14-Dec-05	A11SB01 C077G052 (FD) 7 - 12 14-Dec-05	A11SB02 C077G053 5 - 10 13-Dec-05	A11SB02 C077G054 (FD) 5 - 10 13-Dec-05	S08-HP-06 122-S08-005 7 - 9 17-Nov-98
VOCs										
2-butanone	—[b]	—	—	—	µg/L	200 J	NA	2 U	NA	NA
SVOCs						ND	NA	ND	ND	NA
Pesticides/PCBs						ND	ND	ND	NA	NA
Metals										
arsenic	10	50	—	20.72	µg/L	5 U	NA	**17.5**[c]	NA	NA
barium	2,000	1,000	—	569.5	µg/L	407	NA	209 J	NA	NA
calcium	—	—	—	—	µg/L	115,000	NA	48,600	NA	NA
chromium	100	50	—	12.45	µg/L	2.3 J	NA	3.6 J	NA	NA
iron	—	—	—	6,586	µg/L	*8,820*[d]	NA	1,080	NA	NA
magnesium	—	—	—	—	µg/L	189,000 J	NA	43,900	NA	NA
manganese	—	—	—	1,741	µg/L	668	NA	515	NA	NA
potassium	—	—	—	—	µg/L	76,600	NA	32,100	NA	NA
sodium	—	—	—	—	µg/L	2,070,000	NA	663,000	NA	NA
vanadium	—	—	—	26.27	µg/L	2.5 J	NA	2.4 J	NA	NA
General Chemistry										
solids, total dissolved	—	—	—	—	mg/L	6,140	NA	2,310	NA	NA

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

[c] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL

[d] italicized font indicates result above background

Table 4-4a
Groundwater Sampling Results, AOC 11

Acronyms/Abbreviations:
- AOC – area of concern
- Cal – California
- ESL – environmental screening level
  (San Francisco Bay Regional Water Quality Control Board)
- FD – field duplicate
- Fed – federal
- GW – groundwater
- µg/L – micrograms per liter
- MCL – maximum contaminant level
- mg/L – milligrams per liter
- NA – not analyzed
- ND – not detected
- PCB – polychlorinated biphenyl
- SVOC – semivolatile organic compound
- TPH – total petroleum hydrocarbons
- VOC – volatile organic compound

Review Qualifiers:
- J – indicates an estimated value
- U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit

Table 4-4b
Groundwater Sampling Results, EBS 78–79

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	Groundwater TPH ESL	Background	Result Units	Station ID: D78SB01	D78SB01	D78SB02	D78SB02	D78SB03	D78SB03	D78SB04	D78SB04	D79SB01
						Sample: C077G181	C077G182 (FD)	C077G183	C077G184 (FD)	C077G185	C077G186 (FD)	C077G187	C077G188 (FD)	C077G191
						[a] Depth Interval: 6.5 - 11.5	6.5 - 11.5	6.5 - 11.5	6.5 - 11.5	8 - 13	8 - 13	7 - 12	7 - 12	6.5 - 11.5
						Collection Date: 03-Dec-05	03-Dec-05	03-Dec-05	03-Dec-05	03-Dec-05	03-Dec-05	03-Dec-05	03-Dec-05	03-Dec-05
VOCs														
benzene	5	1	—[b]	—	µg/L	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
carbon disulfide	—	—	—	—	µg/L	0.5 U	0.5 U	0.45 J	NA	1	NA	6.5	NA	0.5 U
1,3-dichlorobenzene	—	—	—	—	µg/L	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
cis-1,2-dichloroethene	70	6	—	—	µg/L	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	0.28 J	NA	0.62
trans-1,2-dichloroethene	100	10	—	—	µg/L	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
toluene	1,000	150	—	—	µg/L	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	0.19 J	NA	0.5 U
trichloroethene	5	5	—	—	µg/L	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	0.5 U	NA	1
1,2,4-trimethylbenzene	—	—	—	—	µg/L	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
m-, p-xylene	—	—	—	—	µg/L	0.5 U	0.5 U	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U
Petroleum Hydrocarbons						ND	ND	ND	ND	ND	NA	ND	NA	ND
SVOCs														
pyrene	—	—	—	—	µg/L	0.17 J	NA	0.14 J	NA	0.2 U	NA	0.2 U	0.2 U	0.2 U
Pesticides/PCBs														
Aroclor 1260	0.5	0.5	—	—	µg/L	0.18 J	NA	0.2 U	NA	0.2 U	NA	0.2 U	NA	0.2 U
alpha-BHC	—	—	—	—	µg/L	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.006 J
gamma-BHC (lindane)	0.2	0.2	—	—	µg/L	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.007 J
alpha-chlordane	—	—	—	—	µg/L	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.009 J
gamma-chlordane	—	—	—	—	µg/L	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.009 J
4,4'-DDE	—	—	—	—	µg/L	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.009 J
4,4'-DDT	—	—	—	—	µg/L	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.01 J
dieldrin	—	—	—	—	µg/L	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.009 J
endosulfan I	—	—	—	—	µg/L	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.01 J
endosulfan II	—	—	—	—	µg/L	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.008 J
endosulfan sulfate	—	—	—	—	µg/L	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.007 J
endrin aldehyde	—	—	—	—	µg/L	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.02 U	NA	0.011 J
heptachlor	0.4	0.01	—	—	µg/L	**0.02 U** [c,d]	NA	**0.02 U** [c]	NA	**0.02 U** [c]	NA	**0.02 U** [c]	NA	0.01 J
heptachlor epoxide	0.2	0.01	—	—	µg/L	**0.02 U** [c]	NA	**0.02 U** [c]	NA	**0.02 U** [c]	NA	**0.02 U** [c]	NA	0.009 J
Metals														
arsenic	10	50	—	20.72	µg/L	***50 U*** [c,e]	NA	***50 U*** [c]	NA	5 U	NA	***25 U*** [c]	NA	***25 U*** [c]
barium	2,000	1,000	—	569.5	µg/L	567	NA	284	NA	312	NA	555	NA	306
beryllium	4	4	—	2.50	µg/L	***20 U*** [c]	NA	***20 U*** [c]	NA	0.27 J	NA	***10 U*** [c]	NA	***10 U*** [c]
calcium	—	—	—	—	µg/L	135,000	NA	54,700	NA	126,000	NA	69,500	NA	69,300
chromium	100	50	—	12.45	µg/L	*20 J*	NA	*50 U* [c]	NA	3.4 J	NA	6.9 J	NA	9.5 J
iron	—	—	—	6,586	µg/L	*15,400*	NA	3,390	NA	2,280	NA	4,980	NA	1,390
magnesium	—	—	—	—	µg/L	251,000	NA	84,900	NA	60,200	NA	74,200	NA	86,000
manganese	—	—	—	1,741	µg/L	*2,410*	NA	724	NA	650	NA	448	NA	407
potassium	—	—	—	—	µg/L	88,000	NA	44,200	NA	23,500	NA	39,000	NA	61,000
selenium	50	50	—	8.58	µg/L	*50 U* [c]	NA	*50 U* [c]	NA	6.5	NA	*22.7 J*	NA	*17.3 J*
sodium	—	—	—	—	µg/L	2,720,000	NA	1,310,000	NA	344,000	NA	878,000	NA	1,650,000
vanadium	—	—	—	26.27	µg/L	*50 U* [c]	NA	*50 U* [c]	NA	1.3 J	NA	25 U	NA	8.1 J
General Chemistry														
solids, total dissolved	—	—	—	—	mg/L	7,720	NA	3,620	NA	1,010	NA	2,510	NA	3,760

Table 4-4b
Groundwater Sampling Results, EBS 78–79

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	Groundwater TPH ESL	Background	Result Units	Station ID: D79SB01 / Sample: C077G192 (FD) / [a]Depth Interval: 6.5 - 11.5 / Collection Date: 03-Dec-05	D79SB02 / C077G193 / 7 - 12 / 05-Dec-05	D79SB03 / C077G194 / 7 - 12 / 05-Dec-05	D79SB03 / C077G195 (FD) / 7 - 12 / 05-Dec-05	D79SB04 / C077G196 / 7 - 12 / 05-Dec-05
VOCs										
benzene	5	1	—[b]	—	µg/L	NA	0.5 U	NA	0.5 U	0.42 J
carbon disulfide	—	—	—	—	µg/L	NA	1.4	NA	0.54	0.5
1,3-dichlorobenzene	—	—	—	—	µg/L	NA	0.5 U	NA	0.11 J	0.5 U
cis-1,2-dichloroethene	70	6	—	—	µg/L	NA	0.87	NA	1.1	3.9
trans-1,2-dichloroethene	100	10	—	—	µg/L	NA	0.5 U	NA	0.5 U	0.41 J
toluene	1,000	150	—	—	µg/L	NA	0.29 J	NA	0.36 J	0.39 J
trichloroethene	5	5	—	—	µg/L	NA	1.1	NA	0.88	0.45 J
1,2,4-trimethylbenzene	—	—	—	—	µg/L	NA	0.5 U	NA	0.33 J	0.5 U
m-, p-xylene	—	—	—	—	µg/L	NA	0.5 U	NA	0.36 J	0.2 J
Petroleum Hydrocarbons						ND	ND	ND	ND	ND
SVOCs										
pyrene	—	—	—	—	µg/L	NA	0.2 U	0.2 U	NA	0.2 U
Pesticides/PCBs										
Aroclor 1260	0.5	0.5	—	—	µg/L	NA	0.2 U	0.2 U	0.2 U	0.2 U
alpha-BHC	—	—	—	—	µg/L	NA	0.02 U	0.02 U	0.02 UJ	0.02 U
gamma-BHC (lindane)	0.2	0.2	—	—	µg/L	NA	0.02 U	0.02 U	0.02 U	0.02 U
alpha-chlordane	—	—	—	—	µg/L	NA	0.02 U	0.02 U	0.02 U	0.02 U
gamma-chlordane	—	—	—	—	µg/L	NA	0.02 U	0.02 U	0.02 U	0.02 U
4,4'-DDE	—	—	—	—	µg/L	NA	0.02 U	0.02 U	0.02 U	0.02 U
4,4'-DDT	—	—	—	—	µg/L	NA	0.02 U	0.02 U	0.02 UJ	0.02 U
dieldrin	—	—	—	—	µg/L	NA	0.02 U	0.02 U	0.02 U	0.02 U
endosulfan I	—	—	—	—	µg/L	NA	0.02 U	0.02 U	0.02 U	0.02 U
endosulfan II	—	—	—	—	µg/L	NA	0.02 U	0.02 U	0.02 U	0.02 U
endosulfan sulfate	—	—	—	—	µg/L	NA	0.02 U	0.02 U	0.02 UJ	0.02 U
endrin aldehyde	—	—	—	—	µg/L	NA	0.02 U	0.02 U	0.02 U	0.02 U
heptachlor	0.4	0.01	—	—	µg/L	NA	**0.02 U**[c]	**0.02 U**[c]	**0.02 U**[c]	**0.02 U**[c]
heptachlor epoxide	0.2	0.01	—	—	µg/L	NA	**0.02 U**[c]	**0.02 U**[c]	**0.02 U**[c]	**0.02 U**[c]
Metals										
arsenic	10	50	—	20.72	µg/L	***25 U***[c]	3.4 J	**14.7**	NA	***21.3***
barium	2,000	1,000	—	569.5	µg/L	232	385	313	NA	403
beryllium	4	4	—	2.50	µg/L	***10 U***[c]	0.28 U	0.28 U	NA	0.3 U
calcium	—	—	—	—	µg/L	53,900	33,400	38,900	NA	32,900
chromium	100	50	—	12.45	µg/L	7.7 J	3.6 J	4.4 J	NA	4.9 J
iron	—	—	—	6,586	µg/L	1,160	1,400	3,150	NA	*10,600*
magnesium	—	—	—	—	µg/L	66,600	37,500	39,900	NA	48,400
manganese	—	—	—	1,741	µg/L	310	237	359	NA	465
potassium	—	—	—	—	µg/L	47,200	31,000	35,000	NA	34,600
selenium	50	50	—	8.58	µg/L	*25 U*[c]	5 U	7.1	NA	5 U
sodium	—	—	—	—	µg/L	1,310,000	1,170,000	1,120,000	NA	1,490,000
vanadium	—	—	—	26.27	µg/L	25 U	3.3 J	3.1 J	NA	3.7 J
General Chemistry										
solids, total dissolved	—	—	—	—	mg/L	NA	3,100	3,140	NA	4,230

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] detection limit is above criteria
[d] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL
[e] italicized font indicates result above background

Acronyms/Abbreviations:
BHC – benzene hexachloride
Cal – California
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
µg/L – micrograms per liter
MCL – maximum contaminant level
mg/L – milligrams per liter
NA – not analyzed
ND – not detected
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 5-1
Estimates of Mobility and Persistence for Contaminants
AOC 11 / EBS 78–79

Analyte	K_{oc} (L/kg)	f_{oc}	Percent Sorbed [a]	Half-Life in Soil (years) [b]
alpha-BHC	1,080	0.005	84.4	1.1
gamma-chlordane[c]	20,000	0.005	99	0.96
4,4′-DDD	8.11E+04	0.005	99.7	2.7
4,4′-DDE	2.7E+05	0.005	100	2.7
4,4′-DDT	3.02E+05	0.005	100	1.6
Aroclor 1260	3.47E+05	0.005	100	4.1E+05
dieldrin	1.2E+04	0.005	98.4	3.0
heptachlor	5.24E+04	0.005	99.6	0.68
heptachlor epoxide	5.26E+03	0.005	96.3	—
trichloroethene	82–150	0.005	29–42.9	0.98

Notes:
[a] percent sorbed = $[K_{oc}f_{oc} / (1+K_{oc}f_{oc})] \times 100$
[b] for microbially mediated degradation in soil (Howard et al. 1991)
[c] K_{oc} value and half-life is for chlordane

Acronyms/Abbreviations:
AOC – area of concern
BHC – benzene hexachloride
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EBS – environmental baseline survey
f_{oc} – fraction organic carbon; average value for poorly graded silty sands at AOC 11
K_{oc} – organic carbon partition coefficient
L/kg – liters per kilogram

Table 6-1
HHRA Results by Exposure Group
AOC 11 / EBS 78–79

Exposure Group	CANCER RISK		Hazard Index
	U.S. EPA	Cal/EPA	
1. All soil and groundwater exposure pathways			
Total*	3E-03	8E-03	233
Without metals below background	2E-03	5E-03	222
2. Exposure pathways for soil and vapors from VOCs in groundwater			
Total*	2E-05	8E-05	2
Without metals below background	5E-06	3E-06	2
Without metals below background and PAHs in soil	4E-06	1E-06	2
3. Exposure pathways for residential use of groundwater			
Total*	3E-03	8E-03	231
Without metals below background	2E-03	5E-03	220

Note:
* includes all COPCs

Acronyms/Abbreviations:
AOC – area of concern
Cal/EPA – California Environmental Protection Agency
COPC – chemical of potential concern
EBS – environmental baseline survey
HHRA – human-health risk assessment
PAH – polynuclear aromatic hydrocarbon
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Table 6-2
HHRA Results by Risk Driver, AOC 11 / EBS 78–79

Study Area	Analyte Name	TOTAL			WITHOUT BACKGROUND		
		Hazard Quotient	U.S. EPA Cancer Risk	Cal/EPA Cancer Risk	Hazard Quotient	U.S. EPA Cancer Risk	Cal/EPA Cancer Risk
AOC 11 / EBS 78–79							
Soil							
	benzo(a)pyrene	—[a]	—	1E-06	—	—	1E-06
	arsenic	—	1E-05	7E-05	—	—	—
	cadmium[b]	—	—	7E-06	—	—	—
	iron	1	—	—	1	—	—
	Total for soil	**2**	**2E-05**	**8E-05**	**2**	**5E-06**	**3E-06**
Groundwater							
	trichloroethene	—	1E-05	—	—	1E-05	—
	Aroclor 1260	220	2E-03	5E-03	220	2E-03	5E-03
	alpha-BHC	—	1E-06	—	—	1E-06	—
	alpha-chlordane	—	—	3E-06	—	—	3E-06
	gamma-chlordane	—	3E-06	9E-06	—	3E-06	9E-06
	4,4'-DDE	—	2E-06	2E-06	—	2E-06	2E-06
	4,4'-DDT	—	4E-06	3E-06	—	4E-06	3E-06
	dieldrin	—	9E-06	1E-05	—	9E-06	1E-05
	heptachlor	—	1E-05	1E-05	—	1E-05	1E-05
	heptachlor epoxide	—	4E-06	2E-06	—	4E-06	2E-06
	arsenic[b]	4	5E-04	3E-03	—	—	—
	iron[b]	2	—	—	—	—	—
	manganese[b]	3	—	—	—	—	—
	Total for groundwater	**231**	**3E-03**	**8E-03**	**220**	**2E-03**	**5E-03**
	Total for soil and groundwater	**233**	**3E-03**	**8E-03**	**222**	**2E-03**	**5E-03**

Notes:

[a] dash indicates not applicable

[b] additional statistical analysis indicated that concentrations of cadmium in soil and concentrations of arsenic, iron, and manganese in groundwater are below Alameda Point pink background

Acronyms/Abbreviations:

AOC – area of concern
BHC – benzene hexachloride
Cal/EPA – California Environmental Protection Agency
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EBS – environmental baseline survey
HHRA – human-health risk assessment
U.S. EPA – United States Environmental Protection Agency

Table 7-1
Summary of RI Results and Recommendations
AOC 11 / EBS 78–79

DQO Problem	DQO Decision Questions	Nature and Extent	Risk Assessment	Recommendation
Investigations at AOC 11 assessed whether chemical storage at EBS Parcel 77, stains observed at Building 101 during the EBS, or pesticides associated with adjacent IR Site 8 impacted soil and groundwater quality at this AOC. Additionally, the RI addressed a request by regulatory agencies on behalf of the Alameda Point Collaborative to further assess soil and groundwater quality at EBS Parcels 78–79 because these parcels are being used by the community.	Have the nature and extent of contamination been defined?	Yes. Diesel-range TPH in soil appears to be limited in extent laterally and is defined vertically. Metals reported in soil and groundwater are believed to be naturally occurring. Results of RI samples indicate that AOC 11 is not impacted by pesticides from IR Site 8.	NA	No further action.
	Are contaminants present in soil or groundwater at concentrations that pose unacceptable risk to potential future residents?	NA	No. Results of the baseline HHRA show U.S. EPA and Cal/EPA total cancer risks of 3×10^{-3} and 8×10^{-3}, respectively (above the risk management range), with an HI of 233. Without metals below Alameda Point background (arsenic, cadmium, and iron in soil and arsenic, iron, and manganese in groundwater), U.S. EPA and Cal/EPA cancer risks are 2×10^{-3} and 5×10^{-3}, respectively, with an HI of 222. The cancer risk and HI are largely due to a single detection of Aroclor 1260 at a concentration in groundwater below the PSC, and likely represents an artifact of sampling (associated with suspended material due to turbidity) rather than a dissolved concentration. Because of their low solubility and tendency to sorb to organic matter and clay-size particles in soil, PCBs are rarely found dissolved in groundwater. Without Aroclor 1260 and metals below background, the HI above 1 is due to iron (HI of 1) in soil. The health	No further action.

Table 7-1 (continued)

DQO Problem	DQO Decision Questions	Nature and Extent	Risk Assessment	Recommendation
			effects of iron are not considered additive with other chemicals.	
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?	NA	NA. This pathway was not evaluated for AOC 11 / EBS Parcels 78–79, located approximately 1,700 feet from the nearest from surface water body.	NA

Acronyms/Abbreviations:
AOC – area of concern
Cal/EPA – California Environmental Protection Agency
DQO – data quality objective
EBS – environmental baseline survey
HHRA – human-health risk assessment
HI – hazard index
HQ – hazard quotient
IR – Installation Restoration (Program)
NA – not applicable
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PSC – preliminary screening criterion
RI – remedial investigation
TCE – trichloroethene
TPH – total petroleum hydrocarbons
U.S. EPA – United States Environmental Protection Agency

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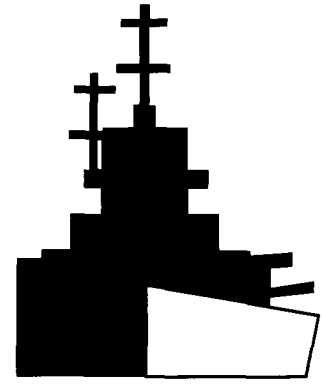
PROGRAM



FINAL
REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT IR SITE 35, AREAS OF CONCERN IN TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105-1
April 2007

Volume IV of V

Submitted to:

Department of the Navy
Base Realignment and Closure
Program Management Office West

1455 Frazee Road, Suite 900
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Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

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CTO-0077/0105-1
April 2007
Volume IV of V

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ATTACHMENT L

AREA OF CONCERN 12

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COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT ATTACHMENT L, AREA OF CONCERN 12 IR SITE 35, TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 12. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station Alameda), Alameda, California (Figure 1-1).

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

AOC 12 is an approximately 0.9-acre area in the central portion of Transfer Parcel Economic Development Conveyance (EDC)-5 near the intersection of Moonlight Terrace and West Ranger Avenue (Figure 1-1). The northern portion of AOC 12 consists of portions of Environmental Baseline Survey (EBS) Parcels 105, 106, and 107 and was formerly occupied by a 200,000-gallon water tower (Structure 33). This area currently consists of grassy open space and paved areas. A small rectangular fenced area (10 by 15 feet) in the grassy open space encloses a rectangular slab of concrete with a metal cover just west of the location of former Structure 33. Another rectangular concrete structure with a metal cover is located in an unfenced area south of former Structure 33. The southern portion of AOC 12, in EBS Parcel 107, was formerly occupied by a 200,000-gallon water tower (Structure 61) and currently consists of open space. Old railroad tracks run north-south through the middle of AOC 12.

1.2 HISTORICAL USE

The northern portion of AOC 12 was historically used for vehicle parking and also contained sidewalks and landscaping. The towers in both the northern and southern areas (Structures 33 and 61, respectively) were used for storing water. The water tower in the northern portion of AOC 12 (Structure 33), including its concrete footings, was removed in December 2002 (Shaw 2003) (Photograph 1-1). Approximately 100 gallons of paint, solvents, and lubricants were observed to be stored in the open space area during the EBS in 1994 (it is not known if this was within the boundaries of AOC 12) (ERM-West 1994a). The water tower in the southern portion of AOC 12 (Structure 61) was removed in January 1994; however, there is no visual evidence of its location (Photograph 1-2).

1.3 PRELIMINARY SCREENING CRITERIA

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this AOC are the following:

- Soil
  - residential preliminary remediation goals (PRGs) (U.S. EPA 2004b), except polynuclear aromatic hydrocarbons (PAHs) classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (µg/kg) (DON 2001a)

Photograph 1-1
Former Location of Water Tower 33, General View to Northeast

Photograph 1-2
Former Location of Water Tower 61 and Building 92, View to West

- environmental screening levels for total petroleum hydrocarbons (TPH) – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)
- lead removal action objective of 199 milligrams per kilogram (mg/kg) (TtEMI 2002b)

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being assessed.

In addition to the above-listed PSCs, metals concentrations in soil at AOC 12 were compared to the following Alameda Point background 95th percentile concentration to help discriminate between site-related and naturally occurring metals:

- Alameda Point background soil concentrations (95th percentile of the data set; Appendix E of the final RI Report of Operable Unit 1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)

For ease of discussion in this report, the Alameda Point 95th percentile concentrations for metals in soil (pink background data set) and groundwater are referred to as "background."

1.4 PREVIOUS INVESTIGATIONS

During two previous investigations and a soil removal at AOC 12, soil samples were collected, and results are summarized below. Locations sampled in AOC 12 are shown on Figure 1-1, and analytical results for soil samples are provided in Appendix B.

1.4.1 Environmental Baseline Survey

Two soil samples (107-0001 and 107-0002) were collected during the EBS to investigate potential contamination associated with the railroad tracks (IT 2001a). These samples were analyzed for semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), TPH, and metals. Reported metals concentrations (iron, thallium, and vanadium) were above PSCs (residential PRGs) in both samples.

Two soil samples (108S-001M and 108S-001) were collected to evaluate the sanitary sewer. Soil sample 108S-001M was analyzed for volatile organic compounds (VOCs), TPH, and metals; soil sample 108S-001 was analyzed for SVOCs, pesticides, and PCBs. Reported analyte concentrations in both soil samples were below PSCs.

1.4.2 Lead Removal Action

Based on potential historical use of lead-based paint (LBP) and elevated lead concentrations in soil samples collected near the two former water towers, an investigation was conducted to determine the extent of lead contamination surrounding a number of structures, including the water towers (Structures 33 and 61) located in AOC 12 (TtEMI 2002b).

Soil samples were collected from a number of locations around each of the former water towers in AOC 12. Samples that were not removed during subsequent removal actions

(discussed in next paragraph) are shown on Figure 1-1 (17 locations near former Structure 61: SS-61-C00, -E25, -E50, -N25, -N50, -NE25, -NE50, -NW25, -NW50, -NW75, -S25, -SE50, -SW25, -SW50, -W25, -W50, and -W75; and 5 locations near former Structure 33: SS-33-E50, -NW50, -S50, -SE50, and -SW50).

An engineering evaluation/cost analysis (EE/CA) was completed in 2002 (TtEMI 2002b). The EE/CA presented a framework for evaluating the best remedial technologies to address LBP on the water towers in AOC 12 and lead-impacted soil near the structures. During the EE/CA, a site-specific human-health removal action objective was developed for lead using the California Environmental Protection Agency Department of Toxic Substances Control LeadSpread 7 model. The objective of 199 mg/kg was compared to the reported concentrations of lead. For the purposes of this RI, the removal action objective is considered the PSC for lead at AOC 12.

A lead non-time-critical removal action (NTCRA) was conducted by the Navy between November 2002 and July 2003 (Shaw 2003). During this NTCRA, soil was removed to 2 to 3 feet below ground surface (bgs) around former Structure 33 in the northern portion of AOC 12 and to 1 to 2 feet bgs around former Structure 61 in the southern portion of AOC 12. Three smaller areas were also excavated adjacent to but outside of AOC 12 at EBS Parcel 105. Confirmation soil borings advanced around former Structure 61 were labeled in the format "Grid ## Tower 61," and confirmation soil borings advanced around former Structure 33 were labeled in the format "Parcel 106 Grid ##." Soil samples were analyzed for metals; selected soil samples and a sample of the fill material were also analyzed for VOCs, SVOCs, TPH, pesticides, and PCBs.

The results of the confirmation sampling conducted as part of the NTCRA indicated that, with the exceptions listed below, most of the metals concentrations were below the removal action objective calculated for lead. Specifically, soil with lead concentrations above the objective was not removed from the following locations:

- four locations around the former Structure 61 excavation (SS-61-W75, -NW50, -N50, and -NE50)
- four locations around the former Structure 33 excavation (SS-33-S50, -SE50, -SW50, and -NW50)
- two locations around smaller excavations at EBS Parcel 105 (SS-105-A1 and -C1)

Additionally, arsenic was reported at concentrations above the PSC and background in soil samples from borings Parcel 106 Grid 28, 30, and 31 at concentrations from 20 to 38 mg/kg at 2 feet bgs. Iron, thallium, and vanadium were also reported at concentrations above PSCs in the 1- to 2-foot-bgs soil samples, 107-0001 and -0002, as follows.

- Iron was reported in primary and secondary samples at concentrations of 35,000 and 34,300 mg/kg, respectively, above the PRG (23,000 mg/kg) and background concentration (22,280 mg/kg).

- Thallium was reported at a concentration of 5.8 mg/kg in a duplicate sample, above the PRG (5.2 J mg/kg). However, it was reported at a concentration of 5.2 J mg/kg in the primary soil sample.
- Vanadium was reported at a concentration of 116 mg/kg, above the PRG (78 mg/kg) and background (47.34 mg/kg).

1.5 ADJACENT SITES

Corrective Action Area (CAA) B is located in the western area of AOC 12 and contained two underground fuel pipelines that have been removed. Analytical results from soil and groundwater samples collected during field screening and pipeline removal activities indicated several areas of localized TPH contamination; these areas were outside of AOC 12 (TtEMI 2000a). TPH totals were above the Alameda Point screening level (100 micrograms per liter for groundwater, 100 mg/kg for soil) at locations along the former fuel lines south of AOC 12. Investigations conducted at CAA B are summarized in greater detail in Section 1.4.5.6 of the main RI/FS Report.

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Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, and geology at AOC 12.

Topography at AOC 12 is relatively flat. The average ground elevation at AOC 12 is 12 feet above mean sea level (MSL), based on elevation data from the 14 borings (A12SB01 through A12SB14) advanced during the RI. Groundwater was encountered during drilling in the RI borings at approximately 4 to 5.5 feet bgs. The nearest surface water body to AOC 12 is Seaplane Lagoon, located approximately 1,500 feet to the south.

The monitoring well nearest to AOC 12 is M06-04, located approximately 475 feet southwest of AOC 12. A review of groundwater depths in this well over time (August 1991 through April 2004) shows depth to water from approximately 3 to 5 feet bgs. The deepest historical groundwater measured in this well is approximately 6 feet above MSL. This value, if subtracted from the ground elevation at AOC 12, would suggest groundwater in the vicinity of this AOC may have been as deep as 6 feet bgs.

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is southeasterly at AOC 12. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Based on tidal studies performed at other Alameda Point sites, tidal influence would not be expected at AOC 12, located approximately 1,500 feet from Seaplane Lagoon.

Soil encountered in the 14 borings included road base (consisting primarily of poorly graded gravel with silt and sand) to about 1.5 to 2 feet bgs. Underlying the road base is fill material to 5.5 to 8 feet bgs. The fill material consists predominantly of silty sand and poorly graded sand. Coarse-grained bay sediments consisting of poorly graded sand and poorly graded sand with silt were encountered from 6 to 8 feet bgs in four soil borings (A12SB01 through A12SB04). Fine-grained bay sediment (Young Bay Mud) consisting of lean clay was encountered at 4.5 to 8 feet bgs in five borings. The lean clay continued to the total boring depth (8 feet bgs) except in A12SB013, where poorly graded sand exists below the clay from 7.25 to 8 feet bgs.

Contacts for the fill material and the Bay Sediment Unit for AOC 12, including the contact with the Young Bay Mud, are shown on cross section H-H′ on Figure 2-9 of the main RI/FS Report. RI boring logs are presented in Appendix D.

As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust is likely to be located beneath AOC 12; however, it was not encountered in borings advanced to 8 feet bgs during the RI.

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Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for AOC 12. The RI was conducted in accordance with the sitewide data quality objectives (DQOs) for AOCs presented in Table 3-1 of the main RI/FS Report.

3.1 APPROACH

The sampling plan for AOC 12 addressed the remaining lead concentrations in soil outside the areas that were subject to the lead NTCRA. Soil from locations with lead at concentrations above the site-specific removal action objective of 199 mg/kg was not removed during the NTCRA due to hardscape cover in these areas (TtEMI 2002b), and the lateral extent was not defined. Therefore, additional samples were collected to assess the extent of lead outside the excavation area.

3.2 SCOPE

Soil samples were collected during the 2005 RI sampling from 14 borings around previous samples where lead concentrations were above the removal action objective. The Work Plan (BEI 2006) proposed soil sample collection at two depths from borings at this AOC; however, a third sampling depth was added to evaluate the potential downward migration of lead. Additionally, elevated photoionization detector (PID) readings were observed during drilling at borings A12SB02 and A12SB03; therefore, VOCs were added to the analytical suite for the deep soil samples collected at these two locations. Groundwater samples were deemed unnecessary.

Two sediment samples (3G and 6G-2) were also collected from two manholes and were analyzed for lead to assess whether lead-containing soil washed down one storm sewer during the removal action. These manholes are located along storm drains that drain AOC 12. Sample 6G-2 was collected along the southern edge of AOC 12, and sample 3G was collected farther down the line adjacent to the west edge of AOC 23.

Table 3-1 summarizes samples collected during the RI and previous investigations. Figure 1-1 shows sampling locations from all investigations.

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Section 4
NATURE AND EXTENT OF CONTAMINATION

This section discusses sampling and analysis from previous investigations and from the RI and describes the concentration ranges and spatial distributions of the analytes identified at AOC 12. Soil samples were collected from 107 locations during the EBS (IT 2001a), the lead removal action (TtEMI 2002b), the lead NTCRA (Shaw 2003), and the RI (Table 3-1 and Figure 1-1). Additionally, two sediment samples were collected from a storm sewer during the RI. One sediment sample (6G-2) was collected from a manhole located in the eastern portion of the AOC and the other (3G) was collected downflow from a manhole located west of AOC 23. Metals reported in soil at concentrations above background are discussed in detail in Section 4.3.3 of the main RI/FS Report. Metals discussion in this section focuses primarily on concentrations above PSCs.

Results of concentrations above PSCs are illustrated on Figure 4-1. Concentration ranges of soil results are presented in Table 4-1, and soil analytical results are summarized in Table 4-2. Sediment sampling results are summarized in Table 4-3. Complete analytical results for historical and RI samples collected within AOC 12 are included in Appendices B and G, respectively.

4.1 SOIL SAMPLING RESULTS

Analytical soil sampling results are discussed for each class of chemicals investigated at AOC 12 (Figure 4-1).

4.1.1 Volatile Organic Compounds

Five VOCs were reported in soil from the two borings with elevated PID readings. Methylene chloride, methyl tert-butyl ether, and 2-butanone were reported in soil from boring A12SB02. Carbon disulfide and vinyl chloride were reported in soil from boring A12SB03. VOC concentrations were below PSCs. VOCs were not reported above laboratory detection limits in fill soil.

4.1.2 Semivolatile Organic Compounds

Three non-PAH SVOCs were reported in soil from two borings. di-n-butyl phthalate was reported in a soil sample collected from boring 108S-001. Dimethyl phthalate, di-n-butyl phthalate, and bis(2-ethylhexyl)phthalate were reported in samples (107-0001 and -0002 [field duplicate]) collected from boring 107-0001. Reported concentrations of these phthalates were below PSCs. One PAH was reported in a sample collected from fill soil before placement in the area of AOC 12. The B(a)P equivalent concentration was below the PSC.

4.1.3 Total Petroleum Hydrocarbons

Motor oil–range TPH was reported in soil collected from boring 107-0001. Diesel- and motor oil–range TPH was also reported in soil sample 88-001. This sample was collected from fill soil before placement in the excavations at AOC 12. Reported TPH concentrations were below PSCs.

4.1.4 Pesticides and Polychlorinated Biphenyls

One pesticide, alpha-chlordane, was reported at a concentration of 1.1 J µg/kg in a soil sample from boring 108S-001. (The "J" qualifier indicates the value is estimated.) A PSC has not been established for this chemical.

4.1.5 Metals

Twenty-five metals were reported in soil from 107 borings. The following five metals were reported at concentrations above PSCs.

- Arsenic was reported at concentrations from 20 to 38 mg/kg in soil samples collected at 2 feet bgs from borings Parcel 106 Grid 28, Parcel 106 Grid 30, and Parcel 106 Grid 31. These concentrations were above the PSC (residential PRG of 0.062 mg/kg) and the background concentration of 9.14 mg/kg.
- Iron was reported at concentrations of 35,000 and 34,300 mg/kg in primary and duplicate samples, respectively, from boring 107-0001 at a depth of 1 to 2 feet bgs. These concentrations were above the PSC (residential PRG of 23,000 mg/kg).
- Lead was reported at concentrations ranging from 211 to 666 mg/kg in 12 samples from 10 borings (SS-33-NW50, SS-33-S50, SS-33-SE50, SS-33-SW50, SS-61-N50, SS-61-NE50, SS-61-NW50, SS-61-W75, SS-105-A1, and SS-105-C1) at depths from 0 to 1 foot bgs. These concentrations were above the PSC (removal action objective of 199 mg/kg) and the background concentration of 37.66 mg/kg. Results from the RI borings defined the extent of lead in soil. Lead was not reported at concentrations above the PSC in soil samples from the RI borings, which were advanced near locations of previous borings with PSC exceedances. Previous samples defined the vertical extent (approximately 1 foot bgs).
- Thallium was reported at a slightly elevated concentration of 5.8 J mg/kg in a duplicate sample collected at 1 to 2 feet bgs from boring 107-0002. However, the thallium concentration in the primary sample was equal to the PSC (residential PRG of 5.2 mg/kg).
- Vanadium was reported at concentrations of 113 and 116 mg/kg in samples 107-0001 and 107-0002, respectively, collected at 1 to 2 feet bgs. These concentrations are above the PSC (residential PRG of 78 mg/kg).

As discussed in Section 4.3 of the main RI/FS Report, iron and vanadium in soil are believed to be naturally occurring. The association of thallium in the same sample with other metals believed to be naturally occurring at AOC 12 (e.g., iron, manganese, and vanadium) suggests that thallium is also naturally occurring. It is not known whether the four arsenic concentrations reported above PSCs and background are naturally occurring or associated with previous activities at AOC 12, such as the historical use of pesticide along the railroad tracks. Two of the four arsenic concentrations were collected from borings near the railroad tracks; these concentrations were identified as outliers in Section 4.3.1.2 and are addressed in the FS portion of the main RI/FS Report.

4.2 SEDIMENT SAMPLING RESULTS

This section presents the results of the sediment samples collected and analyzed during the RI (Figure 1-1). Sediment sample 6G-2 is shown on Figure 1-1 and sediment sample 3G, which is located adjacent to AOC 23, is shown on Figure 1-1 of Attachment R. Sediment samples were not collected at AOC 12 during previous investigations.

Lead was reported at concentrations of 763 and 99.7 mg/kg in sediment samples 3G and 6G-2, respectively. The reported concentration of 763 mg/kg in sample 3G was above the lead removal action objective of 199 mg/kg. Both samples were collected from manholes along the same storm sewer pipeline that drains AOC 12. Sample 6G-2 was collected in the eastern portion of AOC 12, and sample 3G was collected at a downflow location, adjacent to the west side of AOC 23.

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Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for AOC 12. It discusses the conceptual site model, the physical and chemical changes that might occur to contaminants present at AOC 12, and the mechanisms that could potentially transfer the contaminants from the study area. The conceptual site model facilitates understanding of the present AOC conditions by integrating AOC-specific physical characteristics with the nature and extent of contaminants in the physical systems. Section 5.2 includes an evaluation of the mobility and persistence of compounds above PSCs not attributable to background and of risk drivers at AOC 12. Section 5.3 discusses potential migration pathways.

5.1 AOC 12 CONCEPTUAL SITE MODEL

AOC 12 is located in the central portion of Transfer Parcel EDC-5. Topography at AOC 12 is relatively flat and the entire study area is currently an open area covered with grass or paved. The surface water nearest to AOC 12 is Seaplane Lagoon, located approximately 1,500 feet to the south.

Based on a review of RI boring logs for AOC 12, the subsurface lithology at AOC 12 consists of generally coarse-grained sediment (with silt and clay lenses) to approximately 4.5 or 8 feet bgs, overlying Young Bay Mud (the total boring depth explored during the RI). Shallow groundwater of the first water-bearing zone beneath AOC 12 occurs in the fill material. Groundwater was encountered during drilling in the RI borings at approximately 4 to 5.5 feet bgs, flowing to the southeast. Groundwater may have been historically as deep as 6 feet bgs. Young Bay Mud was encountered in the RI borings at approximately 4.5 to 8 feet bgs at this AOC. The underlying Young Bay Mud is expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. Negligible tidal influence is expected at AOC 12 because of its distance from Seaplane Lagoon.

Lead was the primary contaminant reported at AOC 12. The source of the lead in soil is chipped and weathered LBP from the former water towers. Lead at concentrations above the PSC was reported in soil samples along perimeters of the NTCRA lead soil removal areas located beneath hardscape. The RI samples defined the extent of the residual lead-affected soil at concentrations above the PSC. The vertical extent is approximately 1 foot bgs, based on previous sampling. Lead in storm sewer sediment samples was also identified at one location above the soil lead removal objective.

Since the focus at the study area is lead, fate and transport of other metals are not discussed, although metals as a group do exhibit similarity of fate and transport processes, and the extent of lead contamination defined at AOC 12 also generally defines the detections of arsenic. Other metals (iron, thallium, and vanadium) are believed to be naturally occurring, as discussed in Section 4.3 of the main RI/FS Report. It is unknown whether the three arsenic concentrations above background are naturally occurring or associated with previous study area activities. Groundwater samples were not collected at AOC 12.

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in the environment tends to remain in place. The tendency toward immobility and persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Section 5 of the main RI/FS Report discusses the physical and chemical properties of contaminants, and their chemical class (e.g., metals) that affect their transport and persistence in the environment. Also discussed in Section 5 of the main RI/FS Report are mobility and persistence of metals. This section discusses the mobility and persistence of lead.

Lead is an element and cannot be destroyed; however, lead compounds may be transformed in the environment to other lead compounds. Lead is strongly adsorbed to soil, and therefore it is generally retained in the upper layers of soil and does not leach appreciably into the subsoil and groundwater (ATSDR 2005c). The solubility of lead in soil is dependent on pH, being sparingly soluble at pH 8 and becoming more soluble as the pH approaches 5. Between pH 5 and 3.3, large increases in lead solubility in soil are observed and appear to correlate with the adsorption and dissolution of iron and manganese oxides (ATSDR 2005c).

Lead may mobilize from AOC 12 if lead-bearing soil particles run off to surface waters during heavy rains. Lead may also mobilize from soil to the atmosphere by transport of smaller lead-containing soil particles entrained in the prevailing wind.

An estimate of the mobility of lead in the subsurface is shown on Table 5-1. Estimates indicate that all of the lead will be adsorbed to soil and that lead in groundwater will tend to travel 115 times slower than the groundwater flow.

5.3 CONTAMINANT MIGRATION

The potential migration pathways considered for this AOC include atmospheric transport (airborne fugitive dust), transport by surface water runoff, and leaching to groundwater. Groundwater transport was not considered because there is no reason to believe that activities at the study area have impacted groundwater. In addition, lead was not reported in soil samples at concentrations above the PSC deeper than approximately 1 foot bgs; therefore, lead is not in contact with groundwater. Leaching of lead from soil to groundwater is not likely at AOC 12 because of lead's high propensity for soil adsorption and a high retardation factor.

The most likely migration pathways for contaminants at AOC 12 are discussed below.

- **Particulate Migration**. Particulate dispersion is a potential mechanism for transporting lead adsorbed to dust particles. Under normal conditions at AOC 12, particulate migration is not a primary transport pathway, since most of the AOC is covered by grass and the remainder is paved or covered by buildings; however, if the surface cover is disturbed, particulate migration could become significant.

- **Surface Water Runoff**. Lead adsorbed to soil particles may be mobilized by heavy rains or irrigation water and transported with surface water runoff. Under normal conditions at AOC 12, surface water runoff is not a primary transport pathway, since the elevated lead concentrations are under pavement. However, sediment inside the storm sewer may travel with surface water runoff once it enters the drain.

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Section 6
LEAD EVALUATION

This section summarizes the human-health lead risk evaluation results for AOC 12. The human-health risk evaluation is focused on lead because the environmental concern at AOC 12 is LBP in soil. The health effects of lead are evaluated by comparing the exposure point concentration (EPC) to the site-specific PRGs for lead of 184 mg/kg (with homegrown produce) and 322 mg/kg (without homegrown produce). See Section J1.3.4.3 in Appendix J for more details and EPC calculations.

6.1 DATA EVALUATION

Two sets of data were compiled for AOC 12 to compare sitewide risk associated with lead in localized areas:

- sitewide: 226 samples – a set including the lead NTCRA area that was excavated in the past and the RI sampling locations under the hardscape cover
- localized areas: 36 samples – a set from areas under hardscape cover that had concentrations close to or above the NTCRA removal action objective of 199 mg/kg

6.2 EVALUATION OF LEAD EXPOSURE

The EPCs are 77.5 mg/kg for the sitewide data and 267 mg/kg for the area of higher impact. The sitewide concentrations are below the site-specific PRGs of 184 and 322 mg/kg with and without the homegrown produce pathway, respectively. The lead concentrations in the localized areas of higher concentrations are above the site-specific PRG with homegrown produce.

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Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at AOC 12, including the nature and extent of contamination and results of the lead risk evaluation. These results form the basis of responses to the DQO decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendations presented below.

7.1 SUMMARY

Soil samples were collected during the RI to assess the extent of lead remaining at AOC 12 outside the area that was subject to a lead NTCRA, conducted to address contamination resulting from LBP on two former water towers. Additionally, lead concentrations were evaluated in sediment samples collected at one location in a storm sewer line that drains AOC 12.

Results of RI samples defined the extent of lead in soil to below the PSC. Concentrations above the lead NTCRA removal action objective remain in the upper 1 foot bgs in a limited area beneath hardscape cover. Additionally, lead identified in one storm sewer sediment sample was above the soil lead removal action objective.

Four other metals (arsenic, iron, thallium, and vanadium) were reported above PSCs. Arsenic was reported above the PSC and background concentration in three samples (and one duplicate sample) collected near railroad tracks in the same areas as the higher lead concentrations. Iron and vanadium were reported above PSCs in primary and duplicate soil samples collected from a different boring. Iron and vanadium are not believed to be associated with Navy activities, based on the evaluation in Section 4.3 of the main RI/FS Report. It is not known whether the four arsenic concentrations reported above PSCs and background are naturally occurring or associated with previous activities at AOC 12, such as the historical use of pesticides along the railroad tracks. Two of the four arsenic concentrations were reported in samples collected from borings near the railroad tracks; these concentrations were identified as outliers in Section 4.3.1.2 and are addressed in the FS portion of the main RI/FS Report. Thallium was reported in the same sample at a concentration equal to the PRG of 5.2 mg/kg and slightly above (5.8 mg/kg) in a duplicate sample. The association of thallium in the same sample with other metals believed to naturally occurring at AOC 12 (e.g., iron, manganese, and vanadium) suggests that thallium is also naturally occurring.

Results of the lead evaluation show that the EPC for the entire AOC is below the comparison values of 184 and 322 mg/kg. However, the EPC calculated for the area with lead remaining in soil above the lead removal action objective of 199 mg/kg is 267 mg/kg, which is above the site-specific PRG considering ingestion of homegrown produce.

7.2 AOC 12 CONCLUSIONS AND RECOMMENDATIONS

The RI was conducted using the seven-step United States Environmental Protection Agency DQO process (U.S. EPA 2000); DQOs were developed for AOC 12 in the Work Plan (BEI 2006). The RI has addressed these DQOs, as summarized in Table 7-1.

The data collected during the RI were sufficient to characterize the nature and extent of contamination, perform a lead evaluation, and support decisions on the necessity for remedial actions at AOC 12.

An FS is recommended for the area with elevated lead concentrations remaining in shallow soil. This is based on study area conditions, fate and transport analysis, and results of the lead evaluation. The area with arsenic is located in the same general vicinity as the area with higher lead concentrations and should be addressed with the lead in the FS. Additionally, it is recommended that the FS include removal of sediments with elevated lead concentrations from the storm sewer.

No further action is recommended for groundwater beneath AOC 12 because contamination from LBP is generally not soluble or mobile and not expected to readily migrate to groundwater. Additionally, no further action is recommended for the one location with concentrations of iron, thallium, and vanadium. Reported iron concentrations at AOC 12 are within the range of iron concentrations for IR Site 35 that are believed to represent background, as discussed in Section 4.3 in the main RI/FS Report. Thallium was not consistently above the PRG in a primary and duplicate sample.

FIGURES

LEGEND

- AOC AND DATA GAP BOUNDARIES WITHIN IR SITE 35
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- NTCRA REMOVAL LOCATION
- CORRECTIVE ACTION AREA (CAA)
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- FUEL LINE (REMOVED)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

WATER TANK/RADIO ANTENNA SOIL SAMPLING LOCATION WITH STATION ID
- METALS ANALYSIS ONLY

EBS SOIL SAMPLING LOCATION WITH SAMPLE ID
- SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY
- VOCs, SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY

RI SOIL SAMPLING LOCATION WITH STATION ID
- METALS ANALYSIS ONLY
- VOCs AND METALS ANALYSES ONLY

RI SEDIMENT SAMPLING LOCATION WITH STATION ID
- METALS ANALYSIS ONLY

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
NTCRA – NON-TIME-CRITICAL REMOVAL ACTION
OWS – OIL/WATER SEPARATOR
PCBs – POLYCHLORINATED BIPHENYLS
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOCs – VOLATILE ORGANIC COMPOUNDS

RI/FS Report for IR Site 35

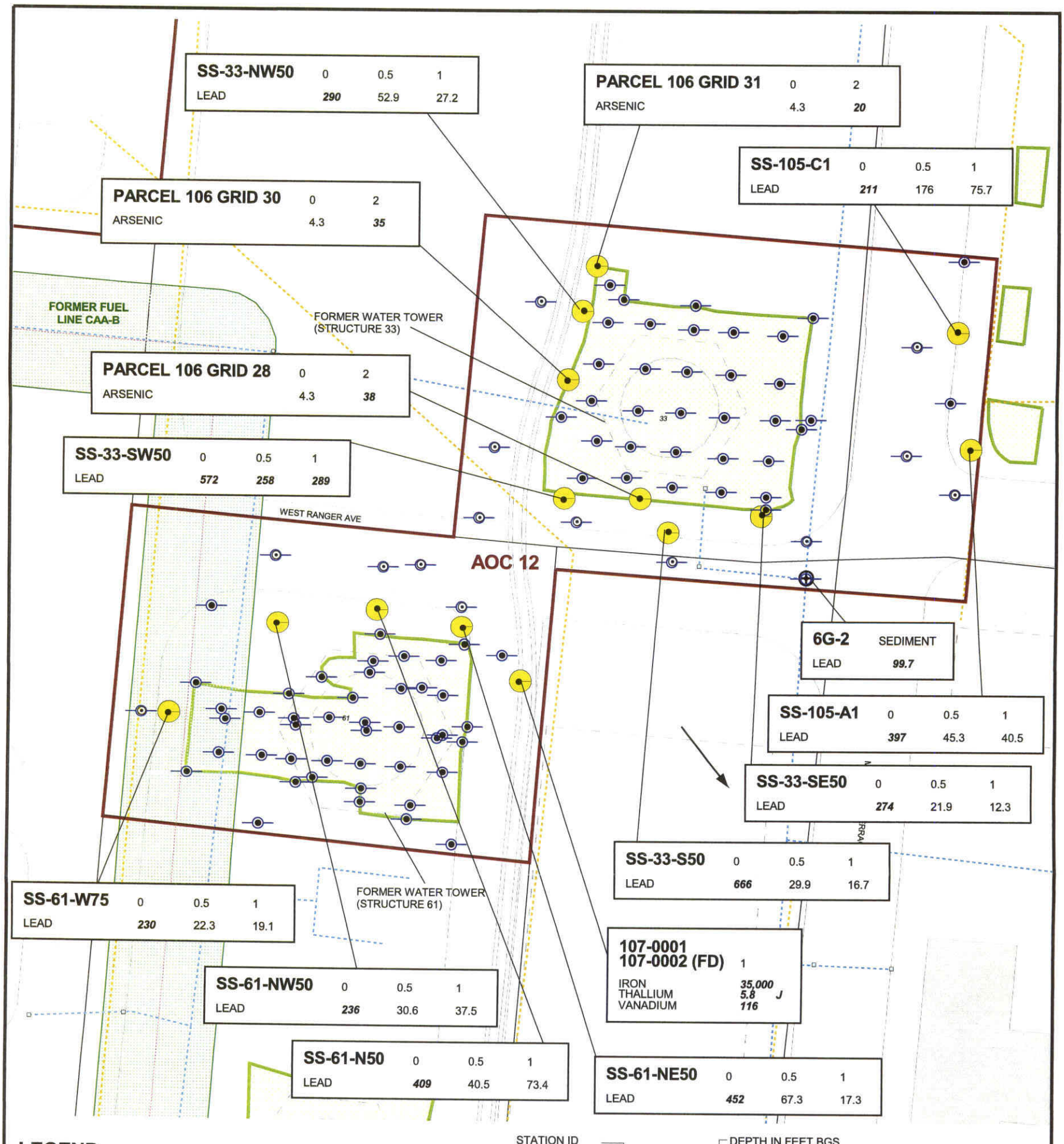
Figure 1-1

Study Area and Sampling Locations
Area of Concern 12

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 1/18/07
File No.: 077L14453
Job No.: 23818-077
Rev No.: D



NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
FD – FIELD DUPLICATE
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
mg/kg – MILLIGRAMS PER KILOGRAM
NTCRA – NON-TIME-CRITICAL REMOVAL ACTION
PRG – PRELIMINARY REMEDIATION GOAL
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

Analyte	PSC
IRON	23,000 mg/kg (Federal Residential PRG)
LEAD	199 mg/kg (Lead Removal Action Objective)
VANADIUM	78 mg/kg (Federal Residential PRG)
THALLIUM	5.2 mg/kg (Federal Residential PRG)
Analyte	**Other Comparsion Criteria**
ARSENIC	9.14 mg/kg (Background 95th Percentile)
LEAD	50-110 mg/kg (Sediment Screening and Testing Requirements for Wetland Creation and Upland Beneficial Reuse)

RI/FS Report for IR Site 35

Figure 4-1

Soil Sampling Results for Analytes Above PSC – Area of Concern 12

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/26/07
File No.: 077L14479
Job No.: 23818-077
Rev No.: D

TABLES

Table 3-1
Sample Analysis Summary, AOC 12

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE					
				VOCs	SVOCs	TPH	Pest/PCBs	Metals	Lead
Soil									
107-Z13-001	107-0001	EBS	1–2		X	X[a]	X	X	
107-Z13-001	107-0002 (FD)	EBS	1–2		X	X[a]	X	X	
108-SN-001	108S-001[b]	EBS	6.5–7		X		X		
108-SN-001	108S-001M[b]	EBS	6.5–7	X		X[a]		X	
Backfill Sample	88-001	Lead NTCRA 2003	0–1	X	X	X[a]	X	X	
GRID 1 TOWER 61	107-001(A-D)	Lead NTCRA 2003	1–1					X	
GRID 10 TOWER 61	107-010(A-D)	Lead NTCRA 2003	1–1					X	
GRID 10 TOWER 61	107-011(A-D) (FD)	Lead NTCRA 2003	1–1					X	
GRID 11 TOWER 61	107-012(A-D)	Lead NTCRA 2003	1–1					X	
GRID 12 TOWER 61	107-013(A-D)	Lead NTCRA 2003	1–1					X	
GRID 13 TOWER 61	107-079(A-D)	Lead NTCRA 2003	2–2					X	
GRID 14 TOWER 61	107-015(A-D)	Lead NTCRA 2003	1–1					X	
GRID 15 TOWER 61	107-016(A-D)	Lead NTCRA 2003	1–1					X	
GRID 16 TOWER 61	107-017(A-D)	Lead NTCRA 2003	1–1					X	
GRID 17 TOWER 61	107-018(A-D)	Lead NTCRA 2003	1–1					X	
GRID 18 TOWER 61	107-019(A-D)	Lead NTCRA 2003	1–1					X	
GRID 19 TOWER 61	107-020(A-D)	Lead NTCRA 2003	1–1					X	
GRID 2 TOWER 61	107-002(A-D)	Lead NTCRA 2003	1–1					X	
GRID 20 TOWER 61	107-021(A-D)	Lead NTCRA 2003	1–1					X	
GRID 20 TOWER 61	107-022(A-D) (FD)	Lead NTCRA 2003	1–1					X	
GRID 21 TOWER 61	107-023(A-D)	Lead NTCRA 2003	1–1					X	
GRID 22 TOWER 61	107-024(A-D)	Lead NTCRA 2003	1–1					X	
GRID 23 TOWER 61	107-025(A-D)	Lead NTCRA 2003	1–1					X	
GRID 24 TOWER 61	107-026(A-D)	Lead NTCRA 2003	1–1					X	
GRID 25 TOWER 61	107-027(A-D)	Lead NTCRA 2003	1–1					X	
GRID 26 TOWER 61	107-028(A-D)	Lead NTCRA 2003	1–1					X	
GRID 27 TOWER 61	107-029(A-D)	Lead NTCRA 2003	1–1					X	
GRID 28 TOWER 61	107-030(A-D)	Lead NTCRA 2003	1–1					X	
GRID 28 TOWER 61	107-031(A-D) (FD)	Lead NTCRA 2003	1–1					X	
GRID 29 TOWER 61	107-088(A-D)	Lead NTCRA 2003	1–1					X	

Table 3-1
Sample Analysis Summary, AOC 12

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE					
				VOCs	SVOCs	TPH	Pest/PCBs	Metals	Lead
GRID 3 TOWER 61	107-003(A-D)	Lead NTCRA 2003	1–1					X	
GRID 30 TOWER 61	107-080(A-D)	Lead NTCRA 2003	1–1					X	
GRID 4 TOWER 61	107-004(A-D)	Lead NTCRA 2003	1–1					X	
GRID 5 TOWER 61	107-005(A-D)	Lead NTCRA 2003	1–1					X	
GRID 6 TOWER 61	107-006(A-D)	Lead NTCRA 2003	1–1					X	
GRID 7 TOWER 61	107-007(A-D)	Lead NTCRA 2003	1–1					X	
GRID 8 TOWER 61	107-008(A-D)	Lead NTCRA 2003	1–1					X	
GRID 9 TOWER 61	107-078(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 1	106-001(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 10	106-010(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 10	106-011(A-D) (FD)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 11	106-012(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 12	106-013(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 13	106-014(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 14	106-015(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 15	106-040(A-D)	Lead NTCRA 2003	3–3					X	
PARCEL 106 GRID 16	106-041(A-D)	Lead NTCRA 2003	3–3					X	
PARCEL 106 GRID 17	106-018(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 18	106-019(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 19	106-020(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 2	106-002(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 20	106-021(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 20	106-022(A-D) (FD)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 21	106-023(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 22	106-024(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 23	106-025(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 24	106-026(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 25	106-027(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 26	106-028(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 27	106-029(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 28	106-030(A-D)	Lead NTCRA 2003	2–2					X	

Table 3-1
Sample Analysis Summary, AOC 12

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE					
				VOCs	SVOCs	TPH	Pest/PCBs	Metals	Lead
PARCEL 106 GRID 29	106-031(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 3	106-003(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 30	106-032(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 30	106-033(A-D) (FD)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 31	106-034(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 32	106-035(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 33	106-036(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 34	106-037(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 35	106-038(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 35	106-039(A-D) (FD)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 4	106-004(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 5	106-005(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 6	106-006(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 7	106-007(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 8	106-008(A-D)	Lead NTCRA 2003	2–2					X	
PARCEL 106 GRID 9	106-009(A-D)	Lead NTCRA 2003	2–2					X	
SS-105-A1	SS-105-A1-A	Lead NTCRA 2001	0–0.5						X
SS-105-A1	SS-105-A1-B	Lead NTCRA 2001	0.5–1						X
SS-105-A1	SS-105-A1-C	Lead NTCRA 2001	1–1.5						X
SS-105-B1	SS-105-B1-A	Lead NTCRA 2001	0–0.5						X
SS-105-B1	SS-105-B1-B	Lead NTCRA 2001	0.5–1						X
SS-105-B1	SS-105-B1-C	Lead NTCRA 2001	1–1.5						X
SS-105-C1	SS-105-C1-A	Lead NTCRA 2001	0–0.5						X
SS-105-C1	SS-105-C1-B	Lead NTCRA 2001	0.5–1						X
SS-105-C1	SS-105-C1-C	Lead NTCRA 2001	1–1.5						X
SS-105-D1	SS-105-D1-A	Lead NTCRA 2001	0–0.5						X
SS-105-D1	SS-105-D1-B	Lead NTCRA 2001	0.5–1						X
SS-105-D1	SS-105-D1-C	Lead NTCRA 2001	1–1.5						X
SS-33-E50	SS-33-E50-A	Lead NTCRA 2001	0–0.5						X
SS-33-E50	SS-33-E50-B	Lead NTCRA 2001	0.5–1						X
SS-33-E50	SS-33-E50-C	Lead NTCRA 2001	1–1.5						X

Table 3-1
Sample Analysis Summary, AOC 12

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE					
				VOCs	SVOCs	TPH	Pest/PCBs	Metals	Lead
SS-33-NW50	SS-33-NW50-A	Lead NTCRA 2001	0–0.5						X
SS-33-NW50	SS-33-NW50-B	Lead NTCRA 2001	0.5–1						X
SS-33-NW50	SS-33-NW50-C	Lead NTCRA 2001	1–1.5						X
SS-33-S50	SS-33-S50-A	Lead NTCRA 2001	0–0.5						X
SS-33-S50	SS-33-S50-B	Lead NTCRA 2001	0.5–1						X
SS-33-S50	SS-33-S50-C	Lead NTCRA 2001	1–1.5						X
SS-33-SE50	SS-33-SE50-A	Lead NTCRA 2001	0–0.5						X
SS-33-SE50	SS-33-SE50-B	Lead NTCRA 2001	0.5–1						X
SS-33-SE50	SS-33-SE50-C	Lead NTCRA 2001	1–1.5						X
SS-33-SW50	SS-33-SW50-A	Lead NTCRA 2001	0–0.5						X
SS-33-SW50	SS-33-SW50-B	Lead NTCRA 2001	0.5–1						X
SS-33-SW50	SS-33-SW50-C	Lead NTCRA 2001	1–1.5						X
SS-61-C00	SS-61-C00-C	Lead NTCRA 2001	1–1.5						X
SS-61-E25	SS-61-E25-C	Lead NTCRA 2001	1–1.5						X
SS-61-E50	SS-61-E50-C	Lead NTCRA 2001	1–1.5						X
SS-61-N25	SS-61-N25-C	Lead NTCRA 2001	1–1.5						X
SS-61-N25	SS-61-N25-C (QC) (FD)	Lead NTCRA 2001	1–1.5						X
SS-61-N50	SS-61-N50-A	Lead NTCRA 2001	0–0.5						X
SS-61-N50	SS-61-N50-B	Lead NTCRA 2001	0.5–1						X
SS-61-N50	SS-61-N50-C	Lead NTCRA 2001	1–1.5						X
SS-61-NE25	SS-61-NE25-C	Lead NTCRA 2001	1–1.5						X
SS-61-NE50	SS-61-NE50-A	Lead NTCRA 2001	0–0.5						X
SS-61-NE50	SS-61-NE50-B	Lead NTCRA 2001	0.5–1						X
SS-61-NE50	SS-61-NE50-C	Lead NTCRA 2001	1–1.5						X
SS-61-NW25	SS-61-NW25-A	Lead NTCRA 2001	0–0.5						X
SS-61-NW25	SS-61-NW25-B	Lead NTCRA 2001	0.5–1						X
SS-61-NW25	SS-61-NW25-C	Lead NTCRA 2001	1–1.5						X
SS-61-NW50	SS-61-NW50-A	Lead NTCRA 2001	0–0.5						X
SS-61-NW50	SS-61-NW50-A (QC) (FD)	Lead NTCRA 2001	0–0.5						X
SS-61-NW50	SS-61-NW50-B	Lead NTCRA 2001	0.5–1						X
SS-61-NW50	SS-61-NW50-B (QC) (FD)	Lead NTCRA 2001	0.5–1						X

Table 3-1
Sample Analysis Summary, AOC 12

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE					
				VOCs	SVOCs	TPH	Pest/PCBs	Metals	Lead
SS-61-NW50	SS-61-NW50-C	Lead NTCRA 2001	1–1.5						X
SS-61-NW50	SS-61-NW50-C (QC) (FD)	Lead NTCRA 2001	1–1.5						X
SS-61-NW75	SS-61-NW75-A	Lead NTCRA 2001	0–0.5						X
SS-61-NW75	SS-61-NW75-B	Lead NTCRA 2001	0.5–1						X
SS-61-NW75	SS-61-NW75-C	Lead NTCRA 2001	1–1.5						X
SS-61-S25	SS-61-S25-A	Lead NTCRA 2001	0–0.5						X
SS-61-S25	SS-61-S25-B	Lead NTCRA 2001	0.5–1						X
SS-61-S25	SS-61-S25-C	Lead NTCRA 2001	1–1.5						X
SS-61-SE50	SS-61-SE50-A	Lead NTCRA 2001	0–0.5						X
SS-61-SE50	SS-61-SE50-B	Lead NTCRA 2001	0.5–1						X
SS-61-SE50	SS-61-SE50-C	Lead NTCRA 2001	1–1.5						X
SS-61-SW25	SS-61-SW25-C	Lead NTCRA 2001	1–1.5						X
SS-61-SW50	SS-61-SW50-A	Lead NTCRA 2001	0–0.5						X
SS-61-SW50	SS-61-SW50-B	Lead NTCRA 2001	0.5–1						X
SS-61-SW50	SS-61-SW50-C	Lead NTCRA 2001	1–1.5						X
SS-61-W25	SS-61-W25-C	Lead NTCRA 2001	1–1.5						X
SS-61-W50	SS-61-W50-C	Lead NTCRA 2001	1–1.5						X
SS-61-W75	SS-61-W75-A	Lead NTCRA 2001	0–0.5						X
SS-61-W75	SS-61-W75-B	Lead NTCRA 2001	0.5–1						X
SS-61-W75	SS-61-W75-C	Lead NTCRA 2001	1–1.5						X
A12SB01	C077S191	Site 35 RI	1.5–2						X
A12SB01	C077S192	Site 35 RI	3.5–4						X
A12SB01	C077S219	Site 35 RI	7.5–8						X
A12SB02	C077S193	Site 35 RI	1–1.5						X
A12SB02	C077S194	Site 35 RI	2–2.5						X
A12SB02	C077S220	Site 35 RI	7–8	X					X
A12SB03	C077S195	Site 35 RI	1.5–2						X
A12SB03	C077S196	Site 35 RI	2.5–3						X
A12SB03	C077S221	Site 35 RI	7–8	X					X
A12SB04	C077S197	Site 35 RI	1–1.5						X
A12SB04	C077S198	Site 35 RI	3–3.5						X

Table 3-1
Sample Analysis Summary, AOC 12

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE					
				VOCs	SVOCs	TPH	Pest/PCBs	Metals	Lead
A12SB04	C077S222	Site 35 RI	7.5–8						X
A12SB05	C077S199	Site 35 RI	1.5–2						X
A12SB05	C077S200	Site 35 RI	3.5–4						X
A12SB05	C077S223	Site 35 RI	7.5–8						X
A12SB06	C077S201	Site 35 RI	1–1.5						X
A12SB06	C077S202	Site 35 RI	3.5–4						X
A12SB06	C077S224	Site 35 RI	7.5–8						X
A12SB07	C077S203	Site 35 RI	1–1.5						X
A12SB07	C077S204	Site 35 RI	3.5–4						X
A12SB07	C077S225	Site 35 RI	4–4.5						X
A12SB08	C077S205	Site 35 RI	0.5–1						X
A12SB08	C077S206	Site 35 RI	2.5–3						X
A12SB08	C077S226	Site 35 RI	4.5–5						X
A12SB09	C077S207	Site 35 RI	1.5–2						X
A12SB09	C077S208	Site 35 RI	3–4						X
A12SB09	C077S227	Site 35 RI	7.5–8						X
A12SB10	C077S209	Site 35 RI	1–1.5						X
A12SB10	C077S210	Site 35 RI	2.5–3						X
A12SB10	C077S228	Site 35 RI	4.5–5						X
A12SB11	C077S211	Site 35 RI	1–1.5						X
A12SB11	C077S212	Site 35 RI	3.5–4						X
A12SB11	C077S229	Site 35 RI	5–5.5						X
A12SB12	C077S213	Site 35 RI	1.5–2						X
A12SB12	C077S214	Site 35 RI	3.5–4						X
A12SB12	C077S230	Site 35 RI	6.5–7						X
A12SB13	C077S215	Site 35 RI	1.5–2						X
A12SB13	C077S216	Site 35 RI	3–3.5						X
A12SB13	C077S231	Site 35 RI	5.5–6						X
A12SB14	C077S217	Site 35 RI	1.5–2						X
A12SB14	C077S218	Site 35 RI	3.5–4						X
A12SB14	C077S232	Site 35 RI	7–8						X

Table 3-1
Sample Analysis Summary, AOC 12

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE					
				VOCs	SVOCs	TPH	Pest/PCBs	Metals	Lead
Sediment									
3G	C077CB02	Site 35 RI	8.92						X
6G-2	C077CB03	Site 35 RI	7						X

References:
EBS (IT 2001a)
Lead NTCRA 2003 (Shaw 2003)
Lead NTCRA 2001 (TtEMI 2002b)

Notes:
[a] analyzed for gasoline-, diesel-, and motor oil–range TPH
[b] sample 108S-001 was analyzed by a fixed-base laboratory; sample 108S-001M was analyzed by a mobile or screening laboratory; samples 108S-001/-001M were collected from the same location

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
EBS – environmental baseline survey
FD – field duplicate
NTCRA – non-time-critical removal action
PCB – polychlorinated biphenyl
Pest – pesticides
QC – quality control
RI – remedial investigation
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

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Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 12

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
Volatile Organic Compounds (µg/kg)										
2-butanone	4	1	25	0	1.9	1.9	1.9	22,000,000	—[c]	—
carbon disulfide	3	1	33	0	2.2	2.2	2.2	360,000	—	—
methyl tert-butyl ether	3	1	33	0	1.2	1.2	1.2	17,000	—	—
methylene chloride	4	1	25	0	53	53	53	9,100	—	—
vinyl chloride	4	1	25	0	8.3	8.3	8.3	79	—	—
Fuels (µg/kg)										
diesel	4	1	96	0	1,700	1,700	1,700	—	100,000	—
motor oil	3	3	100	0	14,000	15,000	40,000	—	500,000	—
Semivolatile Organic Compounds (µg/kg)										
bis(2-ethylhexyl)phthalate	4	2	50	0	26	26	26	35,000	—	—
chrysene	1	1	100	0	6	6	6	3,800[d]	—	—
di-n-butyl phthalate	4	3	75	0	94	140	210	6,100,000	—	—
dimethyl phthalate	4	1	25	0	23	23	23	100,000,000	—	—
Pesticides and Polychlorinated Biphenyls (µg/kg)										—
alpha-chlordane	3	1	33	0	1.1	1.1	1.1	1,600	—	—
Metals (mg/kg)									—	—
aluminum	2	2	100	0	30,600	31,000	32,000	76,000	—	13,960
antimony	74	1	0.72	0	0.63	0.63	0.63	31	—	9.50
arsenic	75	73	99	4	1.4	4.4	38	0.062[d]	—	9.14
barium	75	75	100	0	29	70	150	5,400	—	93.68
beryllium	76	2	47	0	0.14	0.5	0.51	150	—	1.27
cadmium	76	75	99	0	0.17	1.8	7.8	37	—	1.72
calcium	2	2	100	No PSC	67,500	71,000	75,200	—	—	16,800
chromium	76	75	99	0	24	34	96.7	210	—	54.84
chromium, hexavalent	72	9	13	0	0.03	0.058	0.1	30	—	—
cobalt	75	75	100	0	3.8	6.9	27.6	900	—	14.30
copper	76	75	99	0	5.1	12	60.7	3,100	—	39.14
iron	2	2	100	2	34,300	35,000	35,000	23,000	—	22,280
lead	184	77	97	10	1.1	52	666	199[e]	—	37.66
magnesium	2	2	100	No PSC	33,200	36,000	39,600	—	—	7,304
manganese	2	2	100	0	940	940	943	1,800	—	383.0
mercury	76	23	16	0	0.0064	0.15	1.8	23	—	0.52
molybdenum	75	1	0.72	0	0.16	0.16	0.16	390	—	5.20
nickel	76	76	100	0	25	41	140	1,600	—	55.72
potassium	2	2	100	No PSC	534	540	551	—	—	1,232
selenium	75	14	10	0	0.14	0.26	0.78	390	—	1.78
silver	76	11	7.9	0	0.075	0.24	0.54	390	—	2.22
sodium	2	2	100	No PSC	660	750	837	—	—	1,230
thallium	75	2	1.4	2	5.2	5.5	5.8	5.2	—	0.50
vanadium	75	75	100	2	14	24	116	78	—	47.34
zinc	76	76	100	0	19	49	270	23,000	—	67.48

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

[e] non-time-critical removal action objective

Acronyms/Abbreviations:

AOC – area of concern
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
TPH – total petroleum hydrocarbons

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	107-Z13-001 / 107-0001 / 1 - 2 / 31-May-95	107-Z13-001 / 107-0002 (FD) / 1 - 2 / 31-May-95	108-SN-001 / 108S-001 / 6.5 - 7 / 28-Feb-95	108-SN-001 / 108S-001M / 6.5 - 7 / 28-Feb-95	A12SB01 / C077S191 / 1.5 - 2 / 12-Dec-05	A12SB01 / C077S192 / 3.5 - 4 / 12-Dec-05	A12SB01 / C077S219 / 7.5 - 8 / 12-Dec-05	A12SB02 / C077S193 / 1 - 1.5 / 09-Dec-05	A12SB02 / C077S194 / 2 - 2.5 / 09-Dec-05	A12SB02 / C077S220 / 7 - 8 / 09-Dec-05	A12SB03 / C077S195 / 1.5 - 2 / 09-Dec-05	A12SB03 / C077S196 / 2.5 - 3 / 09-Dec-05
VOCs																		
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	10 U	NA	NA	NA	NA	NA	1.9 J	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	100 U	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.2 J	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	10 U	NA	NA	NA	NA	NA	53 J	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	10 U	NA	NA	NA	NA	NA	10 U	NA	NA
Petroleum Hydrocarbons																		
diesel	—	—	100,000	—	—	µg/kg	12000 U	12000 U	NA	50000 U	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	40000 J	40000 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																		
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	26 J	26 J	410 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	110 J	210 J	94 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	23 J	390 U	410 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs																		
alpha-chlordane	1,600	—	—	—	—	µg/kg	2 U	NA	1.1 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																		
aluminum	76,000	—	—	13,960	—	mg/kg	*30600 J*[d]	*32000 J*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	NA	NA	NA	*25 U*[e]	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	—	mg/kg	**1.2 UJ**[e,f]	**0.97 UJ**[e]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	37.3	42.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	0.17 U	0.17 U	NA	*25 U*[e]	NA	NA	NA	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	—	mg/kg	0.26	0.17	NA	*25 U*[e]	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	—	mg/kg	*67500*	*75200*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	*92.3 J*	*96.7 J*	NA	25 U	NA	NA	NA	NA	NA	NA	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	*27*	*27.6*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	*60.7*	*56*	NA	25 U	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	—	mg/kg	***35000***	***34300***	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	0.73 UJ	0.38 UJ	NA	25 U	0.7 UJ	2.4 J	4.6 J	1.7	1.4	1.3	3.9	1.3
magnesium	—	—	—	7,304	—	mg/kg	*33200*	*39600*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	*940*	*943*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	0.2	0.18 U	NA	***25 U***[e]	NA	NA	NA	NA	NA	NA	NA	NA
molybdenum	390	—	—	5.20	—	mg/kg	2.4 U	2.4 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	*100 J*	*110 J*	NA	38	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	—	mg/kg	551 J	534	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	0.78 J	0.66 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	—	mg/kg	0.22 U	0.22 U	NA	*25 U*[e]	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	—	mg/kg	660	837	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	*5.2 J*	***5.8 J***	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	***113***	***116***	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	54.9	46.1	NA	25	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID / Sample / [a]Depth Interval / Collection Date / Result Units	A12SB03 C077S221 7 - 8 09-Dec-05	A12SB04 C077S197 1 - 1.5 09-Dec-05	A12SB04 C077S198 3 - 3.5 09-Dec-05	A12SB04 C077S222 7.5 - 8 09-Dec-05	A12SB05 C077S199 1.5 - 2 09-Dec-05	A12SB05 C077S200 3.5 - 4 09-Dec-05	A12SB05 C077S223 7.5 - 8 09-Dec-05	A12SB06 C077S201 1 - 1.5 09-Dec-05	A12SB06 C077S202 3.5 - 4 09-Dec-05	A12SB06 C077S224 7.5 - 8 09-Dec-05	A12SB07 C077S203 1 - 1.5 12-Dec-05	A12SB07 C077S204 3.5 - 4 12-Dec-05	A12SB07 C077S225 4 - 4.5 12-Dec-05
VOCs																			
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	100 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	2.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	50 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	60 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	8.3 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons																			
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																			
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs																			
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																			
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	1.6	1.1	1.3	3.5	1.6	8.1	3.6	35.5	2.2	1.4	7.7 J	2.4 J	2.4 J
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
molybdenum	390	—	—	5.20	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	A12SB08 C077S205 0.5 - 1 12-Dec-05	A12SB08 C077S206 2.5 - 3 12-Dec-05	A12SB08 C077S226 4.5 - 5 12-Dec-05	A12SB09 C077S207 1.5 - 2 12-Dec-05	A12SB09 C077S208 3 - 4 12-Dec-05	A12SB09 C077S227 7.5 - 8 12-Dec-05	A12SB10 C077S209 1 - 1.5 12-Dec-05	A12SB10 C077S210 2.5 - 3 12-Dec-05	A12SB10 C077S228 4.5 - 5 12-Dec-05	A12SB11 C077S211 1 - 1.5 12-Dec-05	A12SB11 C077S212 3.5 - 4 12-Dec-05	A12SB11 C077S229 5 - 5.5 12-Dec-05	A12SB12 C077S213 1.5 - 2 12-Dec-05
VOCs																			
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons																			
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																			
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs																			
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																			
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	7.3 J	2 J	3 J	21.1	4.9	5.8	5.3	4.8	11	0.5 U	1.7	1.5	20.2 J
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
molybdenum	390	—	—	5.20	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Lead Removal Action Objective	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	A12SB12 C077S214 3.5 - 4 12-Dec-05	A12SB12 C077S230 6.5 - 7 12-Dec-05	A12SB13 C077S215 1.5 - 2 12-Dec-05	A12SB13 C077S216 3 - 3.5 12-Dec-05	A12SB13 C077S231 5.5 - 6 12-Dec-05	A12SB14 C077S217 1.5 - 2 12-Dec-05	A12SB14 C077S218 3.5 - 4 12-Dec-05	A12SB14 C077S232 7 - 8 12-Dec-05	GRID 1 TOWER 61 107-001(A-D) 1 - 1 16-Jan-03	Backfill Sample 88-001 0 - 1 27-Jan-03	GRID 10 TOWER 61 107-010(A-D) 1 - 1 16-Jan-03
VOCs																	
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	9.9 U	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.9 U	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.9 U	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	20 U	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	9.9 U	NA
Petroleum Hydrocarbons																	
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	1700 J	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	14000	NA
SVOCs																	
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	370 U	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	6	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	370 U	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	370 U	NA
Pesticides/PCBs																	
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.9 U	NA
Metals																	
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	2.6 UJ	3.3 UJ	3 UJ
arsenic	0.39	0.062	—	9.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	**2.1**	**4.3**	**2.8**
barium	5,400	—	—	93.68	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	41	89	64
beryllium	150	—	—	1.27	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	0.19 U	0.51	0.33 U
cadmium	37	—	—	1.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	0.97	*2*	1.3
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	26	30	33
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	0.05 U	NA	0.05 U
cobalt	900	—	—	14.30	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	4.3	7.9	5.7
copper	3,100	—	—	39.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	7.4	8.8	11
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	1.8 J	2.9 J	1.6 UJ	1.6 UJ	25.8 J	6.1 J	2.6 J	22.5 J	22	11	*40*
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	0.031 U	0.053 U	0.035 U
molybdenum	390	—	—	5.20	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	0.88 U	1.1 U	1 UJ
nickel	1,600	—	—	55.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	30	43	41
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	0.22 UJ	0.27 UJ	0.25 UJ
silver	390	—	—	2.22	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	0.22 U	0.27 U	0.25 U
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	0.22 U	0.27 U	0.25 U
vanadium	78	—	—	47.34	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	17	24	20
zinc	23,000	—	—	67.48	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	25	35	52

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	GRID 10 TOWER 61 107-011(A-D) (FD) 1 - 1 16-Jan-03	GRID 11 TOWER 61 107-012(A-D) 1 - 1 20-Jan-03	GRID 12 TOWER 61 107-013(A-D) 1 - 1 20-Jan-03	GRID 13 TOWER 61 107-079(A-D) 2 - 2 12-Feb-03	GRID 14 TOWER 61 107-015(A-D) 1 - 1 20-Jan-03	GRID 15 TOWER 61 107-016(A-D) 1 - 1 20-Jan-03	GRID 16 TOWER 61 107-017(A-D) 1 - 1 20-Jan-03
VOCs													
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
SVOCs													
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs													
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	3.1 UJ	2.5 UJ	2.8 UJ	3.3 UJ	2.6 UJ	2.7 UJ	2.5 UJ
arsenic	0.39	0.062	—	9.14	—	mg/kg	**1.5**	**1.7**	**1.7**	**1.7**	**1.8**	**2.1**	**1.6**
barium	5,400	—	—	93.68	—	mg/kg	45	39	39	38	52	61	44
beryllium	150	—	—	1.27	—	mg/kg	0.35 U	0.12 U	0.13 U	0.17 U	0.13 U	0.15 U	0.13 U
cadmium	37	—	—	1.72	—	mg/kg	1.2	1.2	1.5	*7.8*	1.4	1.4	1.3
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	28	33	30	27	28	31	28
chromium, hexavalent	30	—	—	—	—	mg/kg	0.05 U	0.05 U	0.05 U	0.06 U	0.05 U	0.05 U	0.05 U
cobalt	900	—	—	14.30	—	mg/kg	4.2	4.2	4.4	4.4	4.1	4.7	4.1
copper	3,100	—	—	39.14	—	mg/kg	13	6.4	6.6	7.2	7.3	9.3	5.9
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	*73*	*48*	22	*38*	*68*	*80*	12
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	0.046 U	0.0064 J	0.013 J	0.28 U	0.023	0.041	0.017 J
molybdenum	390	—	—	5.20	—	mg/kg	1 UJ	0.82 U	0.92 U	1.1 U	0.87 U	0.9 U	0.84 U
nickel	1,600	—	—	55.72	—	mg/kg	30	30	29	29	27	32	26
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	0.26 UJ	0.21 UJ	0.14 J	0.27 UJ	0.22 UJ	0.22 UJ	0.21 UJ
silver	390	—	—	2.22	—	mg/kg	0.13 J	0.21 U	0.23 U	0.27 U	0.22 U	0.22 U	0.21 U
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	0.26 U	0.21 U	0.23 U	0.27 U	0.22 U	0.22 U	0.21 U
vanadium	78	—	—	47.34	—	mg/kg	17	16	17	16	17	18	17
zinc	23,000	—	—	67.48	—	mg/kg	57	41 J	30 J	24 J	49 J	*170 J*	30 J

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	GRID 17 TOWER 61 107-018(A-D) 1 - 1 20-Jan-03	GRID 18 TOWER 61 107-019(A-D) 1 - 1 20-Jan-03	GRID 19 TOWER 61 107-020(A-D) 1 - 1 20-Jan-03	GRID 2 TOWER 61 107-002(A-D) 1 - 1 16-Jan-03	GRID 20 TOWER 61 107-021(A-D) 1 - 1 20-Jan-03	GRID 20 TOWER 61 107-022(A-D) (FD) 1 - 1 20-Jan-03	GRID 21 TOWER 61 107-023(A-D) 1 - 1 20-Jan-03
VOCs													
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
SVOCs													
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs													
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	3 UJ	2.4 UJ	3 UJ	3.1 UJ	2.9 UJ	3 UJ	3.1 UJ
arsenic	0.39	0.062	—	9.14	—	mg/kg	**1.6**	**2.5**	**1.8**	**2.1**	**1.8**	**1.7**	**3.3**
barium	5,400	—	—	93.68	—	mg/kg	33	36	45	39	41	41	88
beryllium	150	—	—	1.27	—	mg/kg	0.14 U	0.13 U	0.14 U	0.23 U	0.15 U	0.15 U	0.2 U
cadmium	37	—	—	1.72	—	mg/kg	1.1	1.1	*2*	0.86	1.7	*2*	*2.5*
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	28	29	31	26	28	30	*61*
chromium, hexavalent	30	—	—	—	—	mg/kg	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
cobalt	900	—	—	14.30	—	mg/kg	4	4.1	4.7	4.1	4.3	4.1	7.5
copper	3,100	—	—	39.14	—	mg/kg	5.4	5.4	8.3	6.1	7	6.3	26
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	8	5.7	15	*63*	13	9.9	*110*
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	0.05	0.023	0.031	0.047 U	0.025	0.014 J	0.18
molybdenum	390	—	—	5.20	—	mg/kg	1 U	0.78 U	1 U	1 UJ	0.96 U	1 U	1 U
nickel	1,600	—	—	55.72	—	mg/kg	26	27	31	28	29	27	*57*
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	0.25 UJ	0.2 UJ	0.24 J	0.26 UJ	0.24 UJ	0.15 J	0.26 UJ
silver	390	—	—	2.22	—	mg/kg	0.25 U	0.2 U	0.25 U	0.26 U	0.24 U	0.25 U	0.27
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	0.25 U	0.2 U	0.25 U	0.26 U	0.24 U	0.25 U	0.26 U
vanadium	78	—	—	47.34	—	mg/kg	17	18	18	17	18	18	27
zinc	23,000	—	—	67.48	—	mg/kg	19 J	20 J	25 J	33	23 J	21 J	*100 J*

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	GRID 22 TOWER 61 107-024(A-D) 1 - 1 20-Jan-03	GRID 23 TOWER 61 107-025(A-D) 1 - 1 20-Jan-03	GRID 24 TOWER 61 107-026(A-D) 1 - 1 20-Jan-03	GRID 25 TOWER 61 107-027(A-D) 1 - 1 20-Jan-03	GRID 26 TOWER 61 107-028(A-D) 1 - 1 20-Jan-03	GRID 27 TOWER 61 107-029(A-D) 1 - 1 20-Jan-03	GRID 28 TOWER 61 107-030(A-D) 1 - 1 20-Jan-03
VOCs													
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
SVOCs													
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs													
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	3.3 UJ	3 UJ	3 UJ	3.4 UJ	3.1 UJ	2.9 UJ	3.3 UJ
arsenic	0.39	0.062	—	9.14	—	mg/kg	**3.1**	**5.5**	**4.2**	**4.6**	**2.8**	**5.1**	**5.8**
barium	5,400	—	—	93.68	—	mg/kg	61	*150*	*98*	*100*	72	*110*	*130*
beryllium	150	—	—	1.27	—	mg/kg	0.21 U	0.29 U	0.26 U	0.31 U	0.23 U	0.3 U	0.32 U
cadmium	37	—	—	1.72	—	mg/kg	*2.8*	*3.4*	*2.5*	*2.7*	*2.1*	*3.1*	*3.4*
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	*58*	*70*	49	52	35	*58*	*96*
chromium, hexavalent	30	—	—	—	—	mg/kg	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
cobalt	900	—	—	14.30	—	mg/kg	8.3	10	8.3	8.8	6.6	9.2	11
copper	3,100	—	—	39.14	—	mg/kg	38	29	19	23	22	26	28
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	*140*	*150*	*83*	*62*	32	*110*	*150*
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	0.099	0.18	0.05	0.077	0.15	0.13	0.086
molybdenum	390	—	—	5.20	—	mg/kg	1.1 U	1 U	1 U	1.1 U	1 U	0.97 U	1.1 U
nickel	1,600	—	—	55.72	—	mg/kg	39	*79*	*60*	*64*	40	*69*	*87*
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	0.27 UJ	0.25 UJ	0.25 UJ	0.29 UJ	0.25 UJ	0.24 UJ	0.28 UJ
silver	390	—	—	2.22	—	mg/kg	0.11 J	0.48	0.16 J	0.28 J	0.54	0.3	0.18 J
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	0.27 U	0.25 U	0.25 U	0.29 U	0.25 U	0.24 U	0.28 U
vanadium	78	—	—	47.34	—	mg/kg	40	29	23	26	27	27	29
zinc	23,000	—	—	67.48	—	mg/kg	*99 J*	*130 J*	*120 J*	*72 J*	*73 J*	*120 J*	*160 J*

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	GRID 28 TOWER 61 107-031(A-D) (FD) 1 - 1 20-Jan-03	GRID 29 TOWER 61 107-088(A-D) 1 - 1 13-Aug-03	GRID 3 TOWER 61 107-003(A-D) 1 - 1 16-Jan-03	GRID 30 TOWER 61 107-080(A-D) 1 - 1 12-Feb-03	GRID 4 TOWER 61 107-004(A-D) 1 - 1 16-Jan-03	GRID 5 TOWER 61 107-005(A-D) 1 - 1 16-Jan-03	GRID 6 TOWER 61 107-006(A-D) 1 - 1 16-Jan-03
VOCs													
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
SVOCs													
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs													
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	3.4 UJ	0.63 J	3 UJ	3.2 UJ	3.1 UJ	2.9 UJ	3 UJ
arsenic	0.39	0.062	—	9.14	—	mg/kg	**5.6**	**3.1**	**1.6**	**1.9**	**2.5**	**1.7**	**2.1**
barium	5,400	—	—	93.68	—	mg/kg	*120*	74	33	40	48	32	80
beryllium	150	—	—	1.27	—	mg/kg	0.31 U	0.14	0.23 U	0.18 U	0.28 U	0.24 U	0.28 U
cadmium	37	—	—	1.72	—	mg/kg	*3.2*	*2.5*	0.91	1.2	1.1	0.85	1.3
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	*81*	37	27	29	32	27	29
chromium, hexavalent	30	—	—	—	—	mg/kg	0.06 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.06 U
cobalt	900	—	—	14.30	—	mg/kg	9.8	6.4	4	4.2	5.5	4.3	4.3
copper	3,100	—	—	39.14	—	mg/kg	26	15	6.1	8.2	10	6.8	11
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	*150*	*42*	14	*69*	26	7.6	***170***
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	0.1	0.07	0.021 U	0.031 U	0.021 U	0.021 U	0.024 U
molybdenum	390	—	—	5.20	—	mg/kg	1.1 U	0.16 J	0.99 UJ	1.1 U	1 UJ	0.98 UJ	1 UJ
nickel	1,600	—	—	55.72	—	mg/kg	*80*	46	27	26	38	29	29
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	0.28 UJ	0.15 J	0.25 UJ	0.16 J	0.26 UJ	0.25 UJ	0.25 UJ
silver	390	—	—	2.22	—	mg/kg	0.28 U	0.075 J	0.25 U	0.27 U	0.26 U	0.25 U	0.25 U
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	0.28 U	0.21 U	0.25 U	0.27 U	0.26 U	0.25 U	0.25 U
vanadium	78	—	—	47.34	—	mg/kg	27	20	17	17	20	18	18
zinc	23,000	—	—	67.48	—	mg/kg	*160 J*	*200*	50	39 J	42	19	*130*

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	GRID 7 TOWER 61 107-007(A-D) 1 - 1 16-Jan-03	GRID 8 TOWER 61 107-008(A-D) 1 - 1 16-Jan-03	GRID 9 TOWER 61 107-078(A-D) 2 - 2 12-Feb-03	PARCEL 106 GRID 1 106-001(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 10 106-010(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 10 106-011(A-D) (FD) 2 - 2 16-Jan-03	PARCEL 106 GRID 11 106-012(A-D) 2 - 2 16-Jan-03
VOCs													
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
SVOCs													
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs													
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	2.9 UJ	3.1 UJ	2.8 UJ	3.2 UJ	3.2 UJ	3.2 UJ	3.2 UJ
arsenic	0.39	0.062	—	9.14	—	mg/kg	**1.9**	**1.9**	**1.4**	**3.6**	**3.2**	**2.8**	**5.5**
barium	5,400	—	—	93.68	—	mg/kg	71	54	32	60	58	65	35
beryllium	150	—	—	1.27	—	mg/kg	0.25 U	0.27 U	0.14 U	0.2 U	0.19 U	0.19 U	0.14 U
cadmium	37	—	—	1.72	—	mg/kg	0.86	0.92	0.96	*2*	1.6	1.5	1.1
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	27	28	25	35	42	34	27
chromium, hexavalent	30	—	—	—	—	mg/kg	0.05 U	0.05 U	0.05 U	0.06 UJ	0.05 UJ	0.03 J	0.05 U
cobalt	900	—	—	14.30	—	mg/kg	4	4.4	4.1	5.7	5.5	4.8	4.1
copper	3,100	—	—	39.14	—	mg/kg	6.4	7.1	6.1	13	19	17	7.3
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	***160***	32	14	*40 J*	*57 J*	*54 J*	36 J
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	0.021 U	0.02 U	0.028 U	0.092 U	0.094 U	0.13 U	0.023 U
molybdenum	390	—	—	5.20	—	mg/kg	0.97 UJ	1 UJ	0.92 U	1.1 U	1.1 U	1.1 U	1.1 U
nickel	1,600	—	—	55.72	—	mg/kg	29	31	25	36	36	31	26
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	0.24 UJ	0.25 UJ	0.23 UJ	0.24 J	0.17 J	0.27 UJ	0.26 UJ
silver	390	—	—	2.22	—	mg/kg	0.24 U	0.25 U	0.23 U	0.26 U	0.27 U	0.27 U	0.26 U
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	0.24 U	0.25 U	0.23 U	0.26 U	0.27 U	0.27 U	0.26 U
vanadium	78	—	—	47.34	—	mg/kg	18	17	15	24	23	21	17
zinc	23,000	—	—	67.48	—	mg/kg	*80*	33	20 J	49 J	67 J	48 J	23 J

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	PARCEL 106 GRID 12 106-013(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 13 106-014(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 14 106-015(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 15 106-040(A-D) 3 - 3 12-Feb-03	PARCEL 106 GRID 16 106-041(A-D) 3 - 3 12-Feb-03	PARCEL 106 GRID 17 106-018(A-D) 2 - 2 16-Jan-03
VOCs												
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons												
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA
SVOCs												
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Pesticides/PCBs												
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Metals												
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	2.7 UJ	2.9 UJ	3.2 UJ	2.5 UJ	2.6 UJ	2.9 UJ
arsenic	0.39	0.062	—	9.14	—	mg/kg	**3.2**	**2.2**	**2.3**	**3.2**	**1.8**	**3.6**
barium	5,400	—	—	93.68	—	mg/kg	60	44	52	57	40	47
beryllium	150	—	—	1.27	—	mg/kg	0.16 U	0.16 U	0.19 U	0.18 U	0.14 U	0.17 U
cadmium	37	—	—	1.72	—	mg/kg	1.6	1.4	1.5	1.6	1.2	1.4
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	44	33	35	33	27	35
chromium, hexavalent	30	—	—	—	—	mg/kg	0.06	0.05 U	0.05 U	0.05 U	0.05 U	0.1
cobalt	900	—	—	14.30	—	mg/kg	5.5	4.6	5.4	5.3	4.5	5.1
copper	3,100	—	—	39.14	—	mg/kg	11	8.4	10	13	6.8	9.9
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	*130 J*	*62 J*	32 J	*45*	*44*	*88 J*
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	0.06 U	0.05 U	0.06 U	0.07 U	0.022 U	0.046 U
molybdenum	390	—	—	5.20	—	mg/kg	0.9 U	0.95 U	1.1 U	0.82 U	0.86 U	0.96 U
nickel	1,600	—	—	55.72	—	mg/kg	37	29	34	33	28	53
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	0.23 UJ	0.24 UJ	0.27 UJ	0.2 UJ	0.21 UJ	0.15 J
silver	390	—	—	2.22	—	mg/kg	0.23 U	0.24 U	0.27 U	0.2 U	0.21 U	0.24 U
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	0.23 U	0.24 U	0.27 U	0.2 U	0.21 U	0.24 U
vanadium	78	—	—	47.34	—	mg/kg	22	20	22	21	19	19
zinc	23,000	—	—	67.48	—	mg/kg	*84 J*	48 J	33 J	41 J	27 J	*75 J*

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	PARCEL 106 GRID 18 106-019(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 19 106-020(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 2 106-002(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 20 106-021(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 20 106-022(A-D) (FD) 2 - 2 16-Jan-03	PARCEL 106 GRID 21 106-023(A-D) 2 - 2 16-Jan-03
VOCs												
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons												
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA
SVOCs												
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Pesticides/PCBs												
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Metals												
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	2.9 UJ	3.2 UJ	3.1 UJ	3.2 UJ	2.7 UJ	2.9 UJ
arsenic	0.39	0.062	—	9.14	—	mg/kg	**2.3**	**3.7**	**2.7**	**2.1**	**3.2**	**1.7**
barium	5,400	—	—	93.68	—	mg/kg	49	61	38	42	39	33
beryllium	150	—	—	1.27	—	mg/kg	0.18 U	0.24 U	0.15 U	0.2 U	0.14 U	0.13 U
cadmium	37	—	—	1.72	—	mg/kg	1.3	*1.8*	1.5	1.2	1.3	0.91
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	32	52	34	28	45	27
chromium, hexavalent	30	—	—	—	—	mg/kg	0.05 J	0.06 U	0.05 UJ	0.06 U	0.05 U	0.05 U
cobalt	900	—	—	14.30	—	mg/kg	4.9	7.6	4.9	4.6	4.6	3.8
copper	3,100	—	—	39.14	—	mg/kg	8.1	12	8.6	9.1	8.4	5.1
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	*49 J*	*44 J*	28 J	26	*39*	*62*
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	0.025 U	*1.8*	0.058 U	0.05 U	0.058 U	0.022 U
molybdenum	390	—	—	5.20	—	mg/kg	0.98 U	1.1 U	1 U	1.1 U	0.89 U	0.97 U
nickel	1,600	—	—	55.72	—	mg/kg	33	*140*	30	27	31	26
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	0.25 UJ	0.27 UJ	0.26 UJ	0.26 UJ	0.2 J	0.24 UJ
silver	390	—	—	2.22	—	mg/kg	0.25 U	0.27 U	0.25 U	0.26 U	0.22 U	0.24 U
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	0.25 U	0.27 U	0.25 U	0.26 U	0.22 U	0.24 U
vanadium	78	—	—	47.34	—	mg/kg	19	27	22	17	16	14
zinc	23,000	—	—	67.48	—	mg/kg	39 J	*150 J*	36 J	29	*210*	21

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	PARCEL 106 GRID 22 106-024(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 23 106-025(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 24 106-026(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 25 106-027(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 26 106-028(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 27 106-029(A-D) 2 - 2 16-Jan-03
VOCs												
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons												
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA
SVOCs												
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Pesticides/PCBs												
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Metals												
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	3.1 UJ	2.8 UJ	3.1 UJ	3.1 UJ	3 UJ	3.2 UJ
arsenic	0.39	0.062	—	9.14	—	mg/kg	**5.7**	**4**	**3.2**	**4.8**	**1.6**	**2.4**
barium	5,400	—	—	93.68	—	mg/kg	46	50	47	36	30	55
beryllium	150	—	—	1.27	—	mg/kg	0.15 U	0.17 U	0.17 U	0.15 U	0.16 U	0.2 U
cadmium	37	—	—	1.72	—	mg/kg	1.2	1.3	1.4	1	1	1.3
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	29	31	49	27	25	26
chromium, hexavalent	30	—	—	—	—	mg/kg	0.05 U	0.07	0.06 U	0.05 U	0.05 U	0.05 U
cobalt	900	—	—	14.30	—	mg/kg	4.2	5	5.4	4.1	4.2	4.2
copper	3,100	—	—	39.14	—	mg/kg	8.2	9.5	11	7.1	6.4	11
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	*63*	*51*	*76*	9.8	22	23
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	0.022 U	0.032 U	0.053 U	0.025 U	0.02 U	0.044 U
molybdenum	390	—	—	5.20	—	mg/kg	1 U	0.92 U	1 U	1 U	0.99 U	1.1 U
nickel	1,600	—	—	55.72	—	mg/kg	29	34	37	27	28	29
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	0.26 UJ	0.23 UJ	0.26 UJ	0.25 UJ	0.25 UJ	0.27 UJ
silver	390	—	—	2.22	—	mg/kg	0.26 U	0.23 U	0.26 U	0.25 U	0.25 U	0.27 U
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	0.26 U	0.23 U	0.26 U	0.25 U	0.25 U	0.27 U
vanadium	78	—	—	47.34	—	mg/kg	16	18	19	16	15	17
zinc	23,000	—	—	67.48	—	mg/kg	46	39	*270*	21	30	38

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	PARCEL 106 GRID 28 106-030(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 29 106-031(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 3 106-003(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 30 106-032(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 30 106-033(A-D) (FD) 2 - 2 16-Jan-03	PARCEL 106 GRID 31 106-034(A-D) 2 - 2 16-Jan-03
VOCs												
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons												
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA
SVOCs												
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Pesticides/PCBs												
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Metals												
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	3.2 UJ	3.2 UJ	3.3 UJ	2.8 UJ	2.8 UJ	3.1 UJ
arsenic	0.39	0.062	—	9.14	—	mg/kg	***38***	***5.4***	***2.5***	***24***	***35***	***20***
barium	5,400	—	—	93.68	—	mg/kg	67	32	39	50	59	52
beryllium	150	—	—	1.27	—	mg/kg	0.31 U	0.22 U	0.15 U	0.25 U	0.26 U	0.29 U
cadmium	37	—	—	1.72	—	mg/kg	1.7	1.7	1.7	1.3	1.5	*1.9*
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	31	34	32	24	26	25
chromium, hexavalent	30	—	—	—	—	mg/kg	0.05 U	0.05 U	0.05 UJ	0.05 U	0.05 U	0.05 U
cobalt	900	—	—	14.30	—	mg/kg	7.3	6.9	5.8	5.4	5.6	8.2
copper	3,100	—	—	39.14	—	mg/kg	28	30	10	18	25	*42*
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	26	***110***	32 J	11	33	17
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	0.049 U	0.045 U	0.077 U	0.02 U	0.021 U	0.021 U
molybdenum	390	—	—	5.20	—	mg/kg	1.1 U	1.1 U	1.1 U	0.95 U	0.93 U	1 U
nickel	1,600	—	—	55.72	—	mg/kg	41	28	30	34	33	33
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	0.26 UJ	0.26 UJ	0.24 J	0.24 UJ	0.23 UJ	0.25 UJ
silver	390	—	—	2.22	—	mg/kg	0.26 U	0.26 U	0.29 U	0.24 U	0.23 U	0.25 U
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	0.26 U	0.26 U	0.27 U	0.24 U	0.23 U	0.25 U
vanadium	78	—	—	47.34	—	mg/kg	23	28	25	18	18	35
zinc	23,000	—	—	67.48	—	mg/kg	46	*79*	28 J	29	41	36

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	PARCEL 106 GRID 32 106-035(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 33 106-036(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 34 106-037(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 35 106-038(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 35 106-039(A-D) (FD) 2 - 2 16-Jan-03	PARCEL 106 GRID 4 106-004(A-D) 2 - 2 16-Jan-03
VOCs												
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons												
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA
SVOCs												
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Pesticides/PCBs												
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Metals												
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	2.9 UJ	3 UJ	3.2 UJ	3.3 UJ	3.2 UJ	3.2 UJ
arsenic	0.39	0.062	—	9.14	—	mg/kg	**5.9**	**4.3**	**3**	**2.3**	**2.1**	**2.6**
barium	5,400	—	—	93.68	—	mg/kg	48	37	62	44	41	51
beryllium	150	—	—	1.27	—	mg/kg	0.22 U	0.25 U	0.3 U	0.22 U	0.22 U	0.21 U
cadmium	37	—	—	1.72	—	mg/kg	1.2	1.4	1.5	1.2	1.2	1.7
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	31	33	26	29	29	31
chromium, hexavalent	30	—	—	—	—	mg/kg	0.06	0.06 U	0.06 U	0.05 U	0.05 U	0.06 UJ
cobalt	900	—	—	14.30	—	mg/kg	4.3	5.4	4.8	4.9	4.8	5.2
copper	3,100	—	—	39.14	—	mg/kg	10	12	9.7	10	10	10
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	*110*	23	14	18	12	11 J
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	0.044 U	0.046 U	0.024 U	0.1	0.021 U	0.068 U
molybdenum	390	—	—	5.20	—	mg/kg	0.96 U	1 U	1.1 U	1.1 UJ	1.1 U	1.1 U
nickel	1,600	—	—	55.72	—	mg/kg	28	36	30	32	32	33
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	0.24 UJ	0.25 UJ	0.26 UJ	0.27 UJ	0.26 UJ	0.22 J
silver	390	—	—	2.22	—	mg/kg	0.24 U	0.11 J	0.26 U	0.27 U	0.26 U	0.26 U
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	0.24 U	0.25 U	0.26 U	0.27 U	0.26 U	0.26 U
vanadium	78	—	—	47.34	—	mg/kg	17	23	18	21	19	22
zinc	23,000	—	—	67.48	—	mg/kg	52	37	32	32	31	29 J

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	PARCEL 106 GRID 5 106-005(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 6 106-006(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 7 106-007(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 8 106-008(A-D) 2 - 2 16-Jan-03	PARCEL 106 GRID 9 106-009(A-D) 2 - 2 16-Jan-03	SS-105-A1 SS-105-A1-A 0 - 0.5 31-Jul-01	SS-105-A1 SS-105-A1-B 0.5 - 1 31-Jul-01	SS-105-A1 SS-105-A1-C 1 - 1.5 31-Jul-01
VOCs														
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons														
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs														
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs														
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Metals														
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	3.2 UJ	2.9 UJ	3 UJ	2.9 UJ	3 UJ	NA	NA	NA
arsenic	0.39	0.062	—	9.14	—	mg/kg	**1.8**	**7.5**	**2.8**	**2.8**	**2.7**	NA	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	29	53	46	47	60	NA	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	0.14 U	0.17 U	0.14 U	0.15 U	0.22 U	NA	NA	NA
cadmium	37	—	—	1.72	—	mg/kg	*2.2*	1.7	1.6	1.5	*2*	NA	NA	NA
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	25	33	47	29	37	NA	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	0.05 UJ	0.05 J	0.05 J	0.05 J	0.06 UJ	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	7.9	5.5	5.1	5	5.6	NA	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	27	12	9.7	8.1	16	NA	NA	NA
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	15 J	*62 J*	*150 J*	37 J	***160 J***	*397*[g]	*45.3*	*40.5*
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	0.048 U	0.05 U	0.037 U	0.035 U	0.097 U	NA	NA	NA
molybdenum	390	—	—	5.20	—	mg/kg	1.1 U	0.98 U	1 U	0.97 U	1 U	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	29	32	35	29	34	NA	NA	NA
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	0.27 UJ	0.24 UJ	0.18 J	0.24 UJ	0.25 UJ	NA	NA	NA
silver	390	—	—	2.22	—	mg/kg	0.27 U	0.24 U	0.25 U	0.24 U	0.25 U	NA	NA	NA
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	0.27 U	0.24 U	0.25 U	0.24 U	0.25 U	NA	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	35	23	22	22	26	NA	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	33 J	47 J	*90 J*	36 J	*120 J*	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Lead Removal Action Objective	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	SS-105-B1 SS-105-B1-A 0 - 0.5 31-Jul-01	SS-105-B1 SS-105-B1-B 0.5 - 1 31-Jul-01	SS-105-B1 SS-105-B1-C 1 - 1.5 31-Jul-01	SS-105-C1 SS-105-C1-A 0 - 0.5 31-Jul-01	SS-105-C1 SS-105-C1-B 0.5 - 1 31-Jul-01	SS-105-C1 SS-105-C1-C 1 - 1.5 31-Jul-01	SS-105-D1 SS-105-D1-A 0 - 0.5 31-Jul-01	SS-105-D1 SS-105-D1-B 0.5 - 1 31-Jul-01	SS-105-D1 SS-105-D1-C 1 - 1.5 31-Jul-01	SS-33-E50 SS-33-E50-A 0 - 0.5 31-Jul-01	SS-33-E50 SS-33-E50-B 0.5 - 1 31-Jul-01
VOCs																	
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons																	
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																	
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs																	
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																	
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	*137*	*127*	10.5	***211*** [g]	***176***	*75.7*	*112*	28.2	33	*132*	*72.9*
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
molybdenum	390	—	—	5.20	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Lead Removal Action Objective	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	SS-33-E50 SS-33-E50-C 1 - 1.5 31-Jul-01	SS-33-NW50 SS-33-NW50-A 0 - 0.5 31-Jul-01	SS-33-NW50 SS-33-NW50-B 0.5 - 1 31-Jul-01	SS-33-NW50 SS-33-NW50-C 1 - 1.5 31-Jul-01	SS-33-S50 SS-33-S50-A 0 - 0.5 31-Jul-01	SS-33-S50 SS-33-S50-B 0.5 - 1 31-Jul-01	SS-33-S50 SS-33-S50-C 1 - 1.5 31-Jul-01	SS-33-SE50 SS-33-SE50-A 0 - 0.5 31-Jul-01	SS-33-SE50 SS-33-SE50-B 0.5 - 1 31-Jul-01	SS-33-SE50 SS-33-SE50-C 1 - 1.5 31-Jul-01
VOCs																
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons																
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs																
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	20.1	***290*** [g]	*52.9*	27.2	***666*** [g]	29.9	16.7	***274*** [g]	21.9	12.3
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
molybdenum	390	—	—	5.20	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	SS-33-SW50 SS-33-SW50-A 0 - 0.5 31-Jul-01	SS-33-SW50 SS-33-SW50-B 0.5 - 1 31-Jul-01	SS-33-SW50 SS-33-SW50-C 1 - 1.5 31-Jul-01	SS-61-C00 SS-61-C00-C 1 - 1.5 01-Aug-01	SS-61-E25 SS-61-E25-C 1 - 1.5 01-Aug-01	SS-61-E50 SS-61-E50-C 1 - 1.5 01-Aug-01	SS-61-N25 SS-61-N25-C 1 - 1.5 01-Aug-01	SS-61-N25 SS-61-N25-C (QC) (FD) 1 - 1.5 01-Aug-01	SS-61-N50 SS-61-N50-A 0 - 0.5 01-Aug-01	SS-61-N50 SS-61-N50-B 0.5 - 1 01-Aug-01
VOCs																
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons																
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs																
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	***572*** [g]	***258*** [g]	***289*** [g]	***162***	***173***	*95.5*	33.3	*64*	***409*** [g]	*40.5*
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
molybdenum	390	—	—	5.20	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID / Sample / [a]Depth Interval / Collection Date / Result Units	SS-61-N50 / SS-61-N50-C / 1 - 1.5 / 01-Aug-01	SS-61-NE25 / SS-61-NE25-C / 1 - 1.5 / 01-Aug-01	SS-61-NE50 / SS-61-NE50-A / 0 - 0.5 / 01-Aug-01	SS-61-NE50 / SS-61-NE50-B / 0.5 - 1 / 01-Aug-01	SS-61-NE50 / SS-61-NE50-C / 1 - 1.5 / 01-Aug-01	SS-61-NW25 / SS-61-NW25-A / 0 - 0.5 / 01-Aug-01	SS-61-NW25 / SS-61-NW25-B / 0.5 - 1 / 01-Aug-01	SS-61-NW25 / SS-61-NW25-C / 1 - 1.5 / 01-Aug-01	SS-61-NW50 / SS-61-NW50-A / 0 - 0.5 / 01-Aug-01
VOCs															
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons															
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs															
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs															
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals															
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	*73.4*	*52.8*	***452*** [g]	*67.3*	17.3	*86.9*	28	*74.7*	*74*
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
molybdenum	390	—	—	5.20	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Result Units	Station ID: SS-61-NW50 / Sample: SS-61-NW50-A (QC) (FD) / [a]Depth Interval: 0 - 0.5 / Collection Date: 01-Aug-01	SS-61-NW50 / SS-61-NW50-B / 0.5 - 1 / 01-Aug-01	SS-61-NW50 / SS-61-NW50-B (QC) (FD) / 0.5 - 1 / 01-Aug-01	SS-61-NW50 / SS-61-NW50-C / 1 - 1.5 / 01-Aug-01	SS-61-NW50 / SS-61-NW50-C (QC) (FD) / 1 - 1.5 / 01-Aug-01	SS-61-NW75 / SS-61-NW75-A / 0 - 0.5 / 01-Aug-01	SS-61-NW75 / SS-61-NW75-B / 0.5 - 1 / 01-Aug-01
VOCs													
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons													
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
SVOCs													
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs													
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Metals													
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	***236***[g]	25.1	30.6	37.5	29.9	*41*	*58.7*
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
molybdenum	390	—	—	5.20	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Lead Removal Action Objective	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	SS-61-NW75 SS-61-NW75-C 1 - 1.5 01-Aug-01	SS-61-S25 SS-61-S25-A 0 - 0.5 01-Aug-01	SS-61-S25 SS-61-S25-B 0.5 - 1 01-Aug-01	SS-61-S25 SS-61-S25-C 1 - 1.5 01-Aug-01	SS-61-SE50 SS-61-SE50-A 0 - 0.5 01-Aug-01	SS-61-SE50 SS-61-SE50-B 0.5 - 1 01-Aug-01	SS-61-SE50 SS-61-SE50-C 1 - 1.5 01-Aug-01	SS-61-SW25 SS-61-SW25-C 1 - 1.5 01-Aug-01	SS-61-SW50 SS-61-SW50-A 0 - 0.5 01-Aug-01	SS-61-SW50 SS-61-SW50-B 0.5 - 1 01-Aug-01
VOCs																
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons																
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs																
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	34.9	*135*	*95.4*	7	*86.9*	24.6	22.6	*133*	*68.9*	6.5
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
molybdenum	390	—	—	5.20	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 12

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Lead Removal Action Objective	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	SS-61-SW50 SS-61-SW50-C 1 - 1.5 01-Aug-01	SS-61-W25 SS-61-W25-C 1 - 1.5 01-Aug-01	SS-61-W50 SS-61-W50-C 1 - 1.5 01-Aug-01	SS-61-W75 SS-61-W75-A 0 - 0.5 01-Aug-01	SS-61-W75 SS-61-W75-B 0.5 - 1 01-Aug-01	SS-61-W75 SS-61-W75-C 1 - 1.5 01-Aug-01
VOCs												
2-butanone	22,000,000	—[b]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons												
diesel	—	—	100,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	—	µg/kg	NA	NA	NA	NA	NA	NA
SVOCs												
bis(2-ethylhexyl)phthalate	35,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
dimethyl phthalate	100,000,000	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Pesticides/PCBs												
alpha-chlordane	1,600	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Metals												
aluminum	76,000	—	—	13,960	—	mg/kg	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	—	mg/kg	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	—	mg/kg	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	—	mg/kg	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	—	mg/kg	NA	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	—	mg/kg	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	—	mg/kg	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	—	mg/kg	NA	NA	NA	NA	NA	NA
chromium, hexavalent	30	—	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	—	mg/kg	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	—	mg/kg	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	—	mg/kg	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	199	mg/kg	24.8	***176***	19.3	***230***[g]	22.3	19.1
magnesium	—	—	—	7,304	—	mg/kg	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	—	mg/kg	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	—	mg/kg	NA	NA	NA	NA	NA	NA
molybdenum	390	—	—	5.20	—	mg/kg	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	—	mg/kg	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	—	mg/kg	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	—	mg/kg	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	—	mg/kg	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	—	mg/kg	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	—	mg/kg	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	—	mg/kg	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	—	mg/kg	NA	NA	NA	NA	NA	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[d] italicized font indicates result above background
[e] detection limit is above criteria
[f] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL
[g] result is above the lead removal action objective

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
QC – quality control
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 4-3
Sediment Sampling Results, AOC 12

Analyte	NTCRA Removal Action Objective	Result Units	Station ID: 3G Sample: C077CB02 [a] Depth Interval: 8.92 Collection Date: 19-Dec-05	Station ID: 6G-2 Sample: C077CB03 Depth Interval: 7 Collection Date: 20-Dec-05
Metals				
lead	199	mg/kg	**763** [b]	99.7

Notes:

[a] feet below ground surface; sample collected in a storm drain

[b] bolded font indicates result above criterion

Acronyms/Abbreviations:

AOC – area of concern

mg/kg – milligrams per kilogram

NTCRA – non-time-critical removal action

Table 5-1
Estimate of Mobility [a] for Lead, AOC 12

Analyte	K_d [b] (L/kg)	Percent Sorbed [a]	R [c] (unitless)
lead	11,000	100	115

Notes:
[a] mobility is proportional to percent sorbed; percent sorbed = $K_d / (1 + K_d) \times 100$ (Karickhoff et al. 1979)
[b] RAIS 2006
[c] retardation factor calculated as described in Section 5 of the main RI/FS Report

Acronyms/Abbreviations:
AOC – area of concern
K_d – soil water partition coefficient
L/kg – liters per kilogram
R – retardation factor

Table 7-1
Summary of RI Results and Recommendations, AOC 12

DQO Problem	DQO Decision Questions	Nature and Extent	Risk Assessment	Recommendation
Soil from locations with lead at concentrations exceeding the site-specific removal action objective of 199 mg/kg was not removed during the lead NTCRA excavations due to hardscape cover in these areas.	Have the nature and extent of contamination been defined?	Yes. RI samples collected outside of the previous lead soil NTCRA area defined the extent of lead to below the PSC.	NA. Previous investigations defined the vertical extent of lead. Lead was identified in one of two sediment samples from the storm sewer; the concentration was above the lead removal action objective.	Conduct an FS for the area where elevated lead concentrations remain in soil in the upper 1.5 feet bgs. This FS would also include arsenic exceedances that were reported in the same vicinity as remaining higher lead concentrations. No further action is recommended for iron, thallium, and vanadium; these exceedances are not widespread and are believed to represent naturally occurring concentrations.
	Are contaminants present in soil or groundwater at concentrations that pose unacceptable risk to potential future residents?	NA	The lead risk evaluation showed that the EPC for the entire AOC is below the comparison values calculated using LeadSpread 7 (184 and 322 mg/kg). However, the EPC calculated for the area with remaining lead in soil above the removal action objective is 267 mg/kg, which is above the site-specific PRG for homegrown produce. Based on the fate and transport properties and the shallow occurrence of remaining elevated concentrations of lead in soil, groundwater would not be expected to be impacted by lead from previous activities at AOC 12.	See above.
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?	NA	NA. Pathway not evaluated for AOC 12 located approximately 1,500 feet from the nearest surface water body. However, lead was reported in a storm sewer sediment sample above the lead removal action objective; this storm sewer ultimately discharges to Seaplane Lagoon.	Include a description in the FS for how the extent of lead in sediment in the storm sewer that drains from AOC 12 to Seaplane Lagoon will be defined, and how the sediment will be cleaned out.

Table 7-1 (continued)

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
DQO – data quality objective
EPC – exposure point concentration
FS – feasibility study
LeadSpread – Lead Risk Assessment Spreadsheet
mg/kg – milligrams per kilogram
NA – not applicable
NTCRA – non-time-critical removal action
PRG – preliminary remediation goal
PSC – preliminary screening criterion
RI – remedial investigation

ATTACHMENT M

AREA OF CONCERN 13

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT ATTACHMENT M, AREA OF CONCERN 13 IR SITE 35, TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

Prepared by:

BECHTEL ENVIRONMENTAL, INC.
1230 Columbia Street, Suite 400
San Diego, California 92101-8502

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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 13. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station Alameda), Alameda, California (Figure 1-1).

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

AOC 13 is an approximately 1.1-acre area in the central portion of Transfer Parcel Economic Development Conveyance (EDC)-5 near the intersection of Stardust Place and Rainbow Court (Figure 1-1), and is along the western edge of Environmental Baseline Survey (EBS) Parcel 103. The portion of EBS Parcel 103 included in AOC 13 contains most of family housing Building FH-813, all of FH-816, the southwestern tip of FH-814, and landscaped open space used for vehicle parking and recreation. FH-816 is currently occupied by tenants; FH-813 and FH-814 are unoccupied (Photographs 1-1 and 1-2).

1.2 HISTORICAL USE

EBS Parcel 103 was historically used for barracks, public works storage, insect vector control, ready-issue storage, applied instruction, a combat training pool, and as a play field. It is not known which of these uses were within the boundaries of AOC 13. Buildings housing these historical activities were demolished in 1960, and the family housing units currently present on the study area were constructed after that time.

1.3 PRELIMINARY SCREENING CRITERIA AND BACKGROUND METALS

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this AOC are the following.

- Soil
  - residential preliminary remediation goals (PRGs) (U.S. EPA 2004b), except polynuclear aromatic hydrocarbons (PAHs) classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (µg/kg) (DON 2001a)
  - environmental screening levels for total petroleum hydrocarbons (TPH) – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium

Photograph 1-1
AOC 13, Building FH-813 (Abandoned), View to Northeast

Photograph 1-2
AOC 13, Building FH-816 (Currently Used as Housing)

being assessed. Chemicals of potential concern (COPCs) identified in the health risk evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs.

In addition to the above-listed PSCs, soil samples analyzed for arsenic at AOC 13 were compared to the following Alameda Point background concentration to help discriminate between site-related and naturally occurring arsenic:

- Alameda Point background soil concentrations (95th percentile of the pink data set; Appendix E of the final RI Report of Operable Unit 1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)

For ease of discussion in this report, the Alameda Point 95th percentile concentrations for metals in soil (pink background data set) and groundwater are referred to as "background."

1.4 PREVIOUS INVESTIGATIONS

During the two previous investigations, soil samples were collected at AOC 13, and results are summarized below. Locations sampled in AOC 13 are shown on Figure 1-1, and analytical results are provided in Appendix B.

1.4.1 Environmental Baseline Survey

Ten soil samples (103-0001, -0002, -0019, -0020, -0021, -0022, -0023, -0024, -0031, and -0032) were collected during the EBS for analysis for pesticides and polychlorinated biphenyls (PCBs); one additional sample (103S-002M) was collected to investigate the sanitary sewer and was analyzed for gasoline-range and diesel-range TPH (IT 2001a). TPH and PCBs were not reported above laboratory detection limits. Reported concentrations of pesticides (4,4'-dichlorodiphenyltrichloroethane [DDT], 4,4'-dichloro-diphenyldichloroethane [DDD], and/or dieldrin) were above PSCs in three samples (103-0002, -0020, and -0023). Pesticides concentrations above PSCs were reported in samples collected in the upper 1 foot below ground surface (bgs) in two of the samples (103-0002 and 103-0023), and from 7 to 7.5 feet bgs in the third sample (103-0020).

1.4.2 Polynuclear Aromatic Hydrocarbon Removal Action

The identification of PAHs at concentrations above the PSC in soil samples collected from Transfer Parcel EDC-5 during the 2002 PAH study prompted the Navy to conduct a time-critical removal action (TCRA) in portions of the West Housing Area (FWEC 2004). PAH TCRA soil removals in the West Housing Area were conducted using a grid pattern at several EBS parcels, including an area of AOC 13. Soil was removed to a depth of approximately 2 feet bgs from certain grid areas to address elevated concentrations of PAHs. The excavations were backfilled using clean fill material. Locations of the removals at AOC 13 are shown on Figure 1-1. Only laboratory results for soil samples collected outside of or below the TCRA excavations were reviewed for this report.

Thirteen soil borings (PP24B, QQ25, RR21 through RR25, SS21 through SS24, TT22, and TT23) were advanced in AOC 13 as part of the removal action activities. Samples were collected from these borings at depths between 0 and 8 feet bgs and were analyzed

primarily for PAHs. Samples from one boring (SS21) were also analyzed for pesticides, PCBs, and arsenic. Results indicated that soil from boring QQ25 at a depth of 0.5 to 2 feet bgs had a B(a)P equivalent concentration above the PSC (620 µg/kg) (BEI 2005a). Concentrations of all other analytes were below PSCs in all samples.

Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, and geology at AOC 13.

Topography at AOC 13 is relatively flat. The average ground elevation at AOC 13 is 11.5 feet above mean sea level (MSL), based on elevation data from the seven borings (A13SB01 through A13SB07) advanced during the RI. Water was not encountered in any of the seven borings, which were advanced to 4 feet bgs.

The nearest groundwater monitoring well to AOC 13 is M07A-03, located approximately 1,350 feet to the east-southeast of AOC 13. A review of groundwater depths in this well over time (June 1991 through April 2004) shows depth to water from approximately 2 to 9 feet bgs. The deepest historical groundwater measured in this well is approximately 8 feet above MSL. This value, if subtracted from the ground elevation at AOC 13, would suggest groundwater in the vicinity of this AOC may have been present at approximately 4 feet bgs.

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is southeast at AOC 13. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Tidal influence at AOC 13, located approximately 1,500 feet from Seaplane Lagoon, is not expected based on tidal studies performed at other Alameda Point sites.

Soil encountered in the seven RI borings consists of approximately 1 foot of fine-grained fill (silt, silt with sand) underlain by coarse-grained fill (poorly graded sand and silty sand) to approximately 4 feet bgs (maximum depth of the RI borings). Six inches of concrete underlain by coarse-grained fill to a depth of approximately 4 feet bgs were encountered in A13SB06 only. The Young Bay Mud was not encountered in the RI borings; however, based on observed lithology at borings 32EDC-5-93 and -102 located west and southeast, respectively, of AOC 13, it is estimated that the Young Bay Mud beneath AOC 13 is at approximately 7.5 feet bgs. RI boring logs are presented in Appendix D. As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust may be present beneath AOC 13, although it was not encountered in borings advanced to 4 feet bgs during the RI.

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Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for AOC 13. The RI was conducted in accordance with the sitewide data quality objectives (DQOs) for AOCs presented in Table 3-1 of the main RI/FS Report.

3.1 APPROACH

RI sampling at AOC 13 addressed concentrations of pesticides identified in the EBS that were above PSCs in three samples (103-0002, -0020, and -0023). The extent of pesticides in the three EBS soil samples was not determined during the EBS.

Additionally, soil from boring QQ25 had a B(a)P equivalent concentration that was above the PSC (BEI 2005a); this boring is near the location of EBS sample 103-0002. Additional soil samples were collected near boring QQ25 to assess the distribution of PAHs.

3.2 SCOPE

Soil samples were collected from seven borings around EBS samples 103-0002, 103-0020, 103-0023, and QQ25; two soil samples were collected from each boring (at 0 to 2 and 2 to 4 feet bgs). Groundwater samples were not deemed necessary at AOC 13. Soil samples were analyzed for pesticides. One soil sample (A13SB07) collected south of sampling location QQ25 was also analyzed for PAHs.

Table 3-1 summarizes samples collected during the RI and previous investigations. Soil sampling locations are shown on Figure 1-1.

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Section 4
NATURE AND EXTENT OF CONTAMINATION

This section discusses sampling and analysis from previous investigations and from the RI, along with concentration ranges and spatial distributions of the analytes identified at AOC 13. Soil samples were collected at 25 locations during the EBS (IT 2001a), the 2002 PAH study (BEI 2005a), and the RI (Table 3-1). Results for analytes with concentrations above PSCs are illustrated on Figure 4-1. Statistical summaries of soil results are presented in Table 4-1, and soil analytical results are summarized in Table 4-2. Complete analytical results for historical and RI samples collected within AOC 13 are included in Appendices B and G, respectively.

Analytical results are discussed below for each class of chemicals investigated at AOC 13.

4.1 SEMIVOLATILE ORGANIC COMPOUNDS

PAHs were reported in soil from 14 borings (PP24B, QQ25, RR21 through RR25, SS21 through SS24, TT22, TT23, and A13SB07). The B(a)P equivalent concentration (740 µg/kg) reported for the 0.5- to 2-foot-bgs soil sample from boring QQ25 was above the PSC (620 µg/kg). The other B(a)P equivalent concentrations were below the PSC. The B(a)P equivalent exceedance at QQ25 was incorporated into the PAH Areas (Attachment W).

4.2 TOTAL PETROLEUM HYDROCARBONS

A sample collected from boring 103S-002M was analyzed for gasoline- and diesel-range TPH. TPH was not reported above laboratory detection limits.

4.3 PESTICIDES AND POLYCHLORINATED BIPHENYLS

Ten soil samples (103-0001, -0002, -0019, -0020, -0021, -0022, -0023, -0024, -0031, and -0032) were collected and analyzed for PCBs. PCBs were not reported above laboratory detection limits.

Fifteen pesticides were reported in soil from borings 103-001-001, 103-002-002, 103-002-019, 103-002-020, A13SB02, A13SB03, A13SB04, A13SB05, and A13SB07 at concentrations below PSCs. Endrin aldehyde was reported in soil from boring A13SB06. However, a PSC was not identified for endrin aldehyde.

4,4′-DDT, 4,4′-DDD, and dieldrin were the only pesticides reported in soil above PSCs. 4,4′-DDT and dieldrin were reported at 0.5 to 1 foot bgs from samples 103-0002 and 103-0023 at concentrations of 2,200 J and 50 J µg/kg, respectively. (The "J" qualifier indicates the value is estimated.) Concentrations were below laboratory detection limits or PSCs for deeper samples collected in the same borings (samples 103-0031 and 103-024; 4 to 4.5 feet bgs). 4,4′-DDT and 4,4′-DDD were reported at 7 to 7.5 feet bgs from sample 103-0020 at concentrations of 2,600 J and 5,300 J µg/kg, respectively. Deeper samples were not collected at this location; however, concentrations were significantly lower in the shallow sample (0.5 to 1 foot bgs) collected from this boring (740 and 36 J µg/kg of 4,4′-DDT and 4,4′-DDD, respectively). The PSCs (residential soil PRGs) for 4,4′-DDT, 4,4′-DDD, and dieldrin are 1,700; 2,400; and 30 µg/kg,

respectively. Results of RI samples were either below laboratory detection limits or below PSCs.

Except for the concentrations at the one deeper sampling location, the lateral extent of pesticides was defined by samples collected during the RI, and the vertical extent was defined during previous investigations. Results of nearby samples (both laterally and vertically) suggest that the extent of 4,4'-DDT and 4,4'-DDD at sampling location 103-0020 is limited.

4.4 ARSENIC

Soil samples from boring SS21 were analyzed for arsenic. Arsenic was reported at concentrations from 2.3 to 5.5 milligrams per kilogram (mg/kg). These concentrations were above the PSC (residential soil PRG of 0.062 mg/kg), but below the background concentration of 9.14 mg/kg.

Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for AOC 13. It discusses the conceptual site model, the physical and chemical changes that might occur to contaminants present at AOC 13, and the mechanisms that could potentially transfer the contaminants from the study area. The conceptual site model facilitates understanding of the present AOC conditions by integrating AOC-specific physical characteristics with the nature and extent of contaminants in the physical system. Section 5.2 includes an evaluation of the mobility and persistence of compounds above PSCs not attributable to background and of risk drivers identified at AOC 13. Section 5.3 discusses potential migration pathways.

5.1 AOC 13 CONCEPTUAL SITE MODEL

AOC 13 is located in the central portion of Transfer Parcel EDC-5. The study area is relatively flat and covered with buildings, asphalt-covered parking areas, and landscaped areas. The nearest surface water to AOC 13 is Seaplane Lagoon, located approximately 1,500 feet to the south-southwest.

Based on a review of borings logs for AOC 13 and observations at AOC 12 and IR Site 26, the subsurface lithology at AOC 13 consists of approximately 2 feet of fine-grained fill (silt and silt with sand) underlain by coarse-grained fill (sand and silty sand) to approximately 9 feet bgs, then underlain by Young Bay Mud. Groundwater was not encountered during drilling but is expected to occur within the fill at approximately 4 feet bgs, with flow to the southeast. The underlying Young Bay Mud is expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. The western extent of the Marsh Crust may be located beneath AOC 13, although it was not encountered in the RI borings. Negligible tidal influence is expected at AOC 13 because of its distance from Seaplane Lagoon.

PAHs and pesticides (4,4′-DDD, 4,4′-DDT, and dieldrin) were reported in soil at concentrations above PSCs at AOC 13. Pesticides above PSCs were reported in four samples from three noncontiguous boring locations. Except for the concentrations at one deeper sampling location (103-0020 at 7 to 7.5 feet bgs), the lateral extent of pesticides was defined by samples collected during the RI, and the vertical extent was defined during previous investigations. Results of nearby samples suggest that the extent of 4,4′-DDT and 4,4′-DDD at the deeper sampling location (103-0020) is also limited.

PAH exceedances are addressed in the PAH Areas (Attachment W). Groundwater samples were not collected at AOC 13.

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in the environment tends to remain in place. The tendency toward immobility and persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Section 5 of the main RI/FS Report discusses the physical and

chemical properties of contaminants, and their chemical class (e.g., pesticides), which affect their transport and persistence in the environment. Also discussed in Section 5 of the main RI/FS Report are mobility and persistence of PAHs. This section discusses the mobility and persistence of pesticides, specifically, 4,4′-DDT, 4,4′-DDD (one of the primary metabolites of 4,4′-DDT), and dieldrin.

Characteristics of most organochlorine pesticides such as 4,4′-DDT, 4,4′-DDD, and dieldrin are low water solubility, propensity for sorption to organic matter, and high persistence in the environment. Pesticides have high organic carbon partition coefficient values, causing them to be relatively immobile and to persist in soil and sediment. Pesticides are expected to adsorb strongly to soil and sediment and resist leaching to groundwater. 4,4′-DDT released into water adsorbs to particulate matter in the water column and soils (ATSDR 2002). Dieldrin also sorbs tightly to soils, particularly if substantial amounts of organic carbon are present.

Table 5-1 provides estimates of mobility and persistence for pesticides reported at AOC 13. Geotechnical samples were not collected from AOC 13; therefore, the fraction organic carbon (f_{oc}) used for surface and subsurface soils classified as silty sand and poorly graded sand/silty sand at AOC 13 is the average f_{oc} value from similar soils at AOC 15 and AOC 17. The low solubility and mobility exhibited by these pesticides retard their migration to groundwater as indicated by the calculated estimate of percent sorbed in Table 5-1: 98 percent of dieldrin and 100 percent of 4,4′-DDT and 4,4′-DDD will remain sorbed to soil and not move with the groundwater.

Four mechanisms have been suggested to account for most losses of 4,4′-DDT residues from soils: volatilizations, removal by harvest, water runoff, and chemical transformation. When 4,4′-DDT is initially applied, much of it is lost to volatilization (especially from wet soils); however, after long periods of time, biodegradation becomes the more significant loss mechanism (ATSDR 2002). In soil, 4,4′-DDT biodegrades primarily to dichlorodiphenyldichloroethene (DDE) under aerobic conditions and to DDD under anaerobic conditions. At first this process appears to follow first order kinetics, but over long periods of time, DDT becomes sequestered with the soil particles and less is available to microorganisms. Dieldrin is one of the most persistent of the chlorinated hydrocarbons and is highly resistant to biodegradation and abiotic degradation.

5.3 CONTAMINANT MIGRATION

The potential migration pathways considered for this AOC include atmospheric transport (vapors and airborne fugitive dust), migration from soil to groundwater, and transport by surface water runoff. Groundwater transport was not considered because there is no reason to believe that activities at the study area have impacted groundwater.

Significant pathways for the transport of pesticides at AOC 13 were not identified for the following reasons.

- Migration of pesticides from soil to groundwater is not considered a significant pathway at AOC 13. Although pesticides of concern (4,4′-DDT and 4,4′-DDD) were reported at concentrations above PSCs in one deeper soil sample (7 to

7.5 feet bgs), which may come in contact with groundwater, significant migration to groundwater is not likely because these compounds are expected to remain sorbed to soil particles (Table 5-1).

- Volatilization of pesticides from soil to ambient air or indoor air is not considered a significant transport mechanism at AOC 13 because of when the pesticides were released and because of their high molecular weight, low vapor pressure, and low Henry's law constant.
- Particulate dispersion (either by wind or surface water runoff) is not a primary transport mechanism at this time because AOC 13 is covered with asphalt, concrete, and landscaping; however, if the surface cover at the area is disturbed or removed during and after redevelopment, particulate dispersion from soil is considered a possible transport pathway for nonvolatile compounds in surface soil.

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Section 6
TIER 1 EVALUATION

This section summarizes the Tier 1 risk evaluation results for AOC 13. In a Tier 1 evaluation, risk for a residential exposure scenario is assessed with the assumption that no remedial action would take place at the study area. This section also presents a qualitative uncertainty evaluation that identifies and characterizes the effects of uncertainties on the risk results.

A Tier 1 evaluation is a screening level approach that calculates total cumulative risk values using published risk-based guidelines from the United States Environmental Protection Agency (U.S. EPA), California Environmental Protection Agency (Cal/EPA), and San Francisco Bay Regional Water Quality Control Board. The Tier 1 evaluations include all chemicals identified in at least one sample except for PAHs in soil. PAHs in soil are not included because site-specific remediation goals for PAHs are being developed. The approach used to estimate risk is described in Section 6 of the main RI/FS Report. Tier 1 information is provided in Appendix J.

Cancer risk and noncancer values for AOC 13 are shown in Table 6-1. Risk drivers for cancer and noncancer risk are presented in Table 6-2.

6.1 COPC IDENTIFICATION

The data selection and identification of COPCs are based on a compilation of all usable data for soil. In accordance with the Work Plan (BEI 2006), groundwater data were not collected. All chemicals reported in at least one sample collected at AOC 13 during the RI and/or included in the historical data were included as Tier 1 COPCs.

In soil at AOC 13, there are 16 Tier 1 COPCs: 1 metal (arsenic) based on 4 samples and 15 pesticides based on 24 samples.

6.2 RISK CHARACTERIZATION

The cancer risk and noncancer hazard values were calculated using the Tier 1 protocol from Cal/EPA (2005). The maximum concentration of each COPC in soil was compared with a risk-based guideline to estimate cancer and noncancer risks. Two results are presented for applicable exposure groups, the total risk and a second value that does not include risk associated with metals concentrations that are below background.

At AOC 13, the cancer risks of 1×10^{-4} (total) and 6×10^{-6} (without metals below background) and the noncancer hazard values of 0.0007 (both total and without metals below background) are based on exposure pathways for soil only (Exposure Group 2). The COPCs are pesticides.

6.3 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation are representative of any potential health concerns at AOC 13. The results are consistent with the site history and previous investigations. The site characterization is adequate, with 15 samples on this approximately 1.1-acre site focused on the chemicals identified through earlier sampling.

6.4 CONCLUSIONS

For AOC 13, total cancer risk and noncancer hazard index including metals below background is 1×10^{-4} and less than 1, respectively, for Exposure Group 2.

Because groundwater samples were deemed unnecessary, only Exposure Group 2 results were calculated. For reasonable future uses, the cancer risk without metals below background is 6×10^{-6} due to the pesticides 4,4'-DDD, 4,4'-DDT, and dieldrin, each with a cancer risk of 2×10^{-6}. The noncancer hazard value is below 1.

Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at AOC 13, including the nature and extent of contamination and results of the Tier 1 risk evaluation. These results form the basis of responses to the DQO decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendations presented below.

7.1 SUMMARY

RI sampling was performed at AOC 13 to assess the extent of pesticides previously reported at concentrations above PSCs. Additionally, soil samples were also analyzed for PAHs in the vicinity of a boring where the B(a)P equivalent concentration was above the PSC to assess the distribution of PAHs.

PAHs and pesticides (4,4'-DDD, 4,4'-DDT, and dieldrin) were reported in soil at concentrations above PSCs at AOC 13. Except for the concentrations at one deeper sampling location, the lateral extent of pesticides was defined by samples collected during the RI, and the vertical extent was defined during previous investigations. Results of nearby samples suggest that the extent of 4,4'-DDT and 4,4'-DDD at the deeper sampling location (103-0020) is limited. The B(a)P equivalent concentration above the PSC was incorporated into the PAH Areas (Attachment W).

Results of the Tier 1 risk evaluation show a U.S. EPA total cancer risk for soil of 1×10^{-4} (within the risk management range) due primarily to naturally occurring levels of arsenic in soil. The hazard index (HI) is well below 1 (0.0007). Cancer risk without the background metal arsenic is within the risk management range (6×10^{-6}, due primarily to 4,4'-DDD, 4,4'-DDT, and dieldrin).

7.2 AOC 13 CONCLUSIONS AND RECOMMENDATIONS

The RI was conducted using the seven-step U.S. EPA DQO process (U.S. EPA 2000); DQOs were developed for AOC 13 in the Work Plan (BEI 2006). The RI has addressed these DQOs, as summarized in Table 7-1.

Data collected during the RI characterized the nature and extent of pesticides sufficiently to perform a Tier 1 risk evaluation and support decisions on the necessity for remedial actions at AOC 13.

No further action is recommended at AOC 13. Further evaluation of the extent of pesticides and PAHs in soil is not recommended for the following reasons.

- Without arsenic, which is below background, cancer risk associated with pesticides in soil is within the risk management range of 10^{-6} to 10^{-4} and the HI is less than 1.
- Groundwater impacts are not a concern because pesticides in soil are generally not soluble or mobile and do not migrate readily to or in groundwater.
- PAHs are addressed as part of the PAH Areas (Attachment W).

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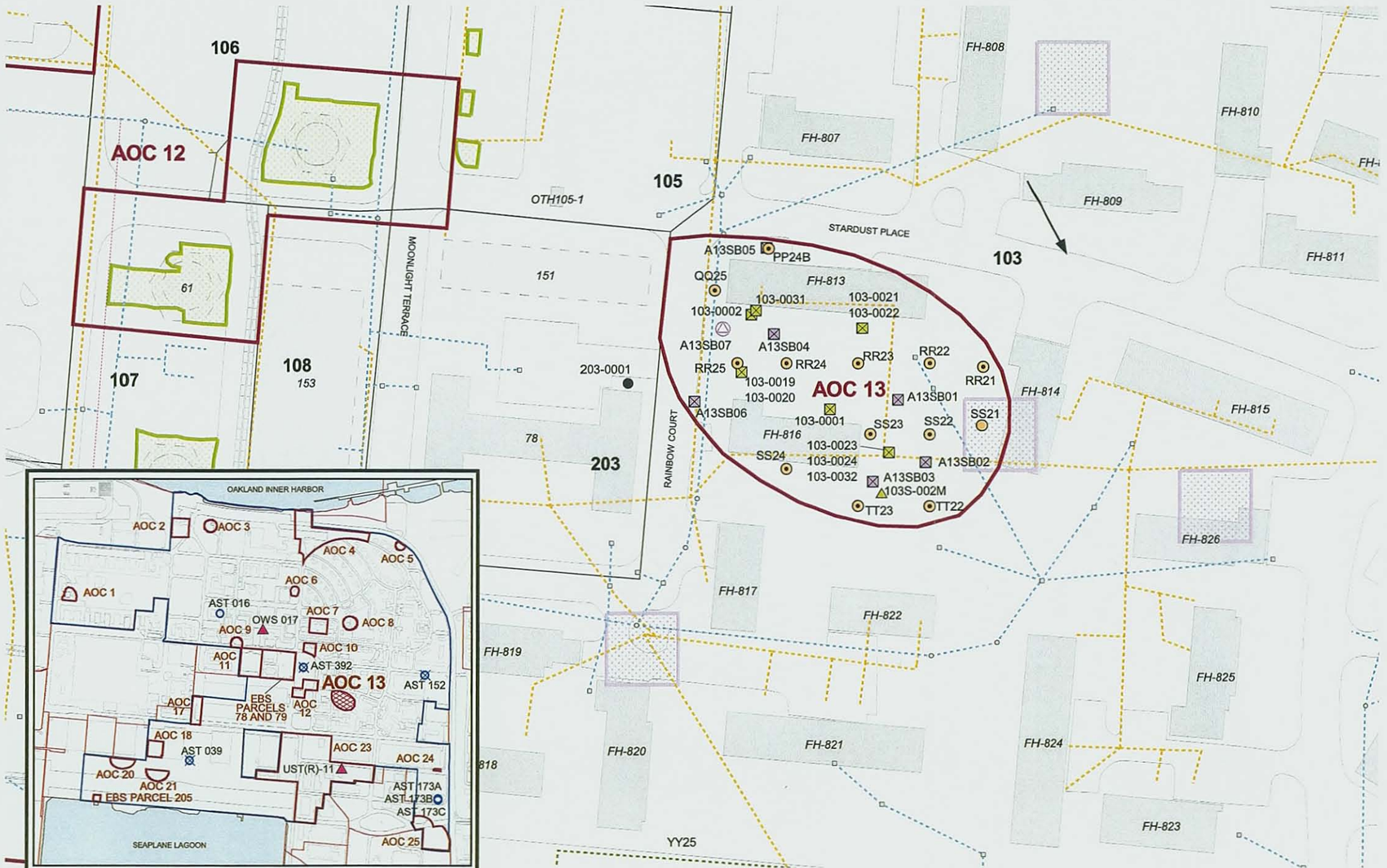
FIGURES



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

N

PAH REMOVAL ACTION SOIL SAMPLING LOCATION WITH STATION ID
- SVOCs ANALYSIS ONLY
- SVOCs, PESTICIDES/PCBs, AND METALS ANALYSES ONLY

EBS SOIL SAMPLING LOCATION WITH SAMPLE ID
- FUELS ANALYSIS ONLY
- PESTICIDES/PCBs ANALYSIS ONLY

RI SOIL SAMPLING LOCATION WITH STATION ID
- PESTICIDES/PCBs ANALYSES ONLY
- SVOCs AND PESTICIDES/PCBs ANALYSES ONLY

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK

100 0 100 Feet

RI/FS Report for IR Site 35

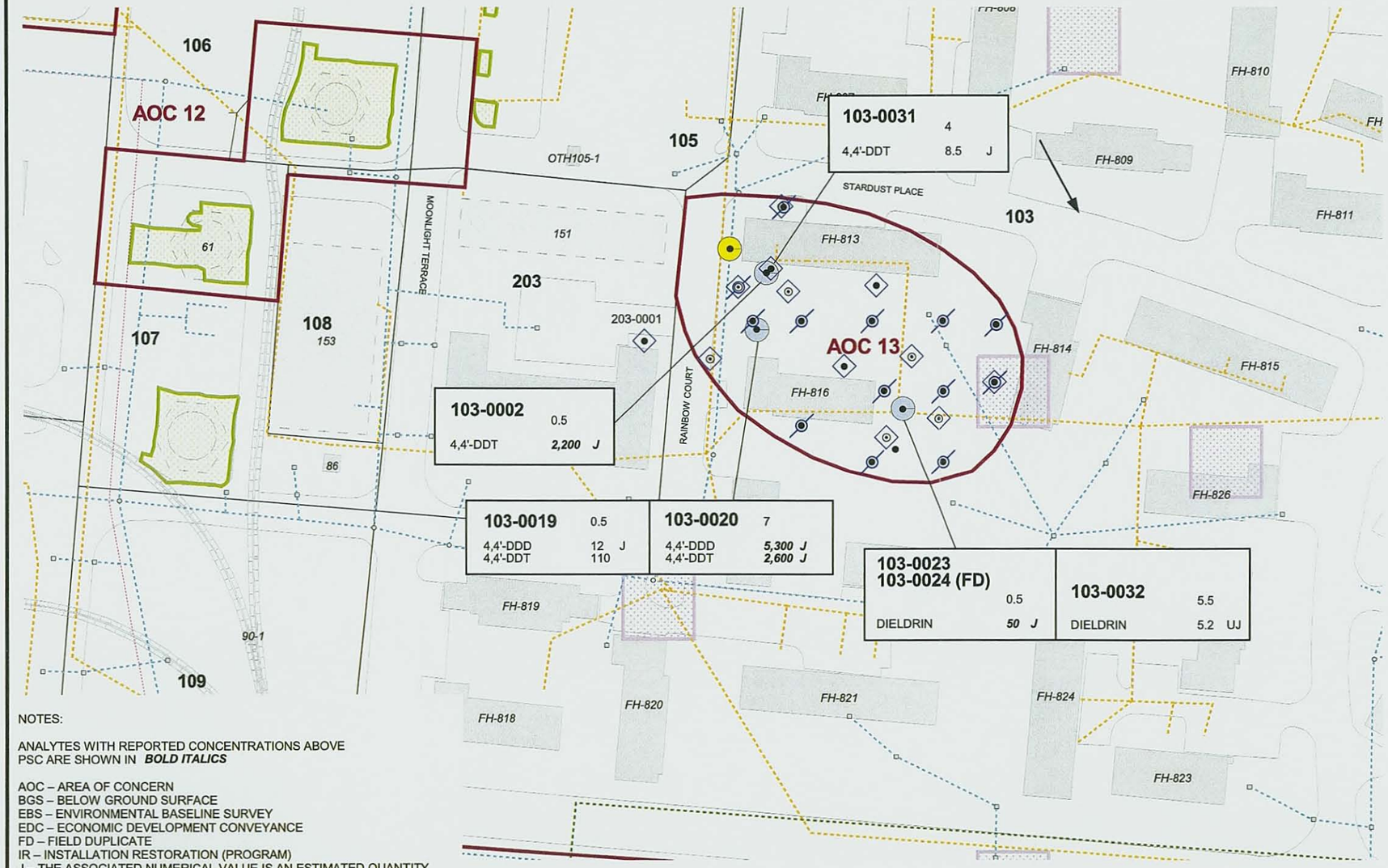
Figure 1-1

Study Area and Sampling Locations
Area of Concern 13

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/30/06
File No.: 077L14454
Job No.: 23818-077
Rev No.: C



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL SOIL SAMPLING LOCATION
- RI SOIL SAMPLING LOCATION

N

SOIL SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC FOR :

- PESTICIDES/PCBs
- BENZO(A)PYRENE EQUIVALENT (SEE ATTACHMENT W, PAH AREAS, FOR ADDITIONAL INFORMATION AND CONCENTRATIONS)

SOIL SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :

- PESTICIDES/PCBs
- SVOCs

STATION ID (SAMPLE ID FOR EBS LOCATIONS)

DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

103-0002 0.5
4,4'-DDT **2,200 J**

ANALYTE

REVIEW QUALIFIER

CONCENTRATION in µg/kg

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
FD – FIELD DUPLICATE
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
µg/kg – MICROGRAMS PER KILOGRAM
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
PRG – PRELIMINARY REMEDIATION GOAL
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
UJ – THE ANALYTE WAS NOT REPORTED ABOVE THE DETECTION LIMIT. THE SAMPLE QUANTITATION LIMIT IS AN ESTIMATED QUANTITY

Analyte	PSC
4-4'-DDD	2,400 µg/kg (Federal Residential PRG)
4-4'-DDT	1,700 µg/kg (Federal Residential PRG)
DIELDRIN	30 µg/kg (Federal Residential PRG)

RI/FS Report for IR Site 35

Figure 4-1

Soil Sampling Results for Analytes Above PSC – Area of Concern 13

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/30/06
File No.: 077L14486
Job No.: 23818-077
Rev No.: C

TABLES

Table 3-1
Sample Analysis Summary, AOC 13

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE				
				PAHs	TPH*	Pesticides	PCBs	Arsenic
Soil								
103-001-001	103-0001	EBS	0.5–1			X	X	
103-001-002	103-0002	EBS	0.5–1			X	X	
103-002-002	103-0031	EBS	4–4.5			X	X	
103-002-018	103-0019	EBS	0.5–1			X	X	
103-002-018	103-0020	EBS	7–7.5			X	X	
103-002-019	103-0021	EBS	1–1.5			X	X	
103-002-019	103-0022	EBS	7.5–8			X	X	
103-002-020	103-0023	EBS	0.5–1			X	X	
103-002-020	103-0024	EBS	5.5–6.5			X	X	
103-002-020	103-0032 (FD)	EBS	5.5–6.5			X	X	
103-SN-002	103S-002M	EBS	9–9.5		X			
PP24B	0040-WHA-3863	PAH TCRA	0–0.5	X				
PP24B	0040-WHA-3864	PAH TCRA	0.5–2	X				
QQ25	0040-WHA-3720	PAH TCRA	0–0.5	X				
QQ25	0040-WHA-3721	PAH TCRA	0.5–2	X				
RR21	0040-WHA-3874	PAH TCRA	0–0.5	X				
RR21	0040-WHA-3875	PAH TCRA	0.5–2	X				
RR21	0040-WHA-3876	PAH TCRA	2–4	X				
RR21	0040-WHA-3877	PAH TCRA	4–8	X				
RR22	0040-WHA-0437	PAH TCRA	0.5–1	X				
RR23	0040-WHA-0435	PAH TCRA	1–1.5	X				
RR24	0040-WHA-0436	PAH TCRA	1.5–2	X				
RR25	0040-WHA-0165	PAH TCRA	0.5–1	X				
SS21	0040-WHA-5096	PAH TCRA	0–0.5	X			X	X
SS21	0040-WHA-5097 (FD)	PAH TCRA	0–0.5	X			X	X
SS21	0040-WHA-6123	PAH TCRA	0.5–2	X			X	X
SS21	0040-WHA-6124 (FD)	PAH TCRA	0.5–2	X			X	X
SS21	0040-WHA-3880	PAH TCRA	2–4	X				
SS21	0040-WHA-3881	PAH TCRA	4–8	X				
SS22	0040-WHA-0434	PAH TCRA	0.5–1	X				
SS23	0040-WHA-0433	PAH TCRA	1–2	X				

Table 3-1
Sample Analysis Summary, AOC 13

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE				
				PAHs	TPH*	Pesticides	PCBs	Arsenic
SS24	0040-WHA-0125	PAH TCRA	0.5–1	X				
TT22	0040-WHA-0127	PAH TCRA	1.5–2	X				
TT23	0040-WHA-0126	PAH TCRA	0.5–1	X				
A13SB01	C077S241	Site 35 RI	1–1.5			X		
A13SB01	C077S242	Site 35 RI	2.5–3			X		
A13SB02	C077S243	Site 35 RI	1.5–2			X		
A13SB02	C077S244	Site 35 RI	3.5–4			X		
A13SB03	C077S245	Site 35 RI	0.5–1			X		
A13SB03	C077S246	Site 35 RI	2–2.5			X		
A13SB04	C077S247	Site 35 RI	1.5–2			X		
A13SB04	C077S248	Site 35 RI	3.5–4			X		
A13SB05	C077S249	Site 35 RI	0.5–1			X		
A13SB05	C077S250	Site 35 RI	2–2.5			X		
A13SB06	C077S251	Site 35 RI	1–1.5			X		
A13SB06	C077S252	Site 35 RI	3–3.5			X		
A13SB07	C077S253	Site 35 RI	1.5–2	X		X		
A13SB07	C077S254	Site 35 RI	3.5–4	X		X		

References:
EBS (IT 2001a)
PAH TCRA (FWEC 2004)

Note:
* analyzed for gasoline- and diesel-range TPH

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
EBS – environmental baseline survey
FD – field duplicate
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
RI – remedial investigation
TCRA – time-critical removal action
TPH – total petroleum hydrocarbons

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 13

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	Background (95th Percentile)
Semivolatile Organic Compounds (µg/kg)									
acenaphthene	25	4	16	0	1.6	3.6	4.7	3,700,000	—[c]
acenaphthylene	25	8	32	No PSC	1.8	7.6	16	—	—
anthracene	25	14	56	0	0.8	9	29	22,000,000	—
benz(a)anthracene	25	21	84	0	5	77	430	620	—
benzo(b)fluoranthene	25	22	88	0	6.2	110	640	620	—
benzo(k)fluoranthene	25	22	88	0	2	43	220	380 [d]	—
benzo(g,h,i)perylene	25	20	80	No PSC	12	91	420	—	—
benzo(a)pyrene	25	22	88	0	2	93	510	62	—
chrysene	25	20	80	0	6.5	81	470	3,800 [d]	—
dibenz(a,h)anthracene	25	9	36	0	5.4	34	85	62	—
fluoranthene	25	23	92	0	7	100	470	2,300,000	—
fluorene	25	4	16	0	2.2	4.4	6.3	2,700,000	—
indeno(1,2,3-cd)pyrene	25	20	80	0	7.4	72	390	620	—
2-methylnaphthalene	12	3	25	No PSC	1.6	2.9	5.4	—	—
naphthalene	25	9	36	0	1.7	4.9	18	1,700 [d]	—
phenanthrene	25	21	84	No PSC	1	35	110	—	—
pyrene	25	22	88	0	6	130	480	2,300,000	—
Pesticides and Polychlorinated Biphenyls (µg/kg)									
beta-BHC	24	1	4.2	0	4.4	4.4	4.4	320	—
delta-BHC	10	1	10	No PSC	3.4	3.4	3.4	—	—
gamma-BHC (lindane)	24	1	4.2	0	2	2	2	440	—
alpha-chlordane	24	7	29	0	2	30	93	1,600	—
gamma-chlordane	24	7	29	0	2	26	82	1,600	—
4,4'-DDD	24	11	46	1	3	510	5,300	2,400	—
4,4'-DDE	24	13	54	0	0.86	140	590	1,700	—
4,4'-DDT	24	12	50	2	1	540	2,600	1,700	—
dieldrin	24	2	8.3	1	7.3	29	50	30	—
endosulfan I	24	2	8.3	0	3	3	3	370,000	—
endrin	24	2	8.3	0	4.7	5.1	5.5	18,000	—
endrin aldehyde	24	4	17	No PSC	0.72	2	3.8	—	—
heptachlor	24	2	8.3	0	2.8	3.2	3.6	110	—
heptachlor epoxide	24	3	13	0	3.1	3.6	4	53	—
methoxychlor	10	1	10	0	51	51	51	310,000	—
Metals (mg/kg)									
arsenic	4	4	100	0	2.3	3.5	5.5	0.062 [d]	9.14

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

Acronyms/Abbreviations:

AOC – area of concern
BHC – benzene hexachloride
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criterion (PRG)

Table 4-2
Soil Sampling Results, AOC 13

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: 103-001-001	103-001-002	103-002-002	103-002-018	103-002-018	103-002-019	103-002-019	103-002-020	103-002-020	103-002-020	103-SN-002
						Sample: 103-0001	103-0002	103-0031	103-0019	103-0020	103-0021	103-0022	103-0023	103-0024	103-0032 (FD)	103S-002M
						[a] Depth Interval: 0.5 - 1	0.5 - 1	4 - 4.5	0.5 - 1	7 - 7.5	1 - 1.5	7.5 - 8	0.5 - 1	5.5 - 6.5	5.5 - 6.5	9 - 9.5
						Collection Date: 17-Nov-94	17-Nov-94	18-Oct-95	18-Oct-95	18-Oct-95	18-Oct-95	18-Oct-95	18-Oct-95	18-Oct-95	18-Oct-95	18-Jan-95
Petroleum Hydrocarbons						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND
SVOCs																
acenaphthene	3,700,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs																
beta-BHC	320	—	—	—	µg/kg	2.2 UJ	77 UJ	1.7 U	1.7 U	4.4 J	1.7 U	1.9 U	1.7 U	1.8 U	2.7 UJ	NA
delta-BHC	—	—	—	—	µg/kg	2.2 UJ	77 UJ	1.7 U	1.7 U	3.4 J	1.7 U	1.9 U	1.7 U	1.8 U	2.7 UJ	NA
gamma-BHC (lindane)	440	—	—	—	µg/kg	2.2 UJ	77 UJ	1.7 U	1.7 U	2	1.7 U	1.9 U	1.7 U	1.8 U	2.7 UJ	NA
alpha-chlordane	1,600	—	—	—	µg/kg	2.2 UJ	93 J	2.5	5.7 J	61 J	2 J	1.9 U	34 J	1.8 U	2.7 UJ	NA
gamma-chlordane	1,600	—	—	—	µg/kg	2.2 UJ	82 J	1.7 U	5.9 J	49 J	2.8 J	1.9 U	32 J	1.8 U	2.7 UJ	NA
4,4'-DDD	2,400	—	—	—	µg/kg	3 J	150 J	6.4	12 J	**5,300 J**[d]	36 J	3.7 U	110 J	3.6 U	5.2 UJ	NA
4,4'-DDE	1,700	—	—	—	µg/kg	15 J	590 J	3.7 J	30	190 J	280	3.7 U	540	3.6 U	5.2 UJ	NA
4,4'-DDT	1,700	—	—	—	µg/kg	32 J	**2,200 J**	8.5 J	110	**2,600 J**	740	3.7 U	670	3.6 U	8.1 J	NA
dieldrin	30	—	—	—	µg/kg	4.2 UJ	**150 UJ**[e]	3.4 U	3.3 U	7.3 J	3.2 U	3.7 U	**50 J**	3.6 U	5.2 UJ	NA
endosulfan I	370,000	—	—	—	µg/kg	2.2 UJ	77 UJ	1.7 U	1.7 U	3 J	1.7 U	1.9 U	3 J	1.8 U	2.7 UJ	NA
endrin	18,000	—	—	—	µg/kg	4.2 UJ	150 UJ	3.4 U	3.3 U	3.8 U	3.2 U	3.7 U	3.3 U	3.6 U	5.2 UJ	NA
endrin aldehyde	—	—	—	—	µg/kg	4.2 UJ	150 UJ	3.4 U	3.3 U	3.8 U	3.2 U	3.7 U	3.3 U	3.6 U	5.2 UJ	NA
heptachlor	110	—	—	—	µg/kg	2.2 UJ	77 UJ	1.7 U	1.7 U	3.6 J	1.7 U	1.9 U	2.8	1.8 U	2.7 UJ	NA
heptachlor epoxide	53	—	—	—	µg/kg	2.2 UJ	**77 UJ**[e]	1.7 U	3.1 J	4	1.7 U	1.9 U	3.6 J	1.8 U	2.7 UJ	NA
methoxychlor	310,000	—	—	—	µg/kg	22 UJ	770 UJ	17 U	17 U	20 U	17 U	19 U	17 U	18 U	51 J	NA
Metals																
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 13

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	A13SB01 C077S241 1 - 1.5 14-Dec-05	A13SB01 C077S242 2.5 - 3 14-Dec-05	A13SB02 C077S243 1.5 - 2 14-Dec-05	A13SB02 C077S244 3.5 - 4 14-Dec-05	A13SB03 C077S245 0.5 - 1 14-Dec-05	A13SB03 C077S246 2 - 2.5 14-Dec-05	A13SB04 C077S247 1.5 - 2 14-Dec-05	A13SB04 C077S248 3.5 - 4 14-Dec-05	A13SB05 C077S249 0.5 - 1 14-Dec-05	A13SB05 C077S250 2 - 2.5 14-Dec-05	A13SB06 C077S251 1 - 1.5 14-Dec-05	A13SB06 C077S252 3 - 3.5 14-Dec-05	A13SB07 C077S253 1.5 - 2 14-Dec-05	A13SB07 C077S254 3.5 - 4 14-Dec-05
Petroleum Hydrocarbons						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																			
acenaphthene	3,700,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	4.7 J
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	16
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.4 J	27
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	38	140
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	74 J	260
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	44 J	52
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	49	250
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	46 J	**270 J**
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	19	120
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.4 J	31 J
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	45 J	310 J
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	5.3 J
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	33	180
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	5.4
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3 J	18
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11 J	110 J
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	53 J	370 J
Pesticides/PCBs																			
beta-BHC	320	—	—	—	µg/kg	5 UJ	5 U	5 U	5 U	5 U	6 U	5 U	5 U	5 U	6 U	6 U	6 U	5 U	5 U
delta-BHC	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (lindane)	440	—	—	—	µg/kg	5 UJ	5 U	5 U	5 U	5 U	6 U	5 U	5 U	5 U	6 U	6 U	6 U	5 U	5 U
alpha-chlordane	1,600	—	—	—	µg/kg	5 UJ	5 U	5 U	5 U	8.6	6 U	5 U	5 U	5 U	6 U	6 U	6 U	5 U	5 U
gamma-chlordane	1,600	—	—	—	µg/kg	5 UJ	5 U	5 U	5 U	11	6 U	5 U	5 U	5 U	6 U	6 U	6 U	2 J	5 U
4,4'-DDD	2,400	—	—	—	µg/kg	5 UJ	5 U	5 U	5 U	7.8	3.9 J	5 U	5 U	4.7 J	6 U	6 U	6 U	7.2	5 U
4,4'-DDE	1,700	—	—	—	µg/kg	5 UJ	5 U	1 J	5 U	21	5 J	0.86 J	5 U	3.6 J	6 U	6 U	6 U	79	5 U
4,4'-DDT	1,700	—	—	—	µg/kg	5 UJ	5 U	1 J	5 U	33	7.5	5 U	5 U	5 U	6 U	6 U	6 U	38	5 U
dieldrin	30	—	—	—	µg/kg	5 UJ	5 U	5 U	5 U	5 U	6 U	5 U	5 U	5 U	6 U	6 U	6 U	5 U	5 U
endosulfan I	370,000	—	—	—	µg/kg	5 UJ	5 U	5 U	5 U	5 U	6 U	5 U	5 U	5 U	6 U	6 U	6 U	5 U	5 U
endrin	18,000	—	—	—	µg/kg	5 UJ	5 U	5 U	5 U	5.5	6 U	5 U	5 U	5 U	6 U	6 U	6 U	4.7 J	5 U
endrin aldehyde	—	—	—	—	µg/kg	5 UJ	5 U	5 U	5 U	1.3 J	6 U	5 U	3.8 J	5 U	6 U	0.72 J	2.1 J	5 U	5 U
heptachlor	110	—	—	—	µg/kg	5 UJ	5 U	5 U	5 U	5 U	6 U	5 U	5 U	5 U	6 U	6 U	6 U	5 U	5 U
heptachlor epoxide	53	—	—	—	µg/kg	5 UJ	5 U	5 U	5 U	5 U	6 U	5 U	5 U	5 U	6 U	6 U	6 U	5 U	5 U
methoxychlor	310,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																			
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 13

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: PP24B Sample: 0040-WHA-3863 [a] Depth Interval: 0 - 0.5 Collection Date: 24-Jul-03	PP24B 0040-WHA-3864 0.5 - 2 24-Jul-03	QQ25 0040-WHA-3720 0 - 0.5 21-Jul-03	QQ25 0040-WHA-3721 0.5 - 2 21-Jul-03	RR21 0040-WHA-3874 0 - 0.5 24-Jul-03	RR21 0040-WHA-3875 0.5 - 2 24-Jul-03	RR21 0040-WHA-3876 2 - 4 24-Jul-03	RR21 0040-WHA-3877 4 - 8 24-Jul-03	RR22 0040-WHA-0437 0.5 - 1 24-Apr-03
Petroleum Hydrocarbons						NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs														
acenaphthene	3,700,000	—[b]	—	—	µg/kg	5.2 U	1.6 J	3.6 J	4.4 J	5.2 U	5.1 U	5.6 U	5.7 U	110 U
acenaphthylene	—	—	—	—	µg/kg	5.2 U	3.1 J	6.1	11	1.8 J	16	5.6 U	3.1 J	110 U
anthracene	22,000,000	—	—	—	µg/kg	3.1 J	3.1 J	13	23	2.2 J	29	1.2 J	7.1	110 U
benz(a)anthracene	620[c]	—	—	—	µg/kg	51	24	180	430	22	160	5 J	34	87 J
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	64	37	250	**640**	38	240	8.6 U	37	130 J
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	19	13	82	220	14	65	6.4	33	62 J
benzo(g,h,i)perylene	—	—	—	—	µg/kg	23	30	180	420	33	220	14 J	40 J	93 J
benzo(a)pyrene	62[c]	—	—	—	µg/kg	40	31	**190**	**510**	31	**240**	11	43	**94 J**
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	56	28	200	470	28	190	6.5	42	67 J
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	5.2 U	5.2 U	28	**85**	5.2 U	29	5.6 UJ	5.7 UJ	**110 UJ**[c]
fluoranthene	2,300,000	—	—	—	µg/kg	66	43	260	470	40	310	8.3	67	97 J
fluorene	2,700,000	—	—	—	µg/kg	5.2 U	5.2 U	2.2 J	3.6 J	5.2 U	6.3	5.6 U	5.7 U	110 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	22	25	160	390	25	190	10 J	31 J	66 J
2-methylnaphthalene	—	—	—	—	µg/kg	5.2 U	5.2 U	5.2 U	1.7 J	1.6 J	5.1 U	5.6 U	5.7 U	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	1.7 J	2.5 J	3.7 J	5.4	1.9 J	5.7	5.6 U	2.5 J	110 U
phenanthrene	—	—	—	—	µg/kg	20	12	65	110	14	99	4.6 J	16	110 U
pyrene	2,300,000	—	—	—	µg/kg	74	51	300	480	48	380	17	180	230 J
Pesticides/PCBs														
beta-BHC	320	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (lindane)	440	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-chlordane	1,600	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-chlordane	1,600	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	2,400	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	1,700	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	1,700	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
dieldrin	30	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
endosulfan I	370,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
endrin	18,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
endrin aldehyde	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
heptachlor	110	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
heptachlor epoxide	53	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
methoxychlor	310,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals														
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-2
Soil Sampling Results, AOC 13

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	RR23 0040-WHA-0435 1 - 1.5 24-Apr-03	RR24 0040-WHA-0436 1.5 - 2 24-Apr-03	RR25 0040-WHA-0165 0.5 - 1 25-Apr-03	SS21 0040-WHA-3880 2 - 4 24-Jul-03	SS21 0040-WHA-3881 4 - 8 24-Jul-03	SS21 0040-WHA-5096 0 - 0.5 25-Aug-03	SS21 0040-WHA-5097 0 - 0.5 25-Aug-03	SS21 0040-WHA-6123 0.5 - 2 25-Aug-03	SS21 0040-WHA-6124 0.5 - 2 25-Aug-03
Petroleum Hydrocarbons						NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs														
acenaphthene	3,700,000	—[b]	—	—	µg/kg	28 U	26 U	540 U	5.2 UJ	5.8 U	110 U	110 U	100 U	100 U
acenaphthylene	—	—	—	—	µg/kg	28 U	26 U	270 U	5.2 U	3.4 J	54 U	55 U	52 U	52 U
anthracene	22,000,000	—	—	—	µg/kg	28 UJ	26 UJ	11 U	2.7 J	9.8	2.2 U	2.2 U	2.1 U	0.8 J
benz(a)anthracene	620[c]	—	—	—	µg/kg	40	12 J	40	7.9	26	5.4 U	5.5 U	5.2 U	5.2 U
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	70	16 J	59	6.6	23	2.2 U	2.2 U	6.2	6.2
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	38	26 U	25	6.5	20	2.2 U	2.2 U	2 J	2 J
benzo(g,h,i)perylene	—	—	—	—	µg/kg	19 J	26 U	95	12 J	32 J	7.6 U	7.7 U	7.3 U	7.3 U
benzo(a)pyrene	62[c]	—	—	—	µg/kg	49	11 J	**70**	11	38	5.4 U	5.5 U	2 J	3 J
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	43	26 U	30	8.7	41	5.4 U	5.5 U	5.2 U	5.2 U
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	28 U	26 U	56 J	5.2 UJ	5.8 UJ	18 U	19 U	18 U	18 U
fluoranthene	2,300,000	—	—	—	µg/kg	65	13 J	97	16	33	5.4 U	5.5 U	7	8
fluorene	2,700,000	—	—	—	µg/kg	28 U	26 U	54 U	5.2 U	5.8 U	11 U	11 U	10 U	10 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	16 J	26 U	40	7.4 J	23 J	5.4 U	5.5 U	5.2 U	5.2 U
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	5.2 U	5.8 U	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	28 U	26 U	270 U	5.2 U	5.8 U	54 U	55 U	52 U	52 U
phenanthrene	—	—	—	—	µg/kg	29	26 U	43	10	15	4.3 U	4.4 U	1 J	8
pyrene	2,300,000	—	—	—	µg/kg	78	17 J	54 U	26	100	11 U	11 U	6 J	6 J
Pesticides/PCBs														
beta-BHC	320	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (lindane)	440	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-chlordane	1,600	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-chlordane	1,600	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	2,400	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	1,700	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	1,700	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
dieldrin	30	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
endosulfan I	370,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
endrin	18,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
endrin aldehyde	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
heptachlor	110	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
heptachlor epoxide	53	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
methoxychlor	310,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals														
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	**2.3**	**2.3**	**3.9**	**5.5**

Table 4-2
Soil Sampling Results, AOC 13

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: SS22 / Sample: 0040-WHA-0434 / [a]Depth Interval: 0.5 - 1 / Collection Date: 24-Apr-03	Station ID: SS23 / Sample: 0040-WHA-0433 / [a]Depth Interval: 1 - 2 / Collection Date: 24-Apr-03	Station ID: SS24 / Sample: 0040-WHA-0125 / [a]Depth Interval: 0.5 - 1 / Collection Date: 24-Apr-03	Station ID: TT22 / Sample: 0040-WHA-0127 / [a]Depth Interval: 1.5 - 2 / Collection Date: 24-Apr-03	Station ID: TT23 / Sample: 0040-WHA-0126 / [a]Depth Interval: 0.5 - 1 / Collection Date: 24-Apr-03
Petroleum Hydrocarbons						NA	NA	NA	NA	NA
SVOCs										
acenaphthene	3,700,000	—[b]	—	—	µg/kg	29 U	110 U	110 U	110 U	110 U
acenaphthylene	—	—	—	—	µg/kg	29 U	110 U	56 U	54 U	55 U
anthracene	22,000,000	—	—	—	µg/kg	29 UJ	110 UJ	2.2 U	2.1 U	2 J
benz(a)anthracene	620[c]	—	—	—	µg/kg	27 J	140	12	133	17
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	43	330	18	33	32
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	22 J	190	8	16	13
benzo(g,h,i)perylene	—	—	—	—	µg/kg	18 J	200	23	33	38
benzo(a)pyrene	62[c]	—	—	—	µg/kg	33	**260**	24	5.4 U	42
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	29	190	10	25	23
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	29 U	**110 U**[e]	12 J	40	24
fluoranthene	2,300,000	—	—	—	µg/kg	39	240	31	77	65
fluorene	2,700,000	—	—	—	µg/kg	29 U	110 U	11 U	11 U	11 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	16 J	120	17	39	27
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	29 U	110 U	56 U	54 U	55 U
phenanthrene	—	—	—	—	µg/kg	14 J	110 J	7	22	13
pyrene	2,300,000	—	—	—	µg/kg	47	330	30	65	56
Pesticides/PCBs										
beta-BHC	320	—	—	—	µg/kg	NA	NA	NA	NA	NA
delta-BHC	—	—	—	—	µg/kg	NA	NA	NA	NA	NA
gamma-BHC (lindane)	440	—	—	—	µg/kg	NA	NA	NA	NA	NA
alpha-chlordane	1,600	—	—	—	µg/kg	NA	NA	NA	NA	NA
gamma-chlordane	1,600	—	—	—	µg/kg	NA	NA	NA	NA	NA
4,4'-DDD	2,400	—	—	—	µg/kg	NA	NA	NA	NA	NA
4,4'-DDE	1,700	—	—	—	µg/kg	NA	NA	NA	NA	NA
4,4'-DDT	1,700	—	—	—	µg/kg	NA	NA	NA	NA	NA
dieldrin	30	—	—	—	µg/kg	NA	NA	NA	NA	NA
endosulfan I	370,000	—	—	—	µg/kg	NA	NA	NA	NA	NA
endrin	18,000	—	—	—	µg/kg	NA	NA	NA	NA	NA
endrin aldehyde	—	—	—	—	µg/kg	NA	NA	NA	NA	NA
heptachlor	110	—	—	—	µg/kg	NA	NA	NA	NA	NA
heptachlor epoxide	53	—	—	—	µg/kg	NA	NA	NA	NA	NA
methoxychlor	310,000	—	—	—	µg/kg	NA	NA	NA	NA	NA
Metals										
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[d] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL
[e] detection limit is above criteria

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
BHC – benzene hexachloride
Cal – California
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
ND – not detected
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 5-1
Estimates of Mobility and Persistence for Pesticides, AOC 13

Analyte	K_{oc} (L/kg)	f_{oc}	Percent Sorbed [a]	Half-Life in Soil (years)
4,4'-DDD [b]	8.11E+04	5.25E-03	100	2.7
4,4'-DDT [c]	3.02E+05	5.25E-03	100	1.6
dieldrin [c]	1.2E+04	5.25E-03	98	3.0

Note:
[a] percent sorbed = $[K_{oc}f_{oc} / (1+K_{oc}f_{oc})] \times 100$
[b] Vogue et al. 1994
[c] Mackay et al. 1992

Acronyms/Abbreviations:
AOC – area of concern
f_{oc} – fraction organic carbon; average value for surface and subsurface soils classified SM and SP/SM at AOCs 15 and 17, to approximate AOC 13 soils
K_{oc} – organic carbon partition coefficient
L/kg – liters per kilogram
SM – silty sand
SP/SM – poorly graded sand/silty sand

Table 6-1
Tier 1 Evaluation Results by Exposure Group, AOC 13

Exposure Group [a]	Cancer Risk	Hazard Index
1. All soil and groundwater exposure pathways		
Total [b]	NG	NG
Without metals below background	NG	NG
2. Exposure pathways for soil and vapors from VOCs in groundwater		
Total [b]	1E-04	0.0007
Without metals below background	6E-06	0.0007
3. Exposure pathways for residential use of groundwater		
Total [b]	NG	NG
Without metals below background	NG	NG

Notes:

[a] PAHs are not included

[b] includes all COPCs

Acronyms/Abbreviations:

AOC – area of concern

COPC – chemical of potential concern

NG – no groundwater data

PAH – polynuclear aromatic hydrocarbon

VOC – volatile organic compound

Table 6-2
Tier 1 Evaluation Results by Risk Driver, AOC 13

Study Area	Analyte Name	TOTAL		WITHOUT BACKGROUND	
		Hazard Quotient	Cancer Risk	Hazard Quotient	Cancer Risk
AOC 13					
Soil					
	arsenic	—*	9E-05	—	—
	4,4'-DDD	—	2E-06	—	2E-06
	4,4'-DDT	—	2E-06	—	2E-06
	dieldrin	—	2E-06	—	2E-06
	Total for soil	**0.0007**	**1E-04**	**0.0007**	**6E-06**

Note:
* dash indicates not applicable

Acronym/Abbreviation:
AOC – area of concern
DDD – dichlorodiphenyldichloroethane
DDT – dichlorodiphenyltrichloroethane

Table 7-1
Summary of RI Results and Recommendations, AOC 13

DQO Problem	DQO Decision Questions	Nature and Extent	Risk Assessment	Recommendation
The extent of pesticides in the three EBS soil samples was not determined during the EBS. Additionally, soil from boring QQ25 had reported PAH concentrations that exceeded the soil screening criterion. This location is near the location of EBS sample 103-0002. Additional samples were collected near these samples to assess the distribution of pesticides. One of these borings was also used to assess the distribution of PAHs near boring QQ25.	Have the nature and extent of contamination been defined?	Yes, definition is adequate. Except for the concentrations at one deeper soil sampling location, the lateral and vertical extent of pesticides is defined. Pesticides in soil appear to be limited in extent based on results of nearby samples.	NA	No further action. PAHs will be addressed as part of the PAH Areas (Attachment W).
	Are contaminants present at concentrations that contribute to an unacceptable risk to potential future residents?	NA	No. Without arsenic, which is at concentrations below background, the cancer risk for soil is within the risk management range of 10^{-6} to 10^{-4}, and the HI is less than 1.	No further action.
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon.	NA	NA. Pathway not evaluated for AOC 13, located approximately 1,500 feet from the nearest water body.	No further action.

Acronyms/Abbreviations:
AOC – area of concern
DQO – data quality objective
EBS – environmental baseline survey
FS – feasibility study
HHRA – human-health risk assessment
HI – hazard index
NA – not applicable
PAH – polynuclear aromatic hydrocarbon
RI – remedial investigation

ATTACHMENT N

AREA OF CONCERN 17

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT ATTACHMENT N, AREA OF CONCERN 17 IR SITE 35, TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

Prepared by:

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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 17. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station [NAS] Alameda), Alameda, California.

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

AOC 17 is an approximately 0.9-acre area on the western edge of Transfer Parcel Economic Development Conveyance 5 at the intersection of Saratoga Street and West Tower Avenue (Figure 1-1) and is in Environmental Baseline Survey (EBS) Parcel 185. AOC 17 consists of a small portion of the western end of Building 9, paved open space used for vehicle parking, and portions of Saratoga Street and West Tower Avenue (Photographs 1-1 through 1-6). Inactive railroad tracks traverse the southern portion of the study area from east to west.

AOC 17 is located adjacent to and east of IR Sites 5 and 12. IR Site 5 is an area of known total petroleum hydrocarbons (TPH), polynuclear aromatic hydrocarbon (PAH), and metals contamination in soil, and known xylene, chlorinated hydrocarbon, PAH, TPH, and cyanide contamination in groundwater. IR Site 12 was identified as having metals contamination in soil; however, these metals may be attributable to background conditions. Both of these sites are the subject of an RI currently underway at Operable Unit (OU)-2C.

1.2 HISTORICAL USE

Building 9 was historically used as a storage shed, maintenance facility, and aircraft storage area. As noted above, only a small portion on the western edge of the building is in AOC 17 (Photographs 1-1 through 1-6). Open space in AOC 17 was historically used for materials storage and vehicle parking (BEI 2005b).

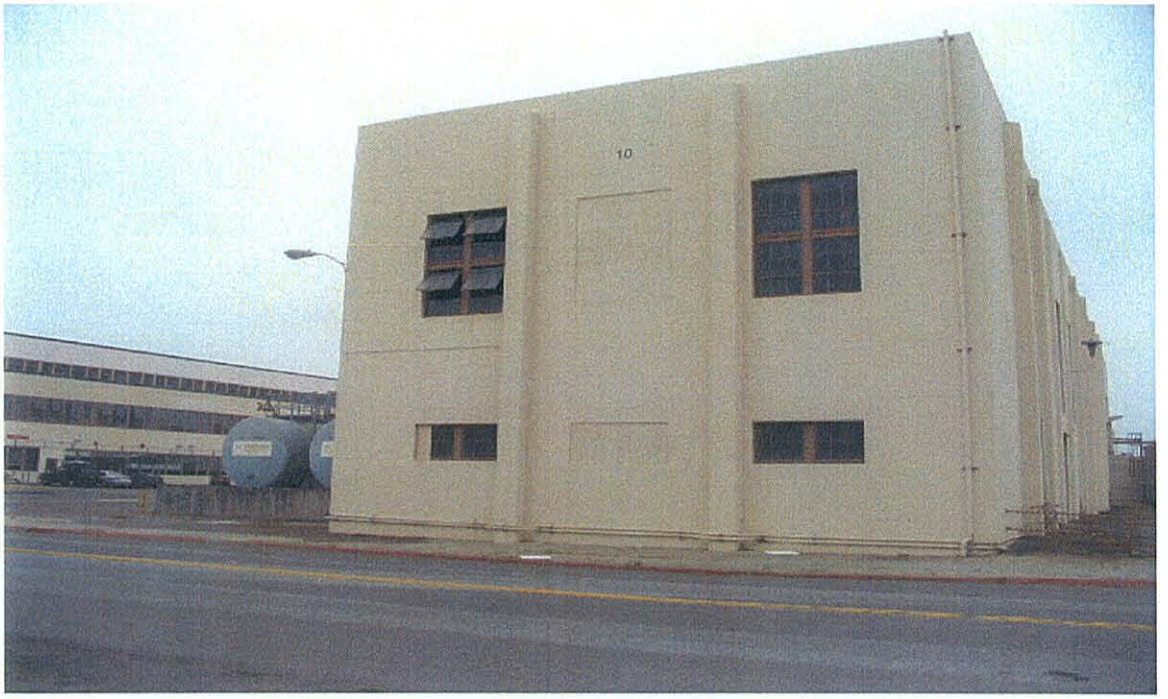
1.3 PRELIMINARY SCREENING CRITERIA AND BACKGROUND METALS

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this AOC are the following:

- Soil
  - residential preliminary remediation goals (PRGs) (U.S. EPA 2004b), except PAHs classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (µg/kg) (DON 2001a)
  - environmental screening levels (ESLs) for TPH – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)

Photograph 1-1
Western Side of Building 9, View to East

Photograph 1-2
Western Side of Building 9, View to East



Photograph 1-3
Eastern Side of Building 10, View to West

Photograph 1-4
Eastern Side of Building 10 and Paved Area to North, View to West

Photograph 1-5
General View to South

Photograph 1-6
General View to South

- Groundwater
  - maximum contaminant levels (MCLs) and advisory level for lead (U.S. EPA 2002, DHS 2006)
  - ESLs for TPH (RWQCB 2005)

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being assessed. For example, groundwater concentrations from all study areas were compared to MCLs, whether or not the groundwater was considered a potential drinking water source in that area. Chemicals of potential concern (COPCs) identified in the health risk evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs

In addition to the above PSCs, metals concentrations in soil and groundwater at AOC 17 were compared to the following Alameda Point background concentrations to help discriminate between site-related and naturally occurring metals:

- Alameda Point background soil concentrations (95th percentile of the pink data set; Appendix E of the final RI Report of OU-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)
- Alameda Point background groundwater concentrations (95th percentile; Appendix E of the final RI Report of OU-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)

For ease of discussion in this report, the Alameda Point 95th percentile concentrations for metals in soil (pink background data set) and groundwater are referred to as "background."

Section 4.3 of the main RI/FS Report provides further discussion on the occurrence and interpretation of metals concentrations in soil and groundwater at IR Site 35.

1.4 PREVIOUS INVESTIGATIONS

During two previous investigations, soil and groundwater samples were collected at AOC 17, and results of these investigations are summarized below. Locations sampled in AOC 17 are shown on Figure 1-1. Analytical results for soil and groundwater samples collected within AOC 17 are summarized in Appendix B.

1.4.1 Phases 2B and 3 Investigation

In 1991, soil and groundwater samples were collected during the Phases 2B and 3 investigation to assess whether contamination was present at IR Site 6, which is located 600 feet southeast of AOC 17 (PRC Environmental and Montgomery 1992). During this investigation, soil samples were also collected that were outside IR Site 6 but within the boundaries of AOC 17. One soil boring (B12-10) was advanced on the western edge of AOC 17. Soil samples were collected from 0 to 15.5 feet below ground surface (bgs), and were analyzed for volatile organic compounds (VOCs), total recoverable petroleum hydrocarbons (TRPH), semivolatile organic compounds (SVOCs), pesticides,

polychlorinated biphenyls (PCBs), and metals. B(a)P equivalent concentrations in soil were above the PSC in a surface sample from this boring collected from 0 to 0.5 foot bgs. Also, TRPH was reported at 20,500 milligrams per kilogram (mg/kg) from this sample; however, there is no PSC for TRPH. No other analytes were reported at concentrations above PSCs.

1.4.2 Environmental Baseline Survey

Seven soil samples (185I-001, -001M, -002, -002M, -005, -007, and -009) and two groundwater samples (185I-006 and 185I-008) were collected in AOC 17 during the EBS sampling to investigate the industrial sewer lines (IT 2001a). Soil and groundwater samples were analyzed for a combination of the following analytes: VOCs, TPH, SVOCs, pesticides, PCBs, herbicides, organotins, and metals.

Soil samples 185I-002 and 185I-001 had reported concentrations of diesel- and motor oil–range TPH, respectively, above PSCs. Arsenic was reported above the PSC, but below background. In addition, arsenic and aluminum were reported at concentrations above PSCs in both groundwater samples (185I-006 and 185I-008). Chromium and nickel concentrations in groundwater sample 185I-008 also were above PSCs.

Metals concentrations in groundwater likely represent total rather than dissolved concentrations in samples from soil borings (grab groundwater samples from soil borings are often turbid, which can result in higher concentrations of metals than in filtered samples). No other analytes were present at concentrations above PSCs in soil or groundwater (BEI 2005b).

1.5 ADJACENT SITES

IR Sites 5 and 12 are adjacent to the west side of AOC 17. Building 5 is currently vacant, but previously housed specialty shops for aircraft component repair and maintenance beginning in 1942. Shops within Building 5 were used for the cleaning, reworking, and manufacturing of metal parts, tool maintenance, plating operations, and painting operations. IR Site 12 includes Building 10, which housed the former NAS Alameda power plant.

Groundwater at IR Sites 5 and 12 (and 10, located approximately 900 feet southwest of AOC 17) is part of OU-2C. TPH, PAH, and metals contamination have been identified in soil at this OU. Additionally, chlorinated and nonchlorinated hydrocarbons and metals (xylene, PAHs, TPH, and cyanide) have been reported in the groundwater, with VOC plumes primarily concentrated under the eastern and central section of Building 5 (Shaw 2004a). IR Site 12 was identified as having metals contamination in soil. Results of groundwater samples collected as part of the basewide groundwater monitoring program from well M12-04 (located just west of AOC 17) do not indicate that concentrations of VOCs, TPH, or dissolved metals above PSCs extend from these IR sites to AOC 17 (ITSI 2005).

Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, geology, and potential beneficial groundwater use at AOC 17.

AOC 17 is located at and east of Saratoga Street. Topography at AOC 17 is relatively flat. The average ground elevation, based on elevation data from the three borings (A17SB01 through A17SB03) advanced during the RI, is 11 feet above mean sea level (MSL). Average depth to groundwater in the three RI borings was approximately 3.7 feet bgs. Groundwater depth was measured in temporary casings prior to groundwater sample collection. Total dissolved solids (TDS) concentrations measured in groundwater samples from the three borings ranged from 462 to 2,950 milligrams per liter (mg/L), and the average TDS concentration was 1,871 mg/L.

The groundwater monitoring well nearest to AOC 17 is M12-04, located approximately 25 feet west of AOC 17 (Figure 1-1). A review of groundwater depths in this well over time (August 1991 through December 2003) shows depth to water from approximately 3 to 7 feet bgs. The deepest historical groundwater measured in this well is approximately 4 feet above MSL. This value, if subtracted from the ground elevation at AOC 17, would suggest groundwater in the vicinity of this AOC may have been as deep as 7 feet bgs.

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is west to northwest at AOC 17. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Tidal influence at AOC 17, located approximately 1,000 feet from Seaplane Lagoon, is not expected based on tidal studies performed at other Alameda Point sites.

Fill material and coarse-grained sediment were encountered to approximately 10 feet bgs and consisted of poorly graded sand and poorly graded sand with gravel. Fill material is expected to exist about 7 to 8 feet bgs, where a distinct color change from light olive brown to dark greenish gray defines the contact between fill and coarse-grained bay sediment. Fine-grained bay sediment (Young Bay Mud) was encountered at 9.75 feet bgs in soil boring A17SB03 and is expected to be located at 9 to 12 feet bgs across the study area (see cross section G-G' on Figure 2-9 of the main RI/FS Report). RI boring logs are presented in Appendix D. As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust may be located beneath AOC 17; however, it was not encountered in borings advanced to 10 feet bgs during the RI.

Two soil samples were collected from 0.5 to 2 feet bgs and 2.5 to 4 feet bgs at A17SB01 and submitted for geotechnical analysis. The results indicated that the soil is silty sand and the fractions of organic carbon measured in the two samples were 0.0064 and 0.0047. Geotechnical results for samples collected at AOC 17 are presented in Table 3-5 of the main RI/FS Report.

Although it is considered unlikely that groundwater would be used a drinking water source, United States Environmental Protection Agency (U.S. EPA) has classified first-water-bearing-zone water in this area as a Class II aquifer. However, because of its location relative to Saratoga Street, groundwater beneath this study area may meet the exemption criteria for municipal and domestic water supply under the San Francisco Bay Regional Water Quality Control Board's (Water Board's) concurrence letter dated July 21, 2003, regarding groundwater west of Saratoga Street.

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Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for AOC 17. The RI was conducted in accordance with the sitewide data quality objectives (DQOs) for the evaluation of AOCs presented in Table 3-1 of the main RI/FS Report.

3.1 APPROACH

In previous investigations, TPH concentrations reported in soil were above PSCs, and arsenic, aluminum, chromium, and nickel concentrations in groundwater were above PSCs. RI sampling primarily addressed TPH, VOCs, and metals from historical site activities at adjacent IR Site 5 that may have impacted groundwater at AOC 17.

3.2 SCOPE

Soil and grab groundwater samples were collected during the 2005 RI sampling from three borings (A17SB01 through A17SB03). These samples were used to assess whether contaminated groundwater at IR Site 5 has impacted AOC 17, assess the presence of VOCs from previous site activities, confirm metals concentrations reported in groundwater during EBS sampling, and assess soil and groundwater for the presence of TPH. Table 3-1 summarizes samples collected during the RI and previous investigations. Figure 1-1 shows sampling locations from all investigations.

Soil and groundwater samples were analyzed for VOCs, TPH, metals, and hexavalent chromium. Groundwater samples were also analyzed for TDS. Additionally, two soil samples were collected from boring A17SB01 for geotechnical analysis.

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Section 4

NATURE AND EXTENT OF CONTAMINATION

This section presents the analytical results from previous investigations and from the RI, along with the concentration ranges and spatial distributions of the analytes identified at AOC 17. Soil and groundwater samples were collected at seven locations during the Phases 2B and 3 investigation (PRC Environmental and Montgomery 1992), the EBS (IT 2001a), and the RI (Table 3-1 and Figure 1-1). Metals reported in soil and groundwater at concentrations above background are discussed in detail in Section 4.3.3 of the main RI/FS Report. Metals discussion in this section focuses primarily on concentrations above PSCs. Regardless of concentration, all reported metals (except required human trace nutrients) were included in the risk evaluation (Section 6).

Concentration ranges of soil and groundwater results are presented in Tables 4-1 and 4-2, and soil and groundwater analytical results are summarized in Tables 4-3 and 4-4. Distribution of analytes reported at concentrations above PSCs are illustrated on Figures 4-1 and 4-2 for soil and groundwater, respectively. Complete analytical results for historical and RI samples collected within AOC 17 are included in Appendices B and G, respectively.

4.1 SOIL SAMPLING RESULTS

Analytical soil sampling results are summarized below for each class of chemicals investigated at AOC 17.

4.1.1 Volatile Organic Compounds

Methylene chloride was the only VOC reported in soil from borings A17SB01 through A17SB03. Methylene chloride concentrations were below the PSC.

4.1.2 Semivolatile Organic Compounds

Nine SVOCs were reported in soil samples, including one non-PAH SVOC (di-n-butyl phthalate). A B(a)P equivalent concentration of 980 µg/kg was reported in a surface soil sample (0 to 0.5 foot bgs) collected from B12-10. This concentration was above the PSC (620 µg/kg) and was incorporated into the PAH Areas (Attachment W). Other SVOC concentrations were below PSCs.

4.1.3 Total Petroleum Hydrocarbons

Motor oil– and diesel-range TPH were reported in EBS borings 185I-001 (920 J mg/kg) and 185I-002 (2,540 J mg/kg), respectively, from a depth of 9 to 9.5 feet bgs. These concentrations were above PSCs (100 and 500 mg/kg for diesel- and motor oil–range TPH, respectively).

Samples collected during the RI for extractable-range TPH (diesel, jet propellant grade 5, and motor oil) analysis were subject to silica gel cleanup prior to analysis to reduce the amount of nonpetroleum organic matter in samples that would increase the reported TPH concentration. The organic matter can include by-products of biodegradation of petroleum hydrocarbons that naturally occur in the subsurface (e.g., organic acids and

cell material from microorganisms). TPH was reported in only 1 of 12 soil samples collected during the RI (at a concentration well below the PSC), indicating that TPH reported in EBS samples is not widely distributed and/or silica gel cleanup was not performed on the older EBS samples. Therefore, TPH results reported for these EBS samples could be biased high.

Gasoline-range TPH was reported in soil from boring 185I-001 at a concentration below the PSC. Additionally, TRPH was reported at 20,500 mg/kg in a surface soil sample (B12-10); there is no PSC for TRPH.

4.1.4 Metals

Iron was the only metal reported at a concentration above both the PSC and background. Iron was reported at 27,000 mg/kg in boring A17SB02 at a depth of 1 to 2 feet bgs. This concentration was above the PSC (residential PRG of 23,000 mg/kg) and the background concentration of 22,280 mg/kg, but below the maximum background concentration of 27,900 mg/kg. As discussed in Section 4.3 of the main RI/FS Report, this iron concentration is considered naturally occurring. Arsenic was reported above the PSC (0.062 mg/kg), but the maximum concentration of 4.02 mg/kg was below the background concentration of 9.14 mg/kg.

Soil and groundwater samples collected during the RI at AOC 17 were analyzed for both total and hexavalent chromium because the total chromium was above the PSC in two groundwater samples (as discussed in Section 4.2.3 of the main RI/FS Report). Hexavalent chromium concentrations in soil samples ranged from greater than one to greater than two orders of magnitude less than total chromium concentrations.

4.1.5 Organotins

Organotins were not reported at concentrations above laboratory detection limits in either soil sample analyzed for these compounds.

4.2 GROUNDWATER SAMPLING RESULTS

Analytical groundwater sampling results are presented for each class of chemicals investigated at AOC 17.

4.2.1 Volatile Organic Compounds

Carbon disulfide and toluene were reported in groundwater from borings A17SB03 and A17SB02, respectively. The reported toluene concentration was below the PSC. Carbon disulfide does not have an established PSC.

4.2.2 Semivolatile Organic Compounds

SVOCs were not reported at concentrations above detection limits.

4.2.3 Total Petroleum Hydrocarbons

TPH was not reported at concentrations above detection limits.

4.2.4 Metals

Sixteen metals were reported in groundwater from borings A17SB01 through A17SB03 and 185I-008. The only metals concentrations above PSCs were reported in samples collected during previous investigations (185I-008 and 185I-006), where groundwater samples were likely unfiltered, and represent total rather than dissolved concentrations. Concentrations of dissolved metals in RI samples were below PSCs. For example, maximum concentrations of iron (64,900 micrograms per liter [µg/L]) and aluminum (45,800 µg/L) were between two and three orders of magnitude higher in sample 185I-008 than dissolved concentrations reported in RI samples (up to 946 µg/L iron and less than the reporting limit of 100 µg/L aluminum). Additionally, vanadium (no PSC) was identified as a risk contributor (Section 6) and was reported at concentrations of 124 and 38.6 µg/L in samples 185I-008 and 185I-006, respectively, but at concentrations from 1.2 J to 5.8 µg/L in the filtered RI groundwater samples. (The "J" qualifier indicates the value is estimated.)

The arsenic concentrations (15.9 and 10.7 µg/L) were above the PSC (MCL of 10 µg/L) but below the background concentration of 20.72 µg/L. The aluminum concentrations (45,800 and 14,100 µg/L) were above the PSC (MCL of 1,000 µg/L) and the background concentration of 1,070 µg/L in one sample. The total chromium concentrations (173 and 51.9 µg/L) were above the PSC (MCL of 50 µg/L) and the background concentration of 12.45 µg/L in one sample. Hexavalent chromium was not reported above the detection limit of 20 µg/L. Nickel was reported at a maximum concentration of 208 µg/L. This concentration was above its PSC (MCL of 100 µg/L); there is no background concentration for nickel. As discussed in Section 4.3 of the main RI/FS Report, the results from the groundwater samples collected at 185-IW-005 and 185-IW-004 (samples 185I-008 and 185I-006) are considered anomalous because the reported metals concentrations in these samples are not similar to the metals concentrations in samples from the RI.

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Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for AOC 17. It discusses the conceptual site model, the physical and chemical changes that might occur to contaminants present at AOC 17, and the mechanisms that could potentially transfer the contaminants from the study area. The conceptual site model facilitates understanding of the present AOC conditions by integrating AOC-specific physical characteristics with the nature and extent of contaminants in the physical systems. Section 5.2 includes an evaluation of the mobility and persistence of compounds above PSCs not attributable to background and also discusses risk contributors at AOC 17. Section 5.3 discusses potential migration pathways.

5.1 AOC 17 CONCEPTUAL SITE MODEL

AOC 17 is located at and east of Saratoga Street. Topography at the study area is flat and all of the AOC is paved. The nearest surface water to AOC 17 is Seaplane Lagoon, located approximately 1,000 feet to the south.

Based on a review of boring logs for AOC 17, the subsurface lithology at AOC 17 consists of generally homogeneous artificial fill material comprising poorly graded sand and poorly graded sand with gravel. Shallow groundwater of the first water-bearing zone beneath AOC 17 occurs in the fill material; the underlying Young Bay Mud would be expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. The western extent of the Marsh Crust may be located beneath AOC 17 but was not encountered in the RI borings advanced to 10 feet bgs. Groundwater flow direction varies from west to northwest in this area, and average depth to water is approximately 3.7 feet bgs, but may have historically been as much as 7 feet bgs. Negligible tidal influence is expected at AOC 17 because of its distance from Seaplane Lagoon. AOC 17 is within the central groundwater region of Alameda Point; while acknowledged as unlikely in the Alameda Point groundwater beneficial use evaluation (TtEMI 2000b), the groundwater in the central region is considered a Class II potential drinking water source based on TDS concentrations and groundwater yield. However, because AOC 17 includes a segment of Saratoga Street within its boundaries, it is unlikely that the groundwater beneath this AOC would be used as a drinking water source based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.

TPH (in soil), PAHs (in soil), and metals (in soil and groundwater) were reported above PSCs at AOC 17. TPH was not reported in groundwater at concentrations above laboratory detection limits, and toluene (one report of 0.29 J µg/L) was the only fuel-related constituent reported in groundwater. This suggests that groundwater is not significantly impacted by TPH, and that the remaining TPH in soil is likely weathered and not providing a significant, if any, source of soluble constituents to groundwater. PAH exceedances are addressed in the PAH Areas (Attachment W).

The metals that were above PSCs and background in soil and/or groundwater (arsenic, aluminum, chromium, iron, and nickel) include common elements of regional geology

and do not appear to be indicative of a release from previous activities at AOC 17. The concentration of iron in soil above the PSC, while greater than the background concentration, is considered indicative of naturally occurring concentrations in the fill material as discussed in Section 4.3 of the main RI/FS Report. Arsenic concentrations in soil and groundwater are below the Alameda Point background concentrations. Other metals exceedances identified in groundwater samples from previous investigations appear to represent total rather than dissolved metals concentrations, since comparable concentrations of dissolved metals were not reported in RI groundwater samples.

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in the environment tends to remain in place. The tendency toward immobility and persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Section 5 of the main RI/FS Report discusses the physical and chemical properties of contaminants, and their chemical class (e.g., TPH) that affect their transport and persistence in the environment. Also discussed in Section 5 of the main RI/FS Report are mobility and persistence of naturally occurring metals. This section focuses on the fate and transport of diesel- to motor oil–range TPH because they were the analytes reported at AOC 17 at concentrations above PSCs that are not naturally occurring.

TPH is generally composed of a spectrum of hydrocarbon molecule sizes, from the short-chain volatiles (e.g., benzene, toluene, ethylbenzene, and xylenes [BTEX], and naphthalene) to long-chain oils. TPH is subject to biodegradation (weathered) in the subsurface, with constituents that comprise the lighter end of fuels (gasoline and BTEX) being more readily biodegradable under aerobic conditions. These constituents also tend to be more volatile, more soluble, more mobile, and generally more toxic than the longer-chain hydrocarbons. Heavier fuels (motor oil and heavier end of diesel spectrum) do not typically have appreciable amounts of soluble constituents and tend to adhere to soil particles or organic matter in the subsurface, thus being less mobile. Aging or weathering of TPH will remove the light-end hydrocarbons, including volatiles, first. The lack of appreciable fuel-related volatile constituents (BTEX) reported in soil and groundwater (only toluene at a concentration of 0.29 J µg/L) indicates that the TPH present in the subsurface at AOC 17 has been subject to weathering and is not a significant source of soluble or volatile constituents to groundwater or air.

5.3 CONTAMINANT MIGRATION

The migration pathways evaluated for relevance to AOC 17 include atmospheric transport (i.e., vapors and airborne fugitive dust), transport via surface water runoff, and groundwater transport from AOC 17. Motor oil–range TPH and diesel-range TPH are the contaminants identified at AOC 17 whose source may be associated with Navy activities. Metals reported in soil and groundwater at concentrations above PSCs or background are

believed to be naturally occurring. Significant transport pathways were not identified for TPH at AOC 17 for the following reasons.

- Vapor migration of volatile compounds from soil or groundwater is not considered a significant transport mechanism at AOC 17 due to the low concentrations of VOCs reported at the study area and to the fact that motor oil–range TPH and diesel-range TPH are at the heavier end of the TPH spectrum and are not very volatile.
- Particulate dispersion (either by wind or surface water) is not a primary transport mechanism because all of AOC 17 is paved. However, if the surface cover at the AOC is disturbed or removed during and after redevelopment, particulate dispersion from soil is considered a possible transport pathway for nonvolatile compounds in surface soil.
- Transport due to groundwater flow is not considered a significant transport mechanism. While the more soluble constituents of fuels can dissolve into groundwater and migrate, if present, they have not generally been reported at AOC 17. Additionally, TPH was not reported in groundwater at AOC 17. Therefore, migration of fuel-related constituents in groundwater is not considered significant.
- Seasonal fluctuations of the groundwater table are not considered a significant mechanism for transport of TPH from soil to groundwater because the heavier-end TPH that was reported at AOC 17 has lower water solubility and exhibits lower mobility in soil. Additionally, the groundwater samples collected from AOC 17 did not have concentrations of TPH above the reporting limit.

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Section 6
TIER 1 EVALUATION

This section summarizes the Tier 1 risk evaluation results for AOC 17. In a Tier 1 evaluation, risk for a residential exposure scenario is assessed with the assumption that no remedial action would take place at the study area. This section also presents a qualitative uncertainty evaluation that identifies and characterizes the effects of uncertainties on the risk results.

A Tier 1 evaluation is a screening-level approach that calculates total cumulative risk values using published risk-based guidelines from the U.S. EPA, California Environmental Protection Agency (Cal/EPA), and Water Board. The Tier 1 evaluation includes all chemicals identified in at least one sample except for PAHs in soil. PAHs in soil are not included because site-specific remediation goals for PAHs are being developed. The approach used to estimate risk is described in Section 6 of the main RI/FS Report. Tier 1 information is provided in Appendix J.

Cancer risk and noncancer values for AOC 17 are shown in Table 6-1. Risk drivers for cancer and noncancer risk are presented in Table 6-2.

6.1 COPC IDENTIFICATION

The data selection and identification of COPCs are based on a compilation of all usable data for soil and groundwater. All chemicals reported in at least one sample collected during the RI and/or included in the historical data were included as Tier 1 COPCs, except calcium, magnesium, potassium, and sodium, which are known to be required human trace nutrients.

There are 21 Tier 1 COPCs in soil at AOC 17: 19 metals based on 18 to 20 samples, and 1 non-PAH SVOC (di-n-butyl phthalate) and 1 VOC (methylene chloride) based on 16 samples.

There are 15 Tier 1 COPCs in groundwater at AOC 17: 13 metals based on six samples and 2 VOCs, carbon disulfide and toluene, based on three samples.

6.2 RISK CHARACTERIZATION

The cancer risk and noncancer hazard values were calculated using the Tier 1 protocol from Cal/EPA (2005). The maximum concentration of each COPC in soil and groundwater was compared with a risk-based guideline to estimate cancer and noncancer risks. Two results are presented for three exposure groups, the total risk and a second value that does not include risk associated with metals concentrations that are below background.

For soil and groundwater data for the three exposure groups at AOC 17, the calculated cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 2×10^{-3} and 16

  Without metals below background: 2×10^{-6} and 13

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 7×10^{-5} and 3

  Without metals below background: 5×10^{-8} and 2

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 2×10^{-3} and 13

  Without metals below background: 2×10^{-6} and 11

For reasonable future use, the Exposure Group 2 noncancer hazard without metals below background is below 1 without iron.

For residential use of groundwater, the Exposure Group 3 cancer risk without metals at concentrations below background is due to chromium. The noncancer hazard value is due to aluminum (hazard quotient [HQ] of 1), iron (HQ of 6), and vanadium (HQ of 3). These metals are associated with 2001 data from samples that were likely unfiltered, since they were either not reported at comparable concentrations in the RI or were not reported above detection limits.

6.3 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation represent any potential health concerns at AOC 17. The results are consistent with the site history and previous investigations. This approximately 0.9-acre site is adequately characterized with three investigations and a Tier 1 evaluation based on 16 to 20 soil samples for metals and 3 to 6 groundwater samples.

The potential impact of vapors from the two VOCs reported in groundwater to indoor air is negligible. The noncancer hazard indices (HIs) based on the tap water PRGs are well below 1, and the PRG is higher than the ESL for indoor air. The uncertainty associated with the omission of the dermal pathway for groundwater is low because exposure from the dermal pathway for the Tier 1 COPCs would not result in an increase in the cancer risk or HI for residential use of groundwater (Exposure Groups 1 and 3). Cancer risk and hazard values are reported in one significant figure, so small changes will not necessarily result in an overall increase. This finding is based on the ratio of dermal exposure to ingestion for each Tier 1 COPC.

6.4 CONCLUSIONS

The total cancer risk for the exposure groups that include residential use of groundwater (Exposure Groups 1 and 3) are above the risk management range, but without metals below background are within the risk management range at 2×10^{-6}.

For exposure pathways for soil and VOCs in groundwater (Exposure Group 2), the cancer risk without metals below background is below the de minimis level of 10^{-6} for soil.

Also, as discussed in Section 4 of the main RI/FS Report, statistical analysis indicates that the concentrations of iron are naturally occurring and not the result of releases due to Navy activities. The maximum concentration of iron in soil of 27,000 mg/kg is slightly below the maximum concentration in the background (27,900 mg/kg) but above the 95th percentile in background. Also, as noted in Section J1.2.4, the health effects of iron are not considered additive with other chemicals.

For residential use of groundwater, the cancer risk without metals at concentrations below background is due to chromium, and the noncancer hazard is due largely to aluminum, iron, and vanadium. The risk associated with residential use of groundwater is probably overestimated. The higher concentrations of aluminum, chromium, and vanadium were reported in the same two EBS samples, which likely were unfiltered. The four groundwater samples collected during the RI were filtered, and these metals were either not detected or reported at low concentrations (one to two orders of magnitude lower than EBS results).

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Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at AOC 17, including the nature and extent of contamination and results of the Tier 1 risk evaluation. RI results form the basis of responses to the DQO decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendations presented below.

7.1 SUMMARY

RI sampling was performed at AOC 17 to assess whether historical site activities at adjacent IR Site 5 or at AOC 17 have impacted groundwater at AOC 17. Soil and groundwater samples were collected at eight locations during previous investigations and the RI.

PAHs, TPH, and metals (arsenic and iron) in soil, and metals (aluminum, arsenic, chromium, and nickel) in groundwater were reported at concentrations above PSCs. TPH in soil does not appear to be widespread or provide a significant, if any, source of soluble constituents to groundwater, since TPH was not reported in groundwater at concentrations above laboratory detection limits and the only other fuel-related constituent reported in soil or groundwater was toluene (one concentration of 0.29 J µg/L) in groundwater. Metals in soil and groundwater are believed to be naturally occurring rather than a result of Navy activities. Arsenic is above the PSC but below background. Other metals with concentrations above PSCs and background identified in groundwater samples from previous investigations appear to represent total rather than dissolved metals concentrations, since comparable concentrations of dissolved metals were not reported in RI groundwater samples. The B(a)P equivalent concentrations in soil above the PSC were considered under the PAH Areas (Attachment W).

Results of the Tier 1 risk evaluation show a total cancer risk of 2×10^{-3} (above the risk management range) due primarily to arsenic in soil and groundwater and chromium in groundwater. The HI of 16 is due primarily to iron in soil and aluminum, iron, manganese, and vanadium in groundwater. While Tier 1 risk results indicate cancer risk (without metals below background) for both soil and groundwater (residential use) pathways in the low risk management range (2×10^{-6}), the HI is greater than 1. In soil, this is driven by the maximum reported iron concentration (27,000 mg/kg; HQ of 1). This concentration is greater than the background 95th percentile (22,280 mg/kg) but below the maximum concentration of 27,900 mg/kg. Iron concentrations in soil are considered to be consistent with naturally occurring iron concentrations. In groundwater, the HI is driven by maximum concentrations of iron (64,900 µg/L), vanadium (124 µg/L), and aluminum (45,800 µg/L) (HQs of 6, 3, and 1, respectively) that likely represent total rather than dissolved concentrations.

7.2 AOC 17 CONCLUSIONS AND RECOMMENDATIONS

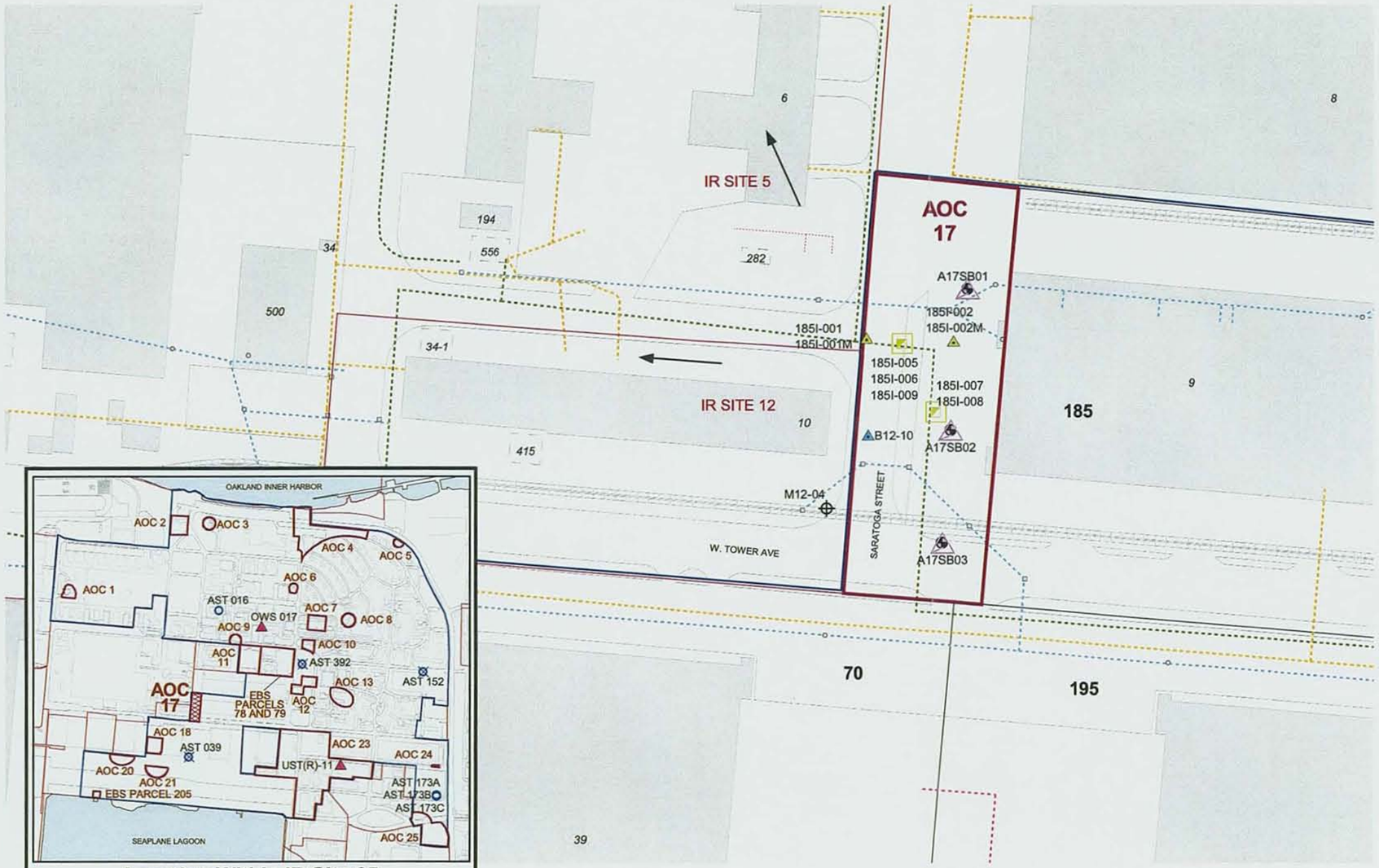
The RI was conducted using the seven-step U.S. EPA DQO process (U.S. EPA 2000); DQOs were developed for AOC 17 in the Work Plan (BEI 2006). The RI has addressed these DQOs, as summarized in Table 7-1.

Data collected during previous investigations and the RI were sufficient to perform a Tier 1 risk evaluation and support decisions on the necessity for remedial actions at AOC 17. While TPH exceedances have been identified in soil from 9 to 9.5 feet bgs and a high TRPH concentration was reported in a surface sample, it appears that the TPH remaining in soil is likely weathered and not providing a significant, if any, source of soluble constituents to groundwater. The TPH and TRPH results could also include contribution from nonpetroleum organic material, as it is unlikely that silica gel cleanup were performed on the pre-RI samples. Additionally, no other significant contamination has been identified in soil or groundwater that is indicative of a release from AOC 17 or the adjacent IR Site 5.

No further action is recommended at AOC 17. Further evaluation of the extent of TPH in soil and metals in soil and groundwater is not recommended for the following reasons.

- TPH remaining in soil is likely weathered and not providing a significant, if any, source of soluble constituents to groundwater.
- Without metals below background, cancer risk associated with soil and residential use of groundwater is within the risk management range of 10^{-6} to 10^{-4}. Without iron, the HI for soil pathways is 1. Elevated concentrations of aluminum, iron, and vanadium in groundwater likely represent total rather dissolved concentrations.
- PAHs are addressed as part of the PAH Areas (Attachment W).

FIGURES



Location Within IR Site 35

1500 0 1500 Feet

LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- FUEL LINE (ABANDONED IN-PLACE)
- FUEL LINE (REMOVED)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- GROUNDWATER MONITORING WELL M12-04

EBS SOIL SAMPLING LOCATION WITH SAMPLE ID
- SVOCs, FUELS, AND METALS ANALYSES ONLY
- VOCs, SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY

EBS GROUNDWATER SAMPLING LOCATION WITH SAMPLE ID
- SVOCs, FUELS, AND METALS ANALYSES ONLY

PHASES 2B AND 3 INVESTIGATION SOIL SAMPLING LOCATION WITH STATION ID
- VOCs, SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY

RI SOIL SAMPLING LOCATION WITH STATION ID
- VOCs, FUELS, AND METALS ANALYSES ONLY

RI GROUNDWATER SAMPLING LOCATION WITH STATION ID
- VOCs, FUELS, AND METALS ANALYSES ONLY

N

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOCs – VOLATILE ORGANIC COMPOUNDS

100 0 100 Feet

RI/FS Report for IR Site 35

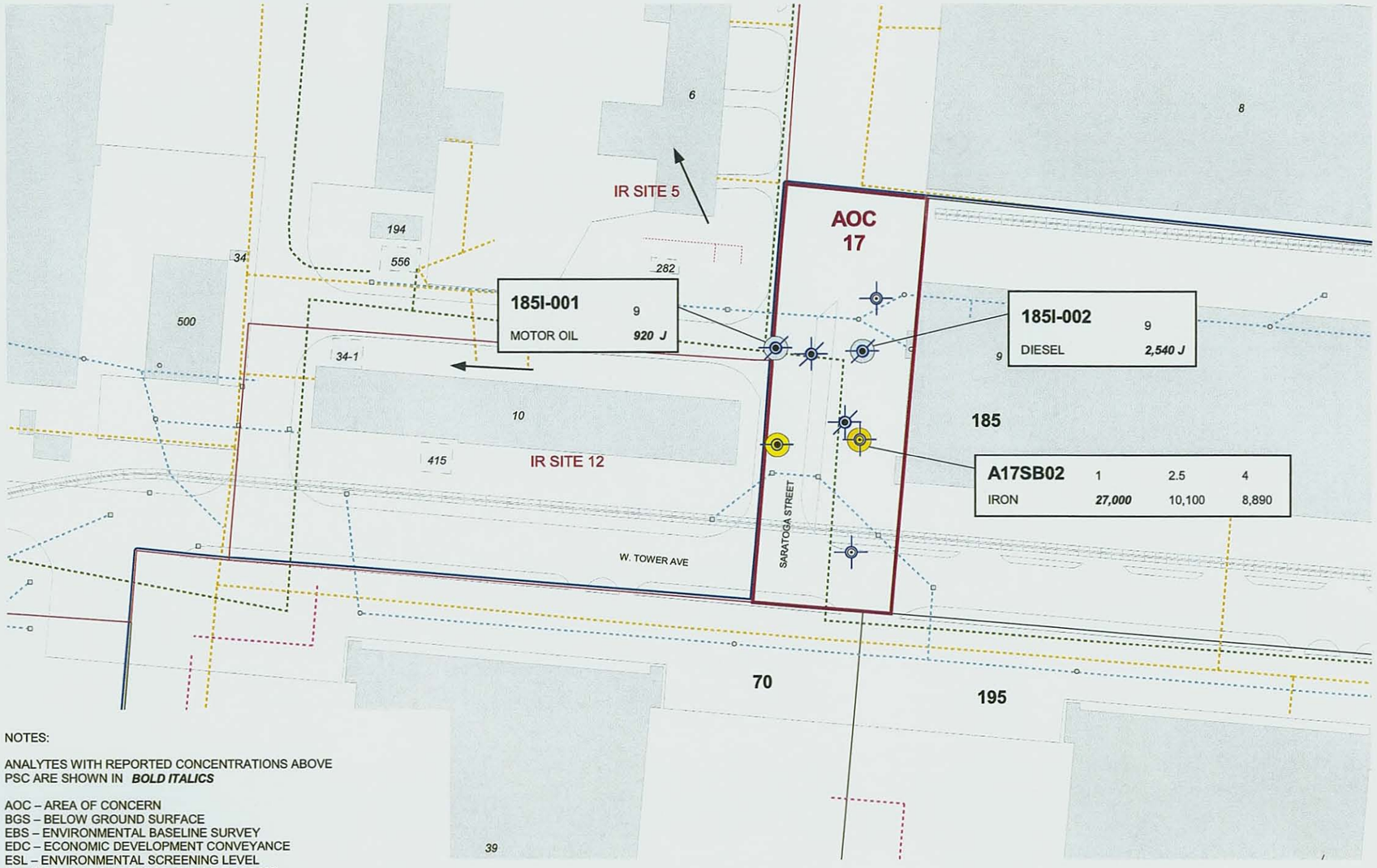
Figure 1-1

Study Area and Sampling Locations
Area of Concern 17

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/30/06
File No.: 077L14456
Job No.: 23818-077
Rev No.: C



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- FUEL LINE (ABANDONED IN-PLACE)
- FUEL LINE (REMOVED)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL SOIL SAMPLING LOCATION
- RI SOIL SAMPLING LOCATION

N

SOIL SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC FOR :

- METALS
- FUELS
- BENZO(A)PYRENE EQUIVALENT (SEE ATTACHMENT W, PAH AREAS, FOR ADDITIONAL INFORMATION AND CONCENTRATIONS)

SOIL SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :

- METALS
- FUELS
- SVOCs

STATION ID (SAMPLE ID FOR EBS LOCATIONS) — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

185I-002
185I-002M 9
DIESEL 2,540 J

ANALYTE — REVIEW QUALIFIER — CONCENTRATION in mg/kg

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
ESL – ENVIRONMENTAL SCREENING LEVEL
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
mg/kg – MILLIGRAMS PER KILOGRAM
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PRG – PRELIMINARY REMEDIATION GOAL
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
TPH – TOTAL PETROLEUM HYDROCARBONS

Analyte	PSC
DIESEL	100 mg/kg (TPH Residential Soil ESL)
IRON	23,000 mg/kg (Federal Residential PRG)
MOTOR OIL	500 mg/kg (TPH Residential Soil ESL)

RI/FS Report for IR Site 35

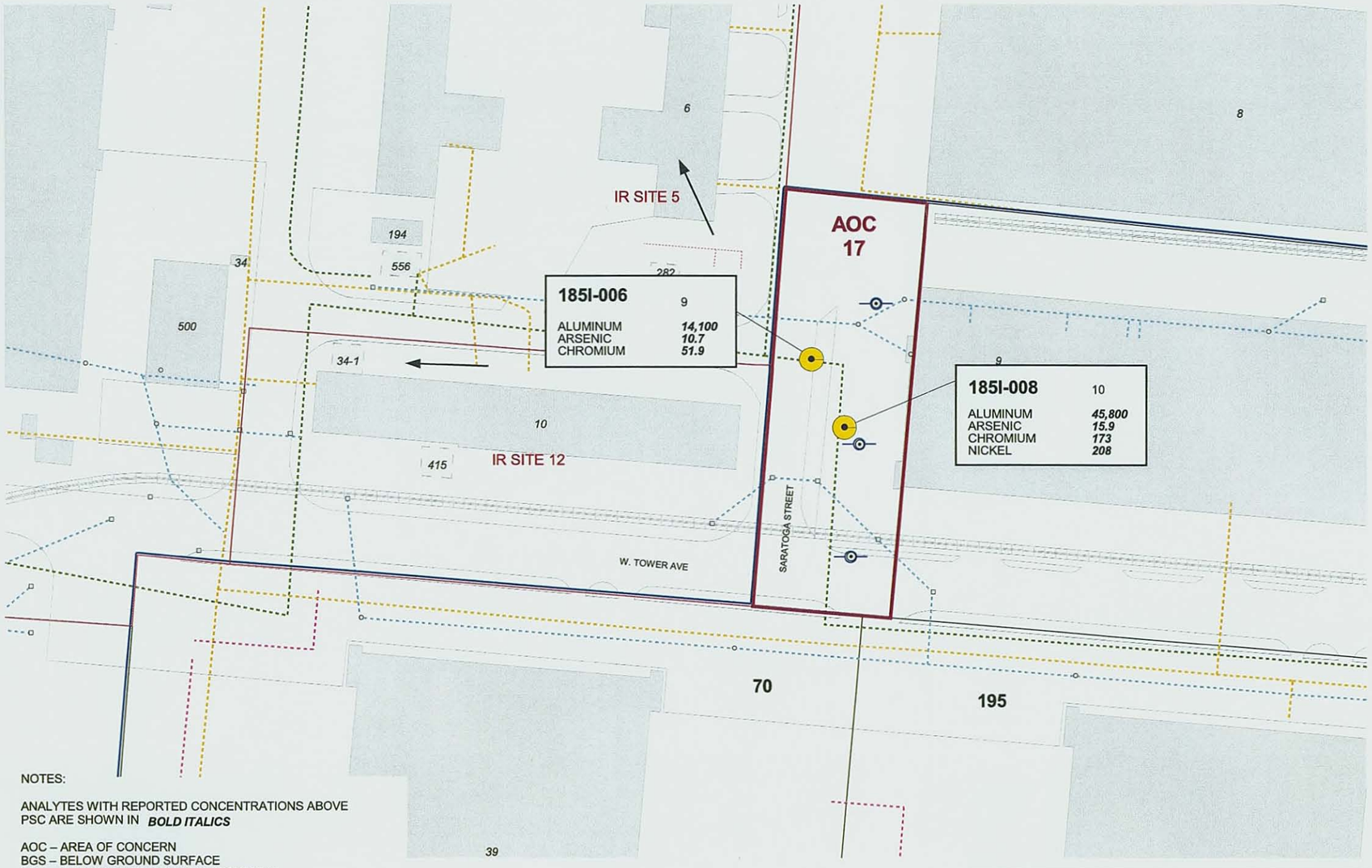
Figure 4-1

Soil Sampling Results for Analytes Above PSC – Area of Concern 17

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/30/06
File No.: 077L14490
Job No.: 23818-077
Rev No.: C



LEGEND

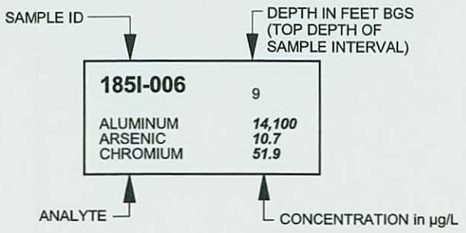
- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- FUEL LINE (ABANDONED IN-PLACE)
- FUEL LINE (REMOVED)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL GROUNDWATER SAMPLING LOCATION
- RI GROUNDWATER SAMPLING LOCATION

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC AND GREATER THAN BACKGROUND FOR :

- METALS

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :

- METALS



N

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
MCL – MAXIMUM CONTAMINANT LEVEL
µg/L – MICROGRAMS PER LITER
NA – NOT APPLICABLE
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

Analyte	PSC	Background 95th Percentile
ALUMINUM	1000 µg/L (California MCL)	1070 µg/L
ARSENIC	10 µg/L (Federal MCL)	20.72 µg/L
CHROMIUM	50 µg/L (California MCL)	12.45 µg/L
NICKEL	100 µg/L (California MCL)	NA

RI/FS Report for IR Site 35

Figure 4-2

Groundwater Sampling Results for Analytes Above PSC – Area of Concern 17

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/26/07
File No.: 077L14491
Job No.: 23818-077
Rev No.: D

TABLES

Table 3-1
Sample Analysis Summary, AOC 17

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE										
				VOCs	SVOCs	TPH	Pest/PCBs	PCBs	Herbicides	Metals	Organotins	Geotechnical Parameters[a]	TDS	CrVI
Soil														
185-IW-001	185I-001[b]	EBS	9–9.5	X	X	X[c]	X		X	X	X			
185-IW-001	185I-001M[b]	EBS	9–9.5	X						X				
185-IW-002	185I-002[b]	EBS	9–9.5	X	X		X		X	X	X			
185-IW-002	185I-002M[b]	EBS	9–9.5	X						X				
185-IW-005	185I-007	EBS	2–3		X	X[c]				X				
B12-10	B12-10-000	Phases 2B and 3 Inv.	0–0.5		X	X[d]	X			X				
B12-10	B12-10-000-DUP (FD)	Phases 2B and 3 Inv.	0–0.5					X						
B12-10	B12-10-002	Phases 2B and 3 Inv.	2–3.5	X	X	X[d]	X			X				
B12-10	B12-10-008	Phases 2B and 3 Inv.	8–9	X	X	X[d]	X			X				
B12-10	B12-10-014	Phases 2B and 3 Inv.	14–15.5	X	X	X[d]	X			X				
A17SB01	C077S281	Site 35 RI	0.5–2	X		X[e]				X		X		X
A17SB01	C077S282	Site 35 RI	2.5–4	X		X[e]				X		X		X
A17SB01	C077S283	Site 35 RI	4–5	X		X[e]				X				X
A17SB02	C077S284	Site 35 RI	1–2	X		X[e]				X				X
A17SB02	C077S285	Site 35 RI	2.5–4	X		X[e]				X				X
A17SB02	C077S286	Site 35 RI	4–5	X		X[e]				X				X
A17SB03	C077S287	Site 35 RI	1–2	X		X[e]				X				X
A17SB03	C077S288	Site 35 RI	3–4	X		X[e]				X				X
A17SB03	C077S289	Site 35 RI	4–5	X		X[e]				X				X
Groundwater														
185-IW-004	185I-006	EBS	9–10	X	X	X[c]				X				
185-IW-005	185I-008	EBS	10–10	X	X	X[c]				X				
A17SB01	C077G061	Site 35 RI	5–10	X		X[e]				X			X	X
A17SB02	C077G062	Site 35 RI	5–10	X		X[e]				X			X	X
A17SB03	C077G063	Site 35 RI	5–10	X		X[e]				X			X	X
A17SB03	C077G064 (FD)	Site 35 RI	5–10							X			X	X

References:
EBS (IT 2001a)
Phases 2B and 3 Inv. (PRC Environmental and Montgomery 1992)

Notes:
[a] see table in Appendix E for a list of geotechnical parameters and results
[b] samples 185I-001 and -002 were analyzed by a fixed-base laboratory; samples 185I-001M and -002M were analyzed by a mobile or screening laboratory; samples 185I-001/-001M and -002/-002M were collected from the same respective locations
[c] analyzed for gasoline-, diesel-, and motor oil–range TPH
[d] analyzed for TRPH
[e] analyzed for diesel-, JP-5–, and motor oil–range TPH

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
CrVI – hexavalent chromium
EBS – environmental baseline survey
FD – field duplicate
Inv. – investigation
JP-5 – jet propellant grade 5
PCB – polychlorinated biphenyl
Pest – pesticides
RI – remedial investigation
SVOC – semivolatile organic compound
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
TRPH – total recoverable petroleum hydrocarbons
VOC – volatile organic compound

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 17

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
Volatile Organic Compounds (µg/kg)										
methylene chloride	16	6	38	0	4.9	6.4	11	9,100	—[c]	—
Fuels (µg/kg)										
diesel	14	1	7	1	2,540,000	2,500,000	2,540,000	—	100,000	—
gasoline	5	1	20	0	1,600	1,600	1,600	—	100,000	—
motor oil	14	2	14	1	19,000	470,000	920,000	—	500,000	—
petroleum hydrocarbons, total recoverable	4	1	25	No PSC	20,500,000	21,000,000	20,500,000	—	—	—
Semivolatile Organic Compounds (µg/kg)										
benz(a)anthracene	4	1	25	0	800	800	800	620	—	—
benzo(b)fluoranthene	4	1	25	0	730	730	730	620	—	—
chrysene	4	1	25	0	930	930	930	3,800[d]	—	—
di-n-butyl phthalate	9	1	11	0	40	40	40	6,100,000	—	—
fluoranthene	4	1	25	0	890	890	890	2,300,000	—	—
2-methylnaphthalene	4	1	25	No PSC	920	920	920	—	—	—
naphthalene	4	1	25	0	1,000	1,000	1,000	1,700[d]	—	—
phenanthrene	4	1	25	No PSC	1,500	1,500	1,500	—	—	—
pyrene	4	1	25	0	1,100	1,100	1,100	2,300,000	—	—
Metals (mg/kg)										
aluminum	18	18	100	0	3,780	6,400	14,500	76,000	—	13,960
antimony	20	4	20	0	3.1	4.9	6.8	31	—	9.50
arsenic	18	15	83	0	1.2	2.3	4.02	0.062[d]	—	9.14
barium	18	18	100	0	17.8	41	85.9	5,400	—	93.68
beryllium	20	15	75	0	0.12	0.33	0.9	150	—	1.27
cadmium	20	2	10	0	0.11	0.21	0.31	37	—	1.72
calcium	18	18	100	No PSC	1,840	2,900	7,850	—	—	16,800
chromium	20	18	90	0	12.9	30	48.8	210	—	54.84
chromium, hexavalent	9	8	89	0	0.086	0.27	0.45	30	—	—
cobalt	18	18	100	0	3.4	5.5	9.92	900	—	14.30
copper	20	18	90	0	4.51	10	24.9	3,100	—	39.14
iron	18	18	100	1	7,440	12,000	27,000	23,000	—	22,280
lead	20	18	90	0	1.6	4.9	19.4	150[d]	—	37.66
magnesium	18	18	100	No PSC	1,970	3,400	7,990	—	—	7,304
manganese	18	18	100	0	76.6	180	685	1,800	—	383.0
mercury	20	2	10	0	0.032	0.07	0.108	23	—	0.52
nickel	20	20	100	0	10.8	29	49.3	1,600	—	55.72
potassium	18	18	100	No PSC	396	790	2,300	—	—	1,232
silver	20	6	30	0	0.33	0.67	1.09	390	—	2.22
sodium	18	10	56	No PSC	155	540	1,460	—	—	1,230
thallium	18	1	5.6	0	0.53	0.53	0.53	5.2	—	0.50
vanadium	18	18	100	0	16.7	24	42.4	78	—	47.34
zinc	20	19	95	0	12.8	24	48.1	23,000	—	67.48

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

Acronyms/Abbreviations:

AOC – area of concern
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
TPH – total petroleum hydrocarbons

Table 4-2
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, AOC 17

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background	Minimum [a]	Average [a]	Maximum [a]	California MCL	Background (95th Percentile)
VOCs (µg/L)									
carbon disulfide	3	1	33	No PSC	0.31	0.31	0.31	—[b]	—
toluene	3	1	33	0	0.29	0.29	0.29	150	—
Metals (µg/L)									
aluminum	6	2	33	2	14,100	30,000	45,800	1,000	1,070
arsenic	6	2	33	0	10.7	13	15.9	10[c]	20.72
barium	6	6	100	0	61.3	180	273	1,000	569.5
calcium	6	6	100	No PSC	4,030	35,000	75,300	—	—
chromium	6	5	83	2	4.7	48	173	50	12.45
cobalt	6	2	33	No PSC	16.8	26	34.2	—	—
copper	6	2	33	No PSC	20.5	47	72.5	—	24.03
iron	6	4	67	No PSC	135	21,000	64,900	—	6,586
lead	6	2	33	1	4	9.5	15	15[c]	11.45
magnesium	6	6	100	No PSC	5,690	37,000	72,300	—	—
manganese	6	6	100	No PSC	180	760	1,360	—	1,741
molybdenum	2	1	50	No PSC	5.8	5.8	5.8	—	—
nickel	6	2	33	1	60.4	130	208	100	—
potassium	6	6	100	No PSC	10,700	21,000	31,200	—	—
sodium	6	6	100	No PSC	49,800	490,000	921,000	—	—
vanadium	6	6	100	No PSC	1.2	30	124	—	26.27
zinc	6	2	33	No PSC	32.6	74	115	—	36.39
General Chemistry (µg/L)									
solids, total dissolved	4	4	100	No PSC	462,000	2,100,000	2,950,000	—	—

Notes:

[a] data review qualifiers are not included in this table

[b] dash indicates not applicable or not established

[c] Federal MCL

Acronyms/Abbreviations:

AOC – area of concern

µg/L – micrograms per liter

MCL – maximum contaminant level

PSC – preliminary screening criterion (MCL)

VOC – volatile organic compound

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Table 4-3
Soil Sampling Results, AOC 17

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	185-IW-001 / 185I-001 / 9 - 9.5 / 09-Dec-94	185-IW-001 / 185I-001M / 9 - 9.5 / 09-Dec-94	185-IW-002 / 185I-002 / 9 - 9.5 / 09-Dec-94	185-IW-002 / 185I-002M / 9 - 9.5 / 09-Dec-94	185-IW-004 / 185I-005 / 5 - 7 / 02-Nov-95	185-IW-004 / 185I-009 (FD) / 5 - 7 / 02-Nov-95	185-IW-005 / 185I-007 / 2 - 3 / 03-Nov-95	A17SB01 / C077S281 / 0.5 - 2 / 13-Dec-05	A17SB01 / C077S282 / 2.5 - 4 / 13-Dec-05	A17SB01 / C077S283 / 4 - 5 / 13-Dec-05	A17SB02 / C077S284 / 1 - 2 / 13-Dec-05	A17SB02 / C077S285 / 2.5 - 4 / 13-Dec-05	A17SB02 / C077S286 / 4 - 5 / 13-Dec-05
VOCs																		
methylene chloride	9,100	—[b]	—	—	µg/kg	11 U	10 U	12 U	10 U	NA	NA	NA	4.9 J	11 J	60 U	5.5 J	50 U	6 J
Petroleum Hydrocarbons																		
diesel	—	—	100,000	—	µg/kg	22,000 U	NA	**2,540,000 J**[c]	NA	26,000 U	28,000 U	26,000 U	1,100 U	1,100 U	1,200 U	1,100 U	1,100 U	1,200 U
gasoline	—	—	100,000	—	µg/kg	1,600 J	NA	580 U	NA	530 U	560 U	530 U	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	µg/kg	**920,000 J**	NA	46,000 U	NA	26,000 U	28,000 U	26,000 U	11,000 U	11,000 U	19,000 J	11,000 U	11,000 U	12,000 U
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																		
benz(a)anthracene	620[d]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[d]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[d]	3,800[d]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	1,900 U	NA	40 J	NA	350 U	360 U	350 U	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[d]	1,700[d]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs						ND	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Herbicides						ND	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																		
aluminum	76,000	—	—	13,960	mg/kg	10,800 J	NA	5,490 J	NA	4,230	4,340	3,800	5,550	4,670	5,400	*14,000*[e]	5,130	4,210
antimony	31	—	—	9.50	mg/kg	0.73 UJ	*25 U*[f]	0.74 UJ	*25 U*[f]	0.77 U	0.81 U	0.77 U	0.5 UJ	0.5 UJ	0.45 UJ	0.6 UJ	0.5 UJ	0.6 UJ
arsenic	0.39	0.062	—	9.14	mg/kg	**1.2**	NA	**2.8**	NA	**1.4 U**[f]	**1.5 U**[f]	**1.4 U**[f]	**2.3**	**2.2**	**2.2**	**2.9**	**2.1**	**1.9**
barium	5,400	—	—	93.68	mg/kg	53.8	NA	50.7	NA	33.3	37	28.2	42.4	37.7	61.3	85.9	35.5	29.7
beryllium	150	—	—	1.27	mg/kg	0.9	*25 U*[f]	0.57 J	*25 U*[f]	0.23 U	0.26 U	0.26 U	0.17 J	0.14 J	0.17 J	0.3	0.16 J	0.13 J
cadmium	37	—	—	1.72	mg/kg	0.11	*25 U*[f]	0.31	*25 U*[f]	0.49 U	0.52 U	0.49 U	0.5 U	0.5 U	0.6 U	0.6 U	0.5 U	0.6 U
calcium	—	—	—	16,800	mg/kg	4,330 J	NA	7,850 J	NA	1,960	1,840	1,990	2,240	1,850	2,140	5,520	2,500	1,880
chromium	210	—	—	54.84	mg/kg	17.7	25 U	39.5	25 U	30.6	26.7	27.6	29.5	31	32.1	12.9	29.6	29.1
chromium, hexavalent	30	—	—	—	mg/kg	NA	NA	NA	NA	NA	NA	NA	0.14 J	1.1 U	0.32 J	0.31 J	0.45 J	0.32 J
cobalt	900	—	—	14.30	mg/kg	8	NA	6.1	NA	4.1	4.2	4.3	5 J	4.4 J	5 J	7.2 J	4.7 J	4.2 J
copper	3,100	—	—	39.14	mg/kg	19.9	25 U	12	25 U	6.6	6.3	6.1	7.9	7.6	7.1	24.9	7.3	6.2
iron	23,000	—	—	22,280	mg/kg	17,300	NA	11,100	NA	8,260	8,170	7,900	11,300	9,980	10,600	***27,000***	10,100	8,890
lead	400	150	—	37.66	mg/kg	7.9	25 U	3.1	25 U	1.6	1.6	2.1	3	3.3	2.8	3.2	15.2	7.7
magnesium	—	—	—	7,304	mg/kg	5,870	NA	3,910	NA	2,410	2,360	1,970	2,850	2,510	2,840	4,910	2,690	2,240
manganese	1,800	—	—	383.0	mg/kg	328 J	NA	350 J	NA	94.8	76.6	77.4	115 J	95.2 J	103 J	*685 J*	102 J	90.7 J
mercury	23	—	—	0.52	mg/kg	0.17 U	***25 U***[f]	0.18 U	***25 U***[f]	0.05 U	0.06 U	0.05 U	0.032 J	0.1 U	0.1 U	0.1 U	0.021 U	0.1 U
nickel	1,600	—	—	55.72	mg/kg	27.7	38	33.3	29	26.1	26.4	20.7	30.6	27.5	31.7	10.8	30.9	26
potassium	—	—	—	1,232	mg/kg	908	NA	739	NA	818	513	512	729	718	806	396	775	788
silver	390	—	—	2.22	mg/kg	0.33	*25 U*[f]	0.58	*25 U*[f]	1.3 U	1.4 U	1.3 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.052 U
sodium	—	—	—	1,230	mg/kg	448	NA	518	NA	155	202	241	102 U	75.5 U	90.1 U	726	293 U	199 U
thallium	5.2	—	—	0.50	mg/kg	*0.53*	NA	*0.52 UJ*[f]	NA	0.11 UJ	0.11 UJ	0.11 UJ	*2 U*[f]	*2 U*[f]	*2 U*[f]	*2 U*[f]	*2 U*[f]	*2 U*[f]
vanadium	78	—	—	47.34	mg/kg	36.3	NA	23.8	NA	17.6	16.7	16.8	21.4	18.3	20.6	26.9	20.1	18.4
zinc	23,000	—	—	67.48	mg/kg	38.4	27	34.4	25 U	18.2 J	18.1 J	17.1 J	19.3	17.1	19.4	48.1	21.8	15.7
Organotins						ND	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 17

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	A17SB03 C077S287 1 - 2 13-Dec-05	A17SB03 C077S288 3 - 4 13-Dec-05	A17SB03 C077S289 4 - 5 13-Dec-05	B12-10 B12-10-000 0 - 0.5 05-Aug-91	B12-10 B12-10-000-DUP 0 - 0.5 05-Aug-91	B12-10 B12-10-002 2 - 3.5 05-Aug-91	B12-10 B12-10-008 8 - 9 05-Aug-91	B12-10 B12-10-014 14 - 15.5 05-Aug-91
VOCs													
methylene chloride	9,100	—[b]	—	—	µg/kg	50 U	6 J	5.2 J	NA	NA	5.1 U	7.3 UJ	6.4 U
Petroleum Hydrocarbons													
diesel	—	—	100,000	—	µg/kg	1,100 U	1,100 U	1,100 U	NA	NA	NA	NA	NA
gasoline	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	µg/kg	11,000 U	11,000 U	11,000 U	NA	NA	NA	NA	NA
TRPH	—	—	—	—	µg/kg	NA	NA	NA	20,500,000	NA	29,000 U	35,200 U	36,300 U
SVOCs													
benz(a)anthracene	620[d]	—	—	—	µg/kg	NA	NA	NA	**800**	NA	100 U	120 U	130 U
benzo(b)fluoranthene	620[d]	—	—	—	µg/kg	NA	NA	NA	**730**	NA	100 U	120 U	130 U
chrysene	62,000[d]	3,800[d]	—	—	µg/kg	NA	NA	NA	930	NA	100 U	120 U	130 U
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	NA	NA	410 U	NA	82 U	100 U	100 U
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	890	NA	82 U	100 U	100 U
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	920	NA	100 U	120 U	130 U
naphthalene	56,000[d]	1,700[d]	—	—	µg/kg	NA	NA	NA	1,000	NA	82 U	100 U	100 U
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	1,500	NA	82 U	100 U	100 U
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	1,100	NA	82 U	100 U	100 U
Pesticides/PCBs						NA	NA	NA	NA	NA	NA	NA	NA
Herbicides						NA	NA	NA	ND	ND	ND	ND	ND
Metals													
aluminum	76,000	—	—	13,960	mg/kg	4,710	5,220	3,780	9,220 J	NA	3,900 J	6,590 J	*14,500 J*
antimony	31	—	—	9.50	mg/kg	0.5 UJ	0.6 UJ	0.6 UJ	4.9 J	NA	3.1 J	4.8 J	6.8 J
arsenic	0.39	0.062	—	9.14	mg/kg	**2.2**	**2.8**	**1.8**	**2.1**	NA	**1.36**	**1.93**	**4.02**
barium	5,400	—	—	93.68	mg/kg	30.1 J	30.7 J	24.8 J	77.6 J	NA	17.8 J	40.4 J	27 J
beryllium	150	—	—	1.27	mg/kg	0.14 J	0.14 J	0.12 J	0.385	NA	0.379	0.673	0.641
cadmium	37	—	—	1.72	mg/kg	0.5 U	0.6 U	0.6 U	0.285 U	NA	0.275 U	0.344 U	0.358 U
calcium	—	—	—	16,800	mg/kg	2,330	2,470	1,840	3,640 J	NA	1,850 J	2,720 J	3,370 J
chromium	210	—	—	54.84	mg/kg	28.3	30	23.3	35.1	NA	30.1	38.3	48.8
chromium, hexavalent	30	—	—	—	mg/kg	0.086 J	0.31 J	0.26 J	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	4 J	4.5 J	3.4 J	9.92	NA	4.61	5.95	9.54
copper	3,100	—	—	39.14	mg/kg	7.3	9	4.9	23.1	NA	4.51	6.63	13
iron	23,000	—	—	22,280	mg/kg	9,970	11,000	8,500	17,800 J	NA	7,440 J	10,300 J	19,000 J
lead	400	150	—	37.66	mg/kg	2.4	4.5	1.9	19.4 J	NA	2.24 J	2.81 J	3.73 J
magnesium	—	—	—	7,304	mg/kg	2,220	2,450	1,990	*7,990 J*	NA	1,990 J	3,090 J	6,770 J
manganese	1,800	—	—	383.0	mg/kg	97.3 J	122 J	82.5 J	*421 J*	NA	82.5 J	118 J	274 J
mercury	23	—	—	0.52	mg/kg	0.1 U	0.021 U	0.1 U	0.108 J	NA	0.101 UJ	0.12 UJ	0.124 UJ
nickel	1,600	—	—	55.72	mg/kg	23	24.2	19.9	49.3 J	NA	23.4 J	33.5 J	43 J
potassium	—	—	—	1,232	mg/kg	579 J	636 J	477 J	853	NA	571	1,140	*2,300*
silver	390	—	—	2.22	mg/kg	0.1 U	0.1 U	0.046 U	0.557	NA	0.551	0.9	1.09
sodium	—	—	—	1,230	mg/kg	75.8 U	87.8 U	58.2 U	623	NA	377	658	*1,460*
thallium	5.2	—	—	0.50	mg/kg	*2 U*[f]	*2 U*[f]	*2 U*[f]	0.278 U	NA	0.265 U	0.337 U	0.335 U
vanadium	78	—	—	47.34	mg/kg	21.8	23	18.3	34.6	NA	19	27.4	42.4
zinc	23,000	—	—	67.48	mg/kg	12.9	14.1	12.8	34.6	NA	16.1	23.4	41.8
Organotins						NA	NA	NA	NA	NA	NA	NA	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL
[d] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[e] italicized font indicates result above background
[f] detection limit is above criteria

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
ND – not detected
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
TRPH – total recoverable petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 4-4
Groundwater Sampling Results, AOC 17

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Back-ground	Result Units	Station ID: 185-IW-004	185-IW-005	A17SB01	A17SB02	A17SB03	A17SB03
						Sample: 185I-006	185I-008	C077G061	C077G062	C077G063	C077G064 (FD)
					[a] Depth Interval:	9 - 10	10 - 10	5 - 10	5 - 10	5 - 10	5 - 10
					Collection Date:	03-Nov-95	03-Nov-95	13-Dec-05	13-Dec-05	13-Dec-05	13-Dec-05
VOCs											
carbon disulfide	—[b]	—	—	—	µg/L	NA	NA	0.5 U	0.5 U	0.31 J	NA
toluene	1,000	150	—	—	µg/L	NA	NA	0.5 U	0.29 J	0.5 U	NA
Petroleum Hydrocarbons						ND	ND	ND	ND	ND	NA
SVOCs						ND	ND	NA	NA	NA	NA
Metals											
aluminum	1,000	1,000	—	1,070	µg/L	***14,100*** [c,d]	***45,800*** [c,d]	100 U	100 U	100 U	100 U
arsenic	10	50	—	20.72	µg/L	**10.7**	**15.9**	3.5 U	6.5 U	7.3 U	6.2 U
barium	2,000	1,000	—	569.5	µg/L	81.4	256	61.3 J	156 J	273 J	260 J
calcium	—	—	—	—	µg/L	4,030	10,700	11,200	75,300	55,000	52,300
chromium	100	50	—	12.45	µg/L	***51.9***	***173***	5 U	4.7 J	5	5
cobalt	—	—	—	—	µg/L	16.8	34.2	3 U	1.9 U	1.8 U	1.7 U
copper	—	—	—	24.03	µg/L	20.5	*72.5*	5 U	5 U	5 U	5 U
iron	—	—	—	6,586	µg/L	*19,000*	*64,900*	135	946	50 U	50 U
lead	15	—	—	11.45	µg/L	4	*15*	3 U	3 U	3 U	3 U
magnesium	—	—	—	—	µg/L	5,690	17,000	8,220	45,800	72,300	71,300
manganese	—	—	—	1,741	µg/L	180	679	189	1,360	1,110	1,060
molybdenum	—	—	—	—	µg/L	5.8	3.4 U	NA	NA	NA	NA
nickel	—	100	—	—	µg/L	60.4	**208**	5 U	5 U	5 U	5 U
potassium	—	—	—	—	µg/L	10,700	13,600	13,900	25,200	31,200	30,600
sodium	—	—	—	—	µg/L	145,000	49,800	148,000	760,000	921,000	900,000
vanadium	—	—	—	26.27	µg/L	*38.6*	*124*	1.2 J	3.1 J	5.4	5.8
zinc	—	—	—	36.39	µg/L	32.6	*115*	*50 U* [e]	*50 U* [e]	*50 U* [e]	*50 U* [e]
General Chemistry											
solids, total dissolved	—	—	—	—	µg/L	NA	NA	462,000	2,240,000	2,910,000	2,950,000

Table 4-4
Groundwater Sampling Results, AOC 17

Notes:

[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL
[d] italicized font indicates result above background
[e] detection limit is above criteria

Acronyms/Abbreviations:

AOC – area of concern
Cal – California
ESL – environmental screening level
(San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
GW – groundwater
µg/L – micrograms per liter
MCL – maximum contaminant level
NA – not analyzed
ND – not detected
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:

J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit

Table 6-1
Tier 1 Evaluation Results by Exposure Group, AOC 17

Exposure Group [a]	Cancer Risk	Hazard Index
1. All soil and groundwater exposure pathways		
Total [b]	2E-03	16
Without metals below background	2E-06	13
2. Exposure pathways for soil and vapors from VOCs in groundwater		
Total [b]	7E-05	3
Without metals below background	5E-08	2
3. Exposure pathways for residential use of groundwater		
Total [b]	2E-03	13
Without metals below background	2E-06	11

Notes:

[a] PAHs are not included

[b] includes all COPCs

Acronyms/Abbreviations:

AOC – area of concern

COPC – chemical of concern

PAH – polynuclear aromatic hydrocarbon

VOC – volatile organic compound

Table 6-2
Tier 1 Evaluation Results by Risk Driver, AOC 17

Study Area	Analyte Name	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND Hazard Quotient	WITHOUT BACKGROUND Cancer Risk
AOC 17					
Soil					
	aluminum	0.2	—*	0.2	—
	antimony	0.2	—	—	—
	arsenic	—	7E-05	—	—
	cadmium	0.2	—	—	—
	iron	1	—	1	—
	manganese	0.4	—	0.4	—
	vanadium	0.5	—	—	—
	Total for soil	**3**	**7E-05**	**2**	**5E-08**
Groundwater					
	aluminum	1	—	1	—
	arsenic	—	2E-03	—	—
	chromium	—	2E-06	—	2E-06
	iron	6	—	6	—
	manganese	2	—	—	—
	vanadium	3	—	3	—
	Total for groundwater	**13**	**2E-03**	**11**	**2E-06**
	Total for soil and groundwater	**16**	**2E-03**	**13**	**2E-06**

Note:
* dash indicates not applicable

Acronym/Abbreviation:
AOC – area of concern

Table 7-1
Summary of RI Results and Recommendations, AOC 17

DQO Problem	DQO Decision Questions	Nature and Extent	Tier 1 Risk Evaluation	Recommendation
In previous investigations, TPH concentrations reported in soil exceeded PSCs, and arsenic, aluminum, chromium, and nickel concentrations in groundwater exceeded PSCs. RI sampling primarily addressed TPH, VOCs, and metals from historical site activities at adjacent IR Site 5 that may have impacted groundwater at AOC 17.	Have the nature and extent of contamination been defined?	Yes. TPH in soil does not appear to be widespread, as it was not identified in RI soil or groundwater samples above laboratory detection limits. Elevated concentrations of naturally occurring metals were identified in soil and groundwater. Additionally, metals concentrations above PSCs in groundwater are believed to represent total rather than dissolved concentrations.	NA	No further action. PAHs are addressed as part of the PAH Areas (Attachment W).
	Are contaminants present in soil or groundwater at concentrations that pose unacceptable risk to potential future residents?	NA	No. Cancer risk without metals above Alameda Point background 95th percentile is 2×10^{-6} (within the risk management range), with an HI of 13, due primarily to iron in soil and aluminum, iron, and vanadium in groundwater. However, statistical analysis indicates that the concentrations of iron in soil are naturally occurring and not from releases due to Navy activities. Additionally, the maximum metals concentrations used in the Tier 1 evaluation are believed to represent total rather than dissolved concentrations.	No further action.
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?	NA	Pathway was not evaluated for AOC 17, located over 1,000 feet from the nearest surface water body.	No further action.

Table 7-1 (continued)

Acronyms/Abbreviations:
AOC – area of concern
DQO – data quality objective
HI – hazard index
IR – Installation Restoration (Program)
NA – not applicable
PAH – polynuclear aromatic hydrocarbons
PSC – preliminary screening criterion
RI – remedial investigation
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

ATTACHMENT O

AREA OF CONCERN 18

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL
REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT
ATTACHMENT O, AREA OF CONCERN 18
IR SITE 35, TRANSFER PARCEL EDC-5
ALAMEDA POINT
ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

Prepared by:

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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 18. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station [NAS] Alameda), Alameda, California.

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

AOC 18 is an approximately 0.8-acre area on the southwestern edge of Transfer Parcel Economic Development Conveyance (EDC)-5, and is along the western edge of Environmental Baseline Survey (EBS) Parcel 70 (Figure 1-1). The portion of the parcel covered by this AOC is paved and consists entirely of open space adjacent to the southwestern corner of Building 39 (an engineering laboratory and maintenance hangar). NAS Generator Accumulation Point (GAP) 23 (storage lockers surrounded by 55-gallon drums) was located in the AOC. A segment of former fuel line Corrective Action Area (CAA)-B runs north-south through the western portion of the AOC.

1.2 HISTORICAL USE

The portion of EBS Parcel 70 where AOC 18 is located was historically used as an aircraft hangar (Building 39) and open space. Building 300 (a general warehouse) was also formerly located on the parcel. At the time of the EBS site inspection, Building 39, located immediately east of the AOC, was used for light aircraft maintenance and painting, and housed Navy helicopters, sleds, a Navy engineering laboratory, and offices (Photograph 1-1).

The hazardous materials storage area (NAS GAP 23) was identified as a potential release area during the EBS inspection. NAS GAP 23 was located on a concrete-paved area approximately 40 by 70 feet on the southwest side of Building 39; this GAP historically consisted of storage lockers surrounded by 55-gallon drums. Materials managed in this area may have included oil, solvents, paint-related materials, and rags.

The open space in the southern and eastern portions of EBS Parcel 70 was formerly used for vehicle parking and aircraft fueling. Seven Conex boxes were observed on the west side of the parcel during the EBS site inspection, and were reportedly used to store alodine (a coating chemical that will produce a chrome conversion coating on aluminum and aluminum alloys), corrosives, paint, solvents, and miscellaneous hazardous wastes. The area is currently used for vehicle parking.

1.3 PRELIMINARY SCREENING CRITERIA AND BACKGROUND METALS

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this AOC are the following:

Photograph 1-1
Location of Former Hazardous Waste Storage Area
Southwest of Building 39, View to East

- Soil
  - residential preliminary remediation goals (PRGs) (U.S. EPA 2004b), except polynuclear aromatic hydrocarbons (PAHs) classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (µg/kg) (DON 2001a)
  - environmental screening levels (ESLs) for total petroleum hydrocarbons (TPH) – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)
- Groundwater
  - maximum contaminant levels (MCLs) and advisory level for lead (U.S. EPA 2002, DHS 2006)
  - ESLs for TPH (RWQCB 2005)

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being assessed. For example, groundwater concentrations from all study areas were compared to MCLs, whether or not the groundwater was considered a potential drinking water source in that area. Chemicals of potential concern (COPCs) identified in the health risk

evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs.

In addition to the above-listed PSCs, metals concentrations in soil and groundwater at AOC 18 were compared to the following Alameda Point background concentrations to help discriminate between site-related and naturally occurring metals:

- Alameda Point background soil concentrations (95th percentile of the pink data set; Appendix E of the final RI Report of Operable Unit [OU]-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)
- Alameda Point background groundwater concentrations (95th percentile; Appendix E of the final RI Report of OU-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)

For ease of discussion in this report, the Alameda Point 95th percentile concentrations for metals in soil (pink background data set) and groundwater are referred to as "background."

Section 4.3 of the main RI/FS Report provides further discussion on the occurrence and interpretation of metals concentrations in soil and groundwater at IR Site 35.

1.4 PREVIOUS INVESTIGATIONS

During previous investigations at AOC 18, soil and groundwater samples were collected, and results of these investigations are summarized below. Locations sampled in the AOC are shown on Figure 1-1. Analytical results for samples collected within the AOC are summarized in Appendix B. Additionally, an investigation of the fuel lines in CAA-B resulted in the in-place closure of the lines present in the western portion of AOC 18.

1.4.1 Environmental Baseline Survey

Seven soil samples (070-0003M, -0004, -0004M, -0022M, -0023M, -0035, and -0036) were collected during the EBS investigation from 0 to 3.5 feet below ground surface (bgs) (IT 2001a). Soil samples were analyzed for volatile organic compounds (VOCs) or TPH. These locations were sampled to investigate NAS GAP 23. Reported concentrations were below PSCs.

1.4.2 Corrective Action Data Gap Investigation

A corrective action data gap investigation was conducted at Alameda Point in 2001 to investigate removed fuel lines (TtEMI 2001a). The investigation included the collection of samples at five EBS parcels located near the former fuel line, including samples at AOC 18, located in EBS Parcel 70. One soil boring (PA02-08) was advanced along the southern boundary of the AOC. Two soil samples were collected from this boring from 2 to 7 feet bgs and analyzed for VOCs, TPH, and lead. One groundwater sample was also collected from this location and analyzed for VOCs, TPH, and lead. Reported concentrations were below PSCs.

1.4.3 2002 Polynuclear Aromatic Hydrocarbon Study

One soil boring (32EDC-5-24) was advanced in AOC 18 during the 2002 PAH study (BEI 2005a). Samples were collected from four depth intervals between 0 and 8 feet bgs and analyzed for PAHs. B(a)P equivalent concentrations in all soil samples from this boring were below the PSC.

1.4.4 Solid Waste Management Unit Report

The NAS GAP 23 was included in the Solid Waste Management Unit (SWMU) Report (SulTech 2005a). During preparation of the SWMU Report, previously existing data from the EBS investigation were further evaluated. The SWMU Report concluded that TPH concentrations present at the GAP site were a result of sitewide activities, rather than spills or leaks from the SWMU. It was concluded that the GAP site did not represent a significant source of contamination at EBS Parcel 70 because no VOCs had been reported and the site was completely paved; therefore, no further sampling was recommended. A letter from California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control, dated November 4, 1999, recommended no further action for NAS GAP 23.

1.5 ADJACENT SITES

Underground pipelines that historically distributed jet propellant grade 5 and other fuels from locations near Seaplane Lagoon to various locations at Alameda Point were removed (34,500 linear feet) or abandoned in place (24,100 linear feet) between June 1998 and February 1999 (TtEMI 2000a). TPH concentrations reported in confirmation soil and groundwater samples collected following fuel line removal and abandonment were above preliminary remediation criteria (screening levels established by the Navy for petroleum-contaminated sites) at Alameda Point (DON 2001a). The former fuel line areas were designated CAA-B; a segment of the former fuel line runs through the western portion of AOC 18 (Figure 1-1). No further action was recommended for CAA-B because it met the criteria for low-risk fuel site closure set forth by the San Francisco Bay Regional Water Quality Control Board (Water Board) (TtEMI 2003b).

Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, geology, and potential groundwater beneficial use at AOC 18.

AOC 18 is west of Saratoga Street. Topography at AOC 18 is relatively flat. The average ground elevation, based on elevation data from the four borings (A18SB01 through A18SB04) advanced during the RI, was 11 feet above mean sea level (MSL). The average depth to water in two of the four RI borings was approximately 5 feet bgs. Groundwater depth was measured in temporary casings prior to groundwater sample collection. Total dissolved solids (TDS) concentrations measured in groundwater samples from two borings were 337 and 432 milligrams per liter (mg/L), and the average TDS concentration was 385 mg/L.

The groundwater monitoring well nearest to AOC 18 is M10-02, located approximately 400 feet west in IR Site 10. A review of groundwater depths in this well over time (August 1991 through December 2003) shows depth to water from approximately 6 to 8 feet bgs. The deepest historical groundwater measured in this well is approximately 6 feet above MSL. This value, if subtracted from the ground elevation at AOC 18, indicates that groundwater in the vicinity of the AOC has been present at 5 feet bgs.

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which appears to be south at AOC 18, towards Seaplane Lagoon. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Tidal influence at AOC 18, located approximately 600 feet from Seaplane Lagoon, is expected to be negligible based on tidal studies performed at other Alameda Point sites. Results of the tidal study at IR Site 27 showed significant tidal influence in wells located within 30 feet of Seaplane Lagoon and minimal tidal influence in a well located approximately 100 feet inland of Seaplane Lagoon, indicating a significant decrease in tidal influence over a relatively short distance.

Soil encountered in the RI borings consists primarily of poorly graded sand. Fill material was observed to exist to about 7 to 8 feet bgs, where a distinct color change from light olive brown to dark greenish gray defines the contact between fill material and coarse-grained bay sediment. Fine-grained bay sediment (Young Bay Mud) was not encountered in the borings; however, based on surrounding borings, the Young Bay Mud is expected to exist at approximately 15 feet bgs (see cross section G-G′ on Figure 2-9 of the main RI/FS Report). RI boring logs for the study area are presented in Appendix D. As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust may be located beneath AOC 18; however, it was not encountered in borings advanced to 10 feet bgs during the RI.

Two geotechnical soil samples were collected from the vadose zone (artificial fill) at AOC 18 at depths of 2.5 to 3 feet bgs in soil borings A18SB03 and A18SB04. The soil in both samples was classified as poorly graded sand to silty sand. The average fraction of organic carbon in the soil samples from AOC 18 is 0.0025. Geotechnical results for samples collected at AOC 18 are presented in Table 3-5 of the main RI/FS Report.

Based on the location of AOC 18 west of Saratoga Street, groundwater at AOC 18 would not be considered a drinking water source. In a letter dated July 21, 2003, the Navy received concurrence from the Water Board that groundwater west of Saratoga Street meets exemption

criteria for the municipal and domestic water supply designation in the California State Water Resources Control Board source of drinking water policy Resolution (Res.) 88-63 (SWRCB 1988) and California Regional Water Quality Control Board Res. 89-39 (RWQCB 2003).

Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for AOC 18. Sitewide data quality objectives (DQOs) for the evaluation of AOCs are presented in Table 3-1 of the main RI/FS Report.

3.1 APPROACH

AOC 18 was formerly used as a hazardous materials storage area (NAS GAP 23) and the adjacent building was used for light aircraft maintenance, painting, vehicle storage, an engineering laboratory, and offices. A limited number of soil samples were collected and analyzed during previous investigations near the former hazardous materials storage area west of Building 39 (NAS GAP 23). Groundwater was not assessed during previous investigations.

3.2 SCOPE

Soil and groundwater samples were collected during the 2005 RI sampling to assess whether releases from storage of hazardous wastes in the area impacted soil and/or groundwater. Three soil samples (with depths of 1 to 2, 2.5 to 4, and 5 to 8 feet bgs) were collected from each of four soil borings, A18SB01 through A18SB04. Additionally, a grab groundwater sample was collected from borings A18SB01 and A18SB02. The grab groundwater samples were collected from temporary well casings screened from 5 to 10 feet bgs placed inside the borings. Table 3-1 provides a summary of samples collected during the RI and previous investigations. Figure 1-1 shows sampling locations for all investigations.

All soil and grab groundwater samples were analyzed for VOCs, TPH (purgeable-range and extractable-range), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and metals. Groundwater samples were also analyzed for TDS. Additionally, two soil samples were collected from the vadose zone and submitted for geotechnical analysis.

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Section 4

NATURE AND EXTENT OF CONTAMINATION

This section discusses sampling and analysis from previous investigations and from the RI and presents the concentration ranges and spatial distributions of the analytes identified at AOC 18. Soil and/or groundwater samples were collected at 12 locations during the EBS (IT 2001a), the corrective action data gap investigation (TtEMI 2001a), the PAH study (BEI 2005a), and the RI (Table 3-1 and Figure 1-1). Concentration ranges of reported soil and groundwater results are presented in Tables 4-1 and 4-2. Soil and groundwater analytical results are summarized in Tables 4-3 and 4-4. Complete analytical results for historical and RI samples collected within AOC 18 are included in Appendices B and G, respectively.

4.1 SOIL SAMPLING RESULTS

Analytical soil sampling results are discussed for each class of chemicals investigated at AOC 18.

4.1.1 Volatile Organic Compounds

Three VOCs (2-butanone, carbon disulfide, and cis-1,2-dichloroethene [DCE]) were reported in soil from borings A18SB01 through A18SB04. VOC concentrations were below PSCs.

4.1.2 Semivolatile Organic Compounds

Thirteen SVOCs were reported in soil samples from borings 32EDC-5-24, and A18SB01 through A18SB04. B(a)P equivalent concentrations were below the PSC (620 µg/kg), and non-PAH SVOC concentrations were also below PSCs.

4.1.3 Pesticides and Polychlorinated Biphenyls

Pesticides and PCBs were not reported in soil at concentrations above the laboratory detection limits.

4.1.4 Total Petroleum Hydrocarbons

Diesel-range TPH and motor oil–range TPH were reported in EBS samples from borings 070-0003M and 070-0004 at 0 to 0.5 foot bgs. The reported concentrations were below PSCs. No other TPH compounds were reported in soil at concentrations above the laboratory detection limits.

4.1.5 Metals

Nineteen metals were reported in soil from borings A18SB01 through A18SB04. Arsenic was the only metal reported at concentrations above the PSC. Arsenic was reported at concentrations from 1.2 to 2.3 milligrams per kilogram (mg/kg). These concentrations are above the PSC (residential PRG of 0.062 mg/kg), but below the background concentration of 9.14 mg/kg.

4.2 GROUNDWATER SAMPLING RESULTS

Analytical groundwater sampling results are presented for each class of chemicals investigated at AOC 18.

4.2.1 Volatile Organic Compounds

Three VOCs (cis-1,2-DCE, naphthalene, and trichloroethene [TCE]) were reported in groundwater samples. The reported concentrations of cis-1,2-DCE and TCE were below PSCs. A PSC was not identified for naphthalene. Naphthalene was identified as a risk contributor in the Tier 1 risk evaluation (discussed in Section 6). It was reported in both groundwater samples collected during the RI at concentrations of 1.1 and 3.6 micrograms per liter (µg/L).

4.2.2 Semivolatile Organic Compounds

SVOCs were not reported in groundwater samples at concentrations above the laboratory detection limits.

4.2.3 Pesticides and Polychlorinated Biphenyls

Pesticides and PCBs were not reported in groundwater samples at concentrations above the laboratory detection limits.

4.2.4 Total Petroleum Hydrocarbons

TPH was not reported in groundwater at concentrations above the laboratory detection limits.

4.2.5 Metals

Ten metals were reported in groundwater samples from borings A18SB01 and A18SB02. Metals concentrations were below PSCs and background.

Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for AOC 18. It discusses the conceptual site model, the physical and chemical changes that might occur to contaminants present at AOC 18, and the mechanisms that could potentially transfer the contaminants from the study area. The conceptual site model facilitates understanding of the present AOC conditions by integrating AOC-specific physical characteristics with the nature and extent of contaminants in the physical system. Section 5.2 includes an evaluation of the mobility and persistence of risk drivers identified at concentrations above background at AOC 18. Section 5.3 discusses potential migration pathways.

5.1 AOC 18 CONCEPTUAL SITE MODEL

AOC 18 is located on the southwestern edge of Transfer Parcel EDC-5, west of Saratoga Street. The AOC is flat and the entire study area is paved. The nearest surface water body is Seaplane Lagoon, approximately 600 feet south of AOC 18. Based on a review of RI borings logs, the subsurface lithology at the AOC consists primarily of poorly graded sand; the underlying Young Bay Mud is expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. The Marsh Crust was not encountered in the borings. Groundwater flow direction appears to be south, and average depth to water was approximately 5 feet bgs. Groundwater would not be considered a drinking water source based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.

VOCs and metals were reported at low concentrations (relative to PSCs) in soil and groundwater samples collected at AOC 18. A PSC was not identified for naphthalene in groundwater. SVOCs and TPH were also reported in the groundwater samples, and sampling results indicated that reported analyte concentrations were below PSCs. Arsenic in soil and naphthalene in groundwater were identified as risk contributors in the Tier 1 risk evaluation (discussed in Section 6); however, arsenic was reported in soil at concentrations below background. Naphthalene was reported at concentrations of 1.1 and 3.6 µg/L in the two groundwater samples collected during the RI.

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in the environment tends to remain in place. The tendency toward immobility and persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Section 5 of the main RI/FS Report discusses the physical and chemical properties of contaminants and their chemical classes (e.g., VOCs) that affect their transport and persistence in the environment. This section summarizes the mobility and persistence of naphthalene.

Although a PAH, naphthalene behaves more like a VOC in the environment. It can be transported in air because of its lower molecular weight and high vapor pressure. The Henry's law constant for naphthalene indicates that it will partition primarily in the vapor phase and is capable of movement in the vadose zone by molecular diffusion. Naphthalene can also adsorb to soil. This process is controlled by organic carbon partition coefficient (K_{oc}) and fraction organic carbon. The result of the distribution calculation for the percentage of naphthalene sorbed to soil indicates that approximately 83 percent will sorb to soil (Table 5-1).

In soil and groundwater, microorganisms have the ability to break down naphthalene (ATSDR 1995), and biodegradation is the dominant fate process for naphthalene in aquatic systems. Half-lives reported for naphthalene range from 3 to 1,700 days in various water systems, with the fastest rates of biodegradation occurring in oil-polluted water and the slower rates in unpolluted waters. In general, biodegradation rates increase with naphthalene concentration (ATSDR 1995).

5.3 CONTAMINANT MIGRATION

The potential migration pathways considered for this AOC include atmospheric transport (i.e., airborne fugitive dust and vapors), transport by surface water runoff, and groundwater transport. Samples collected from soil did not have reported concentrations of analytes above PSCs or above Alameda Point background. Additionally, all of the study area is paved. Therefore, significant transport of by airborne dust or by surface water runoff is unlikely. The two most likely migration pathways for naphthalene at AOC 18 are discussed below.

- **Atmospheric Transport by Vapors**. Naphthalene can be transported into air by volatilizing from groundwater directly into air. Naphthalene is the least volatile of the VOCs identified as contaminants at IR Site 35. The low concentrations of naphthalene (relative to the ESL for indoor air) and the pavement currently covering all of AOC 18 would lessen the effect of this transport mechanism.
- **Groundwater Transport**. Advection and dispersion of chemicals dissolved in groundwater are affected by the groundwater flow velocity, properties of the porous medium, and K_{oc} of the solute. Because of its relatively high (compared to other VOCs) K_{oc} value, migration of naphthalene is expected to be retarded compared to the movement of groundwater. Calculations described in Section 5 of the main RI/FS Report indicate that the velocity of naphthalene in the subsurface would be approximately 138 times slower than the velocity of groundwater.

Section 6
TIER 1 EVALUATION

This section summarizes the Tier 1 risk evaluation results for AOC 18. In a Tier 1 evaluation, risk for a residential exposure scenario is assessed with the assumption that no remedial action would take place at the study area. This section also presents a qualitative uncertainty evaluation that identifies and characterizes the effects of uncertainties on the risk results.

A Tier 1 evaluation is a screening-level approach that calculates total cumulative risk values using published risk-based guidelines from the United States Environmental Protection Agency (U.S. EPA), Cal/EPA, and Water Board. The Tier 1 evaluation includes all chemicals identified in at least one sample except for PAHs in soil. PAHs in soil are not included because site-specific remediation goals for PAHs are being developed. The approach used to estimate risk is described in Section 6 of the main RI/FS Report. Tier 1 information is provided in Appendix J.

Cancer risk and noncancer values for AOC 18 are shown in Table 6-1. Risk drivers for cancer and noncancer risk are presented in Table 6-2.

6.1 COPC IDENTIFICATION

The data selection and identification of COPCs are based on a compilation of all usable data for soil and groundwater. All chemicals reported in at least one sample collected during the RI and/or included in the historical data were included as Tier 1 COPCs, except calcium, magnesium, potassium, and sodium, which are known to be required human trace nutrients.

There are 19 Tier 1 COPCs in soil at AOC 18: 15 metals based on 12 samples, 1 non-PAH SVOC (di-n-butyl-phthalate) based on 12 samples, and 3 VOCs based on 16 samples.

There are nine Tier 1 COPCs in groundwater: six metals and three VOCs based on two and three samples, respectively.

6.2 RISK CHARACTERIZATION

The cancer risk and noncancer hazard values were calculated using the Tier 1 protocol from Cal/EPA (2005). The maximum concentration of each COPC in soil and groundwater was compared with a risk-based guideline to estimate cancer and noncancer risks. Two results are presented for three exposure groups, the total risk and a second value that does not include risk associated with metals concentrations that are below background.

For soil and groundwater data for the three exposure groups at AOC 18, the calculated cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 8×10^{-5} and 1

  Without metals below background: 4×10^{-5} and 0.04

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 4×10^{-5} and 0.9

  Without metals below background: a hazard index (HI) of 0.0004; cancer risk was not estimated because there are no COPCs with risk-based guidelines for cancer

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 4×10^{-5} and 0.2

  Without metals below background: 4×10^{-5} and 0.04

For Exposure Groups 1 and 3, the cancer risk without metals below background is associated with naphthalene in groundwater.

6.3 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation represent any potential health concerns at AOC 18. The results are consistent with the site history and previous investigations. This approximately 0.8-acre site is adequately characterized with data from three investigations and a Tier 1 evaluation based on 12 to 16 soil samples for metals and organic chemicals, and 2 to 3 groundwater samples.

The potential impact of vapors to indoor air for the three VOCs reported in groundwater is negligible. The cancer risk and noncancer HI based on the tap water PRGs are well below 10^{-6} and 1, respectively, for cis-1,2-DCE and TCE. For naphthalene, the ESL of 3,200 µg/L in groundwater based on protection of indoor air is well above the reported concentration of 3.6 µg/L.

Exposure from the dermal pathway for the Tier 1 COPCs would result in an increase in the cancer risk for residential use of groundwater (Exposure Groups 1 and 3) by a factor of two. This finding is based on the ratio of dermal exposure to ingestion for each Tier 1 COPC.

6.4 CONCLUSIONS

For all three exposure groups, the total cancer risks are within the risk management range, and noncancer hazard values are at or below 1. Without metals at concentrations below background, the cancer risk for Exposure Groups 1 and 3 are 4×10^{-5} due to naphthalene in groundwater. For reasonable future use (Exposure Group 2), the cancer risk without metals below background was not estimated (as noted above).

Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the RI at AOC 18, including the nature and extent of contamination and the results of the Tier 1 risk evaluation. These results form the basis of responses to the DQO decision questions that provided the framework for the RI and drive the conclusions and recommendations presented below.

7.1 SUMMARY

Because a limited number of samples were collected and analyzed near the hazardous materials storage area (NAS GAP 23) at AOC 18 during previous investigations, soil and grab groundwater samples were collected during the RI to assess whether possible chemical releases from storage of hazardous wastes in this area impacted soil or groundwater.

VOCs and metals were reported at low concentrations in soil and grab groundwater samples collected at AOC 18. Arsenic concentrations in soil were above the PSC but below background. SVOCs and TPH were also reported in the groundwater samples. However, sampling results indicated that reported analyte concentrations were below PSCs.

Groundwater at AOC 18 would not be a drinking water source, based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the domestic and municipal water supply designation.

Results of the Tier 1 risk evaluation show a total cancer risk of 8×10^{-5} and an HI of 1 due to arsenic in soil and naphthalene in groundwater. Without metals below background and without residential groundwater use, there is no cancer risk because none of the remaining COPCs have cancer slope factors. Volatilization of naphthalene in groundwater to indoor air is not a concern because the ESL for naphthalene in groundwater for protection of indoor air (3,200 µg/L) is well above the maximum naphthalene concentration of 3.6 µg/L reported in groundwater samples from AOC 18. The HI without metals below background is 0.04.

7.2 AOC 18 CONCLUSIONS AND RECOMMENDATIONS

The RI was conducted using the seven-step U.S. EPA DQO process (U.S. EPA 2000); DQOs were developed for AOC 18 in the Work Plan (BEI 2006). The RI has addressed these DQOs, as summarized in Table 7-1.

The data collected during the RI were sufficient to characterize the nature and extent of contamination and support decisions on the necessity for remedial actions at AOC 18.

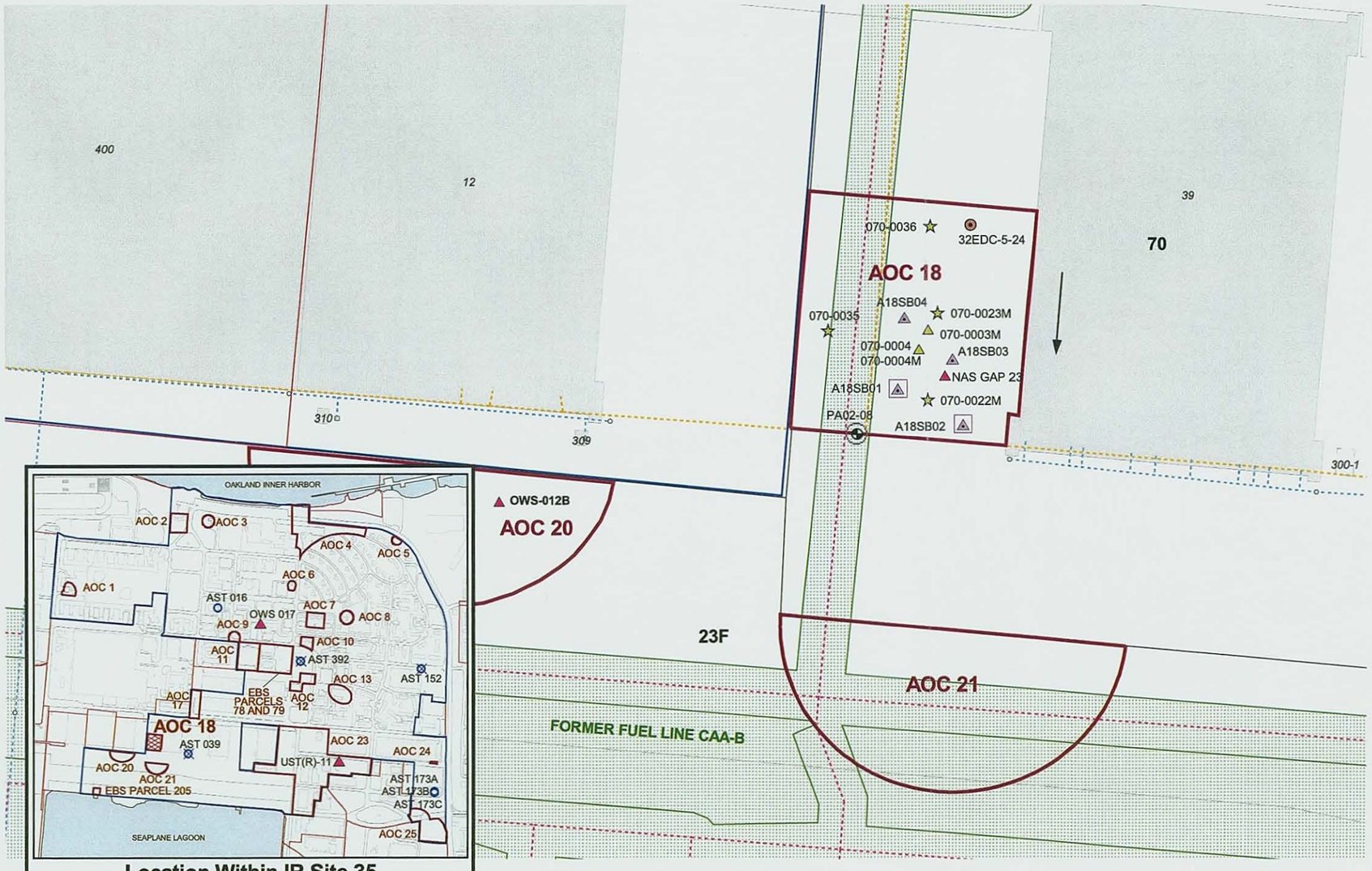
No further action is recommended at AOC 18 for the following reasons.

- Chemicals were not identified at concentrations above PSCs.
- Risk results indicate that reported chemicals are not present in soil or groundwater at concentrations that pose a significant risk to human health: total risk is within the risk management range of 10^{-6} to 10^{-4} with an HI of 1. Without

metals below background and residential groundwater use, no carcinogenic COPCs were identified, and the HI is less than 1.

- All reported metals concentrations in soil and groundwater were below background.

FIGURE



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 71 EBS PARCEL
- CORRECTIVE ACTION AREA (CAA)
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- FUEL LINE (ABANDONED IN-PLACE)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

N

CORRECTIVE ACTION DATA GAP INVESTIGATION SOIL SAMPLING LOCATION WITH STATION ID
- VOCs, FUELS, AND METALS ANALYSES ONLY

CORRECTIVE ACTION DATA GAP INVESTIGATION GROUNDWATER SAMPLING LOCATION WITH STATION ID
- VOCs, FUELS, AND METALS ANALYSES ONLY

EBS SOIL SAMPLING LOCATION WITH SAMPLE ID
- FUELS ANALYSIS ONLY
- VOCs ANALYSIS ONLY

PAH STUDY SOIL SAMPLING LOCATION WITH STATION ID
- SVOCs ANALYSIS ONLY

RI SOIL SAMPLING LOCATION WITH STATION ID
- VOCs, SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY

RI GROUNDWATER SAMPLING LOCATION WITH STATION ID
- VOCs, SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOCs – VOLATILE ORGANIC COMPOUNDS

RI/FS Report for IR Site 35

Figure 1-1

Study Area and Sampling Locations
Area of Concern 18

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/30/06
File No.: 077L14457
Job No.: 23818-077
Rev No.: C

TABLES

Table 3-1
Sample Analysis Summary, AOC 18

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE								
				VOCs	SVOCs	PAHs	TPH	Pest/PCBs	Metals	Lead	Geotechnical Parameters	TDS
Soil												
32EDC-5-24	C032C860	PAH Study	0–0.5			X						
32EDC-5-24	C032C861	PAH Study	0.5–2			X						
32EDC-5-24	C032C862	PAH Study	2–4			X						
32EDC-5-24	C032C863	PAH Study	4–8			X						
070-002-003	070-0003M	EBS	0–0.5				X[b]					
070-002-004	070-0004[a]	EBS	0–0.5				X[b]					
070-002-004	070-0004M[a]	EBS	0–0.5				X[b]					
070-003-022	070-0022M	EBS	3–3.5	X								
070-003-023	070-0023M	EBS	3–3.5	X								
070-003-024	070-0035	EBS	3–3.5	X								
070-003-025	070-0036	EBS	3–3.5	X								
PA02-08	030-CAP-282	Corrective Action Data Gap Inv.	2–3	X			X[c]			X		
PA02-08	030-CAP-283	Corrective Action Data Gap Inv.	6–7	X			X[c]			X		
A18SB01	C077S301	Site 35 RI	1–2	X	X	X	X[c]	X	X			
A18SB01	C077S302	Site 35 RI	2.5–4	X	X	X	X[c]	X	X			
A18SB01	C077S303	Site 35 RI	5–6	X	X	X	X[c]	X	X			
A18SB02	C077S304	Site 35 RI	1–2	X	X	X	X[c]	X	X			
A18SB02	C077S305	Site 35 RI	3–4	X	X	X	X[c]	X	X			
A18SB02	C077S306	Site 35 RI	6–7	X	X	X	X[c]	X	X			
A18SB03	C077S307	Site 35 RI	1–2	X	X	X	X[c]	X	X			
A18SB03	C077S308	Site 35 RI	2.5–3.5								X	
A18SB03	C077S308	Site 35 RI	3–4	X	X	X	X[c]	X	X			
A18SB03	C077S309	Site 35 RI	6–7	X	X	X	X[c]	X	X			
A18SB04	C077S310	Site 35 RI	1–2	X	X	X	X[c]	X	X			
A18SB04	C077S310	Site 35 RI	2.5–3.5								X	
A18SB04	C077S311	Site 35 RI	3–4	X	X	X	X[c]	X	X			
A18SB04	C077S312	Site 35 RI	6.5–8	X	X	X	X[c]	X	X			

Table 3-1
Sample Analysis Summary, AOC 18

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE								
				VOCs	SVOCs	PAHs	TPH	Pest/PCBs	Metals	Lead	Geotechnical Parameters	TDS
Groundwater												
PA02-08	030-CAP-301	Corrective Action Data Gap Inv.	0–10	X			X[c]			X		
A18SB01	C077G071	Site 35 RI	5–10	X	X	X	X[c]	X	X			X
A18SB02	C077G072 (FD)	Site 35 RI	5–10				X[d]					
A18SB02	C077G073	Site 35 RI	5–10	X	X	X	X[c]	X	X			X

References:
Corrective Action Data Gap Inv. (TtEMI 2001a)
EBS (IT 2001a)
PAH Study (BEI 2005a)

Notes:
[a] sample 070-0004 was analyzed by a fixed-base laboratory; sample 070-0004M was analyzed by a mobile or screening laboratory; samples 070-0004/-0004M were collected from the same location
[b] analyzed for gasoline-, diesel-, and motor oil–range TPH
[c] analyzed for gasoline-, diesel-, JP-5–, and motor oil–range TPH
[d] analyzed for gasoline-range TPH

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
EBS – environmental baseline survey
FD – field duplicate
Inv. – investigation
JP-5 – jet propellant grade 5
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
Pest – pesticides
RI – remedial investigation
SVOC – semivolatile organic compound
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 18

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
Volatile Organic Compounds (µg/kg)										
2-butanone	16	2	13	0	1.8	2.3	2.7	22,000,000	—[c]	—
carbon disulfide	16	1	6.3	0	1.2	1.2	1.2	360,000	—	—
cis-1,2-dichloroethene	18	1	5.6	0	0.34	0.34	0.34	43,000	—	—
Fuels (µg/kg)										
diesel	17	2	12	0	14,000	30,000	45,000	—	100,000	—
motor oil	17	3	18	0	38,000	260,000	400,000	—	500,000	—
Semivolatile Organic Compounds (µg/kg)										
anthracene	16	2	13	0	0.46	0.71	0.96	22,000,000	—	—
benz(a)anthracene	16	5	31	0	0.56	3.8	8.7	620	—	—
benzo(b)fluoranthene	16	5	31	0	0.78	5.3	11	620	—	—
benzo(k)fluoranthene	16	5	31	0	0.48	4.4	9.3	380 [d]	—	—
benzo(g,h,i)perylene	16	2	13	No PSC	7.6	8.4	9.1	—	—	—
benzo(a)pyrene	16	3	19	0	7.3	8.4	10	62	—	—
chrysene	16	4	25	0	1.2	6.6	13	3,800 [d]	—	—
dibenz(a,h)anthracene	16	1	6.3	0	7.7	7.7	7.7	62	—	—
di-n-butyl phthalate	12	10	83	0	81	240	990	6,100,000	—	—
fluoranthene	16	5	31	0	0.6	4.3	8.2	2,300,000	—	—
indeno(1,2,3-cd)pyrene	16	2	13	0	4.9	5.8	6.6	620	—	—
phenanthrene	16	2	13	No PSC	1.7	2.1	2.4	—	—	—
pyrene	16	7	44	0	0.65	3.9	7.4	2,300,000	—	—
Metals (mg/kg)										
aluminum	12	12	100	0	3,020	4,100	5,480	76,000	—	13,960
arsenic	12	12	100	0	1.2	1.8	2.3	0.062 [d]	—	9.14
barium	12	12	100	0	19.2	26	36.4	5,400	—	93.68
beryllium	12	12	100	0	0.091	0.11	0.15	150	—	1.27
calcium	12	12	100	No PSC	1,340	2,100	3,020	—	—	16,800
chromium	12	12	100	0	23.9	28	34.2	210	—	54.84
cobalt	12	12	100	0	3.3	4	5.1	900	—	14.30
copper	12	12	100	0	4.5	7	16.4	3,100	—	39.14
iron	12	12	100	0	7,200	8,800	10,900	23,000	—	22,280
lead	14	12	86	0	1.3	1.9	2.6	150 [d]	—	37.66
magnesium	12	12	100	No PSC	1,710	2,200	2,800	—	—	7,304
manganese	12	12	100	0	67.7	87	112	1,800	—	383.0
mercury	12	1	8.3	0	0.019	0.019	0.019	23	—	0.52
nickel	12	12	100	0	21.1	25	34.2	1,600	—	55.72
potassium	12	12	100	No PSC	472	630	833	—	—	1,232
silver	12	9	75	0	0.053	0.1	0.16	390	—	2.22
sodium	12	2	17	No PSC	200	230	262	—	—	1,230
vanadium	12	12	100	0	14	18	21.9	78	—	47.34
zinc	12	12	100	0	11.1	17	43.3	23,000	—	67.48

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

Acronyms/Abbreviations:

AOC – area of concern
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
TPH – total petroleum hydrocarbons

Table 4-2
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, AOC 18

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background	Minimum [a]	Average [a]	Maximum [a]	California MCL	Background (95th Percentile)
VOCs (µg/L)									
cis-1,2-dichloroethene	3	3	100	0	1.1	1.7	2.7	6	—[b]
naphthalene	2	2	100	No PSC	1.1	2.4	3.6	—	—
trichloroethene	3	2	67	0	0.57	0.65	0.72	5	—
Metals (µg/L)									
aluminum	2	1	50	0	153	150	153	1,000	1,070
barium	2	2	100	0	25.6	37	48.6	1,000	569.5
calcium	2	2	100	No PSC	19,200	20,000	20,400	—	—
copper	2	1	50	No PSC	1.7	1.7	1.7	—	24.03
iron	2	1	50	No PSC	228	230	228	—	6,586
magnesium	2	2	100	No PSC	7,320	8,500	9,760	—	—
manganese	2	2	100	No PSC	63.4	69	74.4	—	1,741
potassium	2	2	100	No PSC	13,500	14,000	14,200	—	—
sodium	2	2	100	No PSC	79,600	88,000	95,800	—	—
vanadium	2	2	100	No PSC	1.3	1.6	1.8	—	26.27
General Chemistry (µg/L)									
solids, total dissolved	2	2	100	No PSC	337,000	380,000	432,000	—	—

Notes:

[a] data review qualifiers are not included in this table

[b] dash indicates not applicable or not established

Acronyms/Abbreviations:

AOC – area of concern
µg/L – micrograms per liter
MCL – maximum contaminant level
PSC – preliminary screening criterion (MCL)
VOC – volatile organic compound

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Table 4-3
Soil Sampling Results, AOC 18

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: 070-002-003 / Sample: 070-0003M / [a]Depth Interval: 0 - 0.5 / Collection Date: 27-Mar-95	070-002-004 / 070-0004 / 0 - 0.5 / 27-Mar-95	070-002-004 / 070-0004M / 0 - 0.5 / 27-Mar-95	070-003-022 / 070-0022M / 3 - 3.5 / 27-Mar-95	070-003-023 / 070-0023M / 3 - 3.5 / 27-Mar-95	070-003-024 / 070-0035 / 3 - 3.5 / 27-Mar-95	070-003-025 / 070-0036 / 3 - 3.5 / 27-Mar-95	32EDC-5-24 / C032C860 / 0 - 0.5 / 21-May-02	32EDC-5-24 / C032C861 / 0.5 - 2 / 21-May-02	32EDC-5-24 / C032C862 / 2 - 4 / 21-May-02
VOCs															
2-butanone	22,000,000	—[b]	—	—	µg/kg	NA	NA	NA	12 U	12 U	12 UJ	12 UJ	NA	NA	NA
carbon disulfide	360,000	—	—	—	µg/kg	NA	NA	NA	6 U	5.9 U	12 U	12 U	NA	NA	NA
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	NA	NA	NA	6 U	5.9 U	NA	NA	NA	NA	NA
Petroleum Hydrocarbons															
diesel	—	—	100,000	—	µg/kg	14,000	11,000 U	45,000	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	µg/kg	400,000	38,000 J	350,000	NA	NA	NA	NA	NA	NA	NA
SVOCs															
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	0.96 J	5.4 UJ	0.46 J
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	1.5 J	0.56 J	5.5 J
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	1.7 J	0.78 J	6.3 J
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	1.3 J	0.48 J	4.9 J
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	5.4 UJ	5.4 UJ	5.3 UJ
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	5.4 UJ	5.4 UJ	7.9 J
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	4.5 J	1.2 J	13 J
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	5.4 UJ	5.4 UJ	5.3 UJ
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	6.9 J	0.6 J	8.2 J
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	5.4 UJ	5.4 UJ	5.3 UJ
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	2.4 J	5.4 UJ	1.7 J
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	5.7 J	0.65 J	7.4 J
Pesticides/PCBs						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals															
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 18

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: 32EDC-5-24	A18SB01	A18SB01	A18SB01	A18SB02	A18SB02	A18SB02	A18SB03	A18SB03	A18SB03	A18SB04
Sample:						C032C863	C077S301	C077S302	C077S303	C077S304	C077S305	C077S306	C077S307	C077S308	C077S309	C077S310
[a] Depth Interval:						4 - 8	1 - 2	2.5 - 4	5 - 6	1 - 2	3 - 4	6 - 7	1 - 2	3 - 4	6 - 7	1 - 2
Collection Date:						21-May-02	12-Dec-05	12-Dec-05	12-Dec-05	12-Dec-05	12-Dec-05	12-Dec-05	12-Dec-05	12-Dec-05	12-Dec-05	12-Dec-05
VOCs																
2-butanone	22,000,000	—[b]	—	—	µg/kg	NA	100 U	100 U	100 U	1.8 J	100 U	100 U	2.7 J	100 U	100 U	100 U
carbon disulfide	360,000	—	—	—	µg/kg	NA	1.2 J	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	NA	5 U	5 U	6 U	5 U	5 U	6 U	5 U	6 U	6 U	5 U
Petroleum Hydrocarbons																
diesel	—	—	100,000	—	µg/kg	NA	1,000 U	1,000 U	1,200 U	1,100 U	1,100 U	1,200 U	1,100 U	1,100 U	1,200 U	1,100 U
motor oil	—	—	500,000	—	µg/kg	NA	10,000 U	10,000 U	12,000 U	11,000 U	11,000 U	12,000 U	11,000 U	11,000 U	12,000 U	11,000 U
SVOCs																
anthracene	22,000,000	—	—	—	µg/kg	5.6 UJ	5 U	5 U	6 U	5 U	5 U	6 U	5 U	6 U	6 U	5 U
benz(a)anthracene	620[c]	—	—	—	µg/kg	5.6 UJ	5 U	5 U	6 U	5 U	8.7	6 U	5 U	6 U	6 U	5 U
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	5.6 UJ	5 U	5 U	6 U	5 U	6.8	6 U	5 U	6 U	6 U	5 U
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	5.6 UJ	5 U	5 U	6 U	5 U	9.3	6 U	5 U	6 U	6 U	5 U
benzo(g,h,i)perylene	—	—	—	—	µg/kg	5.6 UJ	5 U	5 U	6 U	5 U	7.6	6 U	5 U	6 U	6 U	5 U
benzo(a)pyrene	62[c]	—	—	—	µg/kg	5.6 UJ	5 U	5 U	6 U	5 U	10	6 U	5 U	6 U	6 U	5 U
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	5.6 UJ	5 U	5 U	6 U	5 U	7.5	6 U	5 U	6 U	6 U	5 U
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	5.6 UJ	5 U	5 U	6 U	5 U	7.7	6 U	5 U	6 U	6 U	5 U
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	300 U	190 J	140 J	110 J	170 J	81 J	300 U	990	350 J	140 J
fluoranthene	2,300,000	—	—	—	µg/kg	5.6 UJ	5 U	5 U	6 U	5 U	2.5 J	6 U	5 U	6 U	6 U	5 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	5.6 UJ	5 U	5 U	6 U	5 U	6.6	6 U	5 U	6 U	6 U	5 U
phenanthrene	—	—	—	—	µg/kg	5.6 UJ	5 U	5 U	6 U	5 U	5 U	6 U	5 U	6 U	6 U	5 U
pyrene	2,300,000	—	—	—	µg/kg	5.6 UJ	5 U	5 U	2.4 J	5 U	3.5 J	6 U	5 U	6 U	2.8 J	5 U
Pesticides/PCBs						NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals																
aluminum	76,000	—	—	13,960	mg/kg	NA	4,410	3,140	4,440	3,310	3,480	4,960	3,840	5,480	4,100	4,810
arsenic	0.39	0.062	—	9.14	mg/kg	NA	**2.3**[d]	**1.4**	**2.1**	**1.7**	**1.3**	**2.1**	**1.8**	**2.1**	**1.2**	**2.2**
barium	5,400	—	—	93.68	mg/kg	NA	21.1	19.2	27.5	23.5	24.6	29.9	29.1	36.4	29	28.6
beryllium	150	—	—	1.27	mg/kg	NA	0.1 J	0.1 J	0.11 J	0.091 J	0.12 J	0.12 J	0.12 J	0.15 J	0.12 J	0.12 J
calcium	—	—	—	16,800	mg/kg	NA	2,470	1,870	2,320	1,850	1,590	2,380	3,020	2,330	1,730	2,090
chromium	210	—	—	54.84	mg/kg	NA	30.9	23.9	28.6	26.1	25	31.6	30.1	34.2	26.1	33.8
cobalt	900	—	—	14.30	mg/kg	NA	3.8 J	3.6 J	4.1 J	3.8 J	3.8 J	4.2 J	4.1 J	5.1 J	4.1 J	4.2 J
copper	3,100	—	—	39.14	mg/kg	NA	5.2	5.8	5.8	5.8	6.2	5.6	5.3	6.2	5.8	11.1
iron	23,000	—	—	22,280	mg/kg	NA	9,140	7,330	9,300	8,650	7,860	9,530	8,790	10,900	8,740	9,770
lead	400	150	—	37.66	mg/kg	NA	2	1.6	2.6	2.4	1.7	2.5	1.7	2	1.7	1.5
magnesium	—	—	—	7,304	mg/kg	NA	2,000	1,780	2,170	1,800	1,950	2,490	2,160	2,800	2,420	2,350
manganese	1,800	—	—	383.0	mg/kg	NA	90.7	67.7	90.8	80.6	82.7	96	88.2	112	87.1	94.2
mercury	23	—	—	0.52	mg/kg	NA	0.019 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
nickel	1,600	—	—	55.72	mg/kg	NA	23.9	22.1	25.4	22.3	23.9	28.1	25.6	34.2	27.3	26.3
potassium	—	—	—	1,232	mg/kg	NA	592	474	621	530	546	821	645	833	706	691
silver	390	—	—	2.22	mg/kg	NA	0.14	0.1 U	0.16	0.14	0.063 J	0.06 J	0.053 J	0.14	0.1 U	0.11
sodium	—	—	—	1,230	mg/kg	NA	262	87.4 U	71.9 U	48.7 U	48.9 U	92.3 U	200	96.5 U	155 U	109 U
vanadium	78	—	—	47.34	mg/kg	NA	20.4	14.3	20.5	19	15.9	19.2	17.3	21.2	16.3	21.7
zinc	23,000	—	—	67.48	mg/kg	NA	12.8	15.1	15.2	15.4	16.4	15.1	13.6	14.1	16.8	14.9

Table 4-3
Soil Sampling Results, AOC 18

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: A18SB04	A18SB04	PA02-08	PA02-08
						Sample: C077S311	C077S312	030-CAP-282	030-CAP-283
						[a] Depth Interval: 3 - 4	6.5 - 8	2 - 3	6 - 7
						Collection Date: 12-Dec-05	12-Dec-05	03-May-00	03-May-00
VOCs									
2-butanone	22,000,000	—[b]	—	—	µg/kg	100 U	100 U	NA	NA
carbon disulfide	360,000	—	—	—	µg/kg	100 U	100 U	NA	NA
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	6 U	0.34 J	10 U	10 U
Petroleum Hydrocarbons									
diesel	—	—	100,000	—	µg/kg	1,200 U	1,200 U	10,000 U	10,000 U
motor oil	—	—	500,000	—	µg/kg	12,000 U	12,000 U	250,000 U	250,000 U
SVOCs									
anthracene	22,000,000	—	—	—	µg/kg	6 U	6 U	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	6 U	2.8 J	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	6 U	11 J	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	6 U	6.2 J	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	6 U	9.1	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	6 U	7.3	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	6 U	6 U	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	6 U	6 U	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	160 J	86 J	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	6 U	3.1 J	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	6 U	4.9 J	NA	NA
phenanthrene	—	—	—	—	µg/kg	6 U	6 U	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	6 U	4.7 J	NA	NA
Pesticides/PCBs						ND	ND	NA	NA
Metals									
aluminum	76,000	—	—	13,960	mg/kg	3,020	3,640	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	**1.3**	**1.7**	NA	NA
barium	5,400	—	—	93.68	mg/kg	21.6	23	NA	NA
beryllium	150	—	—	1.27	mg/kg	0.094 J	0.1 J	NA	NA
calcium	—	—	—	16,800	mg/kg	1,340	1,610	NA	NA
chromium	210	—	—	54.84	mg/kg	24.2	24.3	NA	NA
cobalt	900	—	—	14.30	mg/kg	3.3 J	4 J	NA	NA
copper	3,100	—	—	39.14	mg/kg	4.5	16.4	NA	NA
iron	23,000	—	—	22,280	mg/kg	7,200	8,230	NA	NA
lead	400	150	—	37.66	mg/kg	1.3	1.3	11 U	12 U
magnesium	—	—	—	7,304	mg/kg	1,710	2,180	NA	NA
manganese	1,800	—	—	383.0	mg/kg	68.7	82.2	NA	NA
mercury	23	—	—	0.52	mg/kg	0.1 U	0.1 U	NA	NA
nickel	1,600	—	—	55.72	mg/kg	21.1	25	NA	NA
potassium	—	—	—	1,232	mg/kg	472	651	NA	NA
silver	390	—	—	2.22	mg/kg	0.1 U	0.06 J	NA	NA
sodium	—	—	—	1,230	mg/kg	47.2 U	72.2 U	NA	NA
vanadium	78	—	—	47.34	mg/kg	14	21.9	NA	NA
zinc	23,000	—	—	67.48	mg/kg	11.1	43.3	NA	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[d] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
ND – not detected
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 4-4
Groundwater Sampling Results, AOC 18

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Background	Result Units	Station ID: A18SB01 Sample: C077G071 [a]Depth Interval: 5 - 10 Collection Date: 12-Dec-05	A18SB02 C077G072 (FD) 5 - 10 12-Dec-05	A18SB02 C077G073 5 - 10 12-Dec-05	PA02-08 030-CAP-301 0 - 10 03-May-00
VOCs									
cis-1,2-dichloroethene	70	6	—[b]	—	µg/L	2.7	NA	1.4	1.1
naphthalene	—	—	—	—	µg/L	3.6	NA	1.1	NA
trichloroethene	5	5	—	—	µg/L	0.72	NA	0.57	1.3 UJ
Petroleum Hydrocarbons						ND	ND	ND	ND
SVOCs						ND	NA	ND	NA
Pesticides/PCBs						ND	NA	ND	NA
Metals									
aluminum	1,000	1,000	—	1,070	µg/L	100 U	NA	153	NA
barium	2,000	1,000	—	569.5	µg/L	48.6	NA	25.6	NA
calcium	—	—	—	—	µg/L	20,400	NA	19,200	NA
copper	—	—	—	24.03	µg/L	5 U	NA	1.7 J	NA
iron	—	—	—	6,586	µg/L	50 U	NA	228	NA
magnesium	—	—	—	—	µg/L	9,760	NA	7,320	NA
manganese	—	—	—	1,741	µg/L	74.4	NA	63.4	NA
potassium	—	—	—	—	µg/L	13,500	NA	14,200	NA
sodium	—	—	—	—	µg/L	79,600	NA	95,800	NA
vanadium	—	—	—	26.27	µg/L	1.3 J	NA	1.8 J	NA
General Chemistry									
solids, total dissolved	—	—	—	—	µg/L	337,000	NA	432,000	NA

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

Table 4-4
Groundwater Sampling Results, AOC 18

Acronyms/Abbreviations:

AOC – area of concern
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
GW – groundwater
µg/L – micrograms per liter
MCL – maximum contaminant level
NA – not analyzed
ND – not detected
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:

J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 5-1
Estimates of Mobility and Persistence of Naphthalene, AOC 18

Analyte	K_{oc} (L/kg)	f_{oc}	Percent Sorbed [a]	Half-Life in Soil (years) [b]
naphthalene	2,000	0.0025	83	0.71

Notes:
[a] percent sorbed = $[K_{oc}f_{oc} / (1+K_{oc}f_{oc})] \times 100$
[b] for microbially mediated degradation in soil (Howard et al. 1991)

Acronyms/Abbreviations:
AOC – area of concern
f_{oc} – fraction organic carbon; average value for poorly graded sand–silty sand at AOC 18
K_{oc} – organic carbon partition coefficient
L/kg – liters per kilogram

Table 6-1
Tier 1 Evaluation Results by Exposure Group, AOC 18

Exposure Group [a]	Cancer Risk	Hazard Index
1. All soil and groundwater exposure pathways		
Total [b]	8E-05	1
Without metals below background	4E-05	0.04
2. Exposure pathways for soil and vapors from VOCs in groundwater		
Total [b]	4E-05	0.9
Without metals below background	NC	0.0004
3. Exposure pathways for residential use of groundwater		
Total [b]	4E-05	0.2
Without metals below background	4E-05	0.04

Notes:

[a] PAHs are not included

[b] includes all COPCs

Acronyms/Abbreviations:

AOC – area of concern

COPC – chemical of potential concern

NC – not calculated (no COPCs in this group)

PAH – polynuclear aromatic hydrocarbon

VOC – volatile organic compound

Table 6-2
Tier 1 Evaluation Results by Risk Driver, AOC 18

Study Area	Analyte Name	TOTAL Hazard Quotient	TOTAL Cancer Risk	WITHOUT BACKGROUND Hazard Quotient	WITHOUT BACKGROUND Cancer Risk
AOC 18					
Soil					
	arsenic	—*	4E-05	—	—
	Total for soil	**0.9**	**4E-05**	**0.0004**	**0E+00**
Groundwater					
	naphthalene	—	4E-05	—	4E-05
	Total for groundwater	**0.2**	**5E-07**	**0.04**	**5E-07**
	Total for soil and groundwater	**1**	**8E-05**	**0.04**	**4E-05**

Note:
* dash indicates not applicable

Acronym/Abbreviation:
AOC – area of concern

Table 7-1
Summary of RI Results and Recommendations, AOC 18

DQO Problem	DQO Decision Questions	Nature and Extent	Tier 1 Evaluation	Recommendation
A limited number of soil samples were collected at AOC 18 to evaluate impact from contaminants stored at NAS GAP 23. Groundwater at AOC 18 was not assessed.	Have the nature and extent of contamination been defined?	All reported analyte concentrations are below PSCs.	NA	No further action.
	Are contaminants present at concentrations that contribute to an unacceptable risk to potential future residents?	NA	No. Total cancer risk is within the risk management range of 10^{-6} to 10^{-4}, with an HI of 1. The cancer risk is primarily due to naphthalene in groundwater. Groundwater is not considered a source of drinking water based on the San Francisco Bay Regional Water Quality Control Board's finding that groundwater west of Saratoga Street meets state exemption criteria.	See above.
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?	NA	NA. Pathway was not evaluated for AOC 18, located over 600 feet from the nearest surface water body.	No further action.

Acronyms/Abbreviations:
AOC – area of concern
DQO – data quality objective
GAP – generator accumulation point
HI – hazard index
NA – not applicable
NAS – Naval Air Station
PSC – preliminary screening criterion
RI – remedial investigation

ATTACHMENT P

AREA OF CONCERN 20

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL
REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT
ATTACHMENT P, AREA OF CONCERN 20
IR SITE 35, TRANSFER PARCEL EDC-5
ALAMEDA POINT
ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 20. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station Alameda), Alameda, California (Figure 1-1).

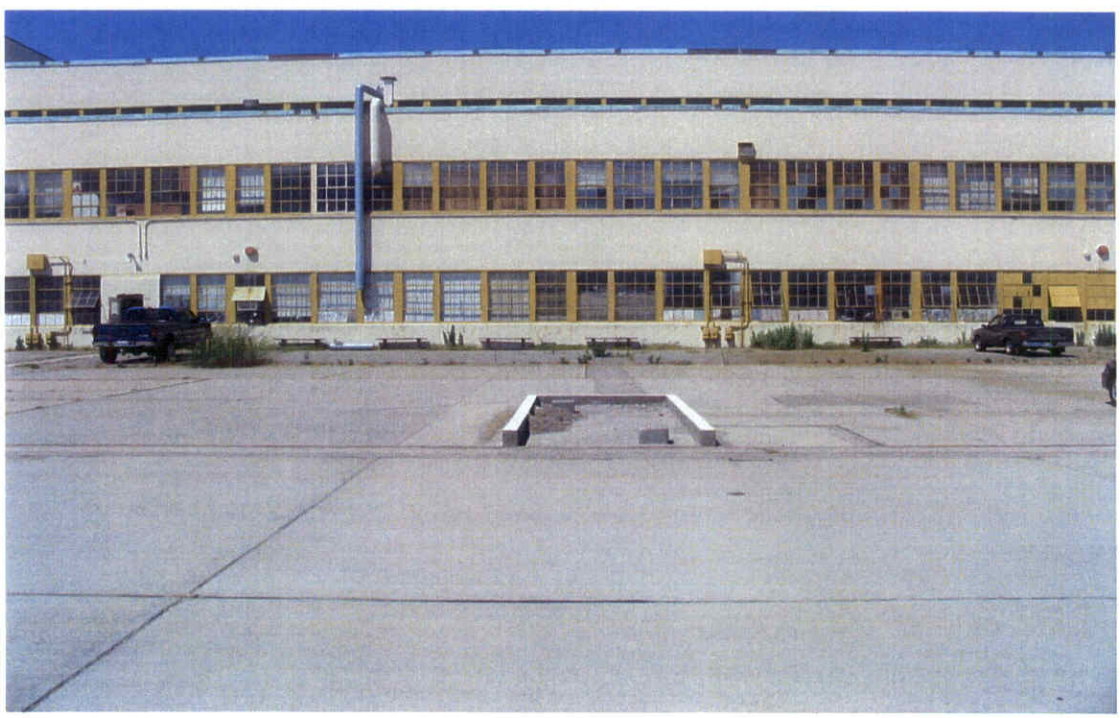
Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

AOC 20 is an approximately 0.6-acre area on the southwestern tip of Transfer Parcel Economic Development Conveyance (EDC)-5 (Figure 1-1). This AOC includes the locations of two former oil/water separators (OWSs) (OWS 012A and OWS 012B) that were aboveground along the northwestern edge of Environmental Baseline Survey (EBS) Parcel 23F (Photographs 1-1 and 1-2). Two helicopter loading pads at AOC 20 were removed, and their former locations are suspected but unknown (Photograph 1-3). The former fuel line Corrective Action Area (CAA)-B was located immediately south of the AOC.

1.2 HISTORICAL USE

EBS Parcel 23F was historically used as a taxiway and parking apron. Two helicopter landing pads (Photograph 1-3) and two OWSs were present in AOC 20. No buildings



Photograph 1-1
Location of Former OWS 12A, View to North

Photograph 1-2
Location of Former OWS 12B, View to North

Photograph 1-3
Suspected Location of Helicopter Pad

were located on this AOC. Chemicals stored in the area included synthetic oils, Freon, trichlorofluoroethane, paint, and hazardous wastes (IT 2001a).

1.3 PRELIMINARY SCREENING CRITERIA AND BACKGROUND METALS

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this AOC are the following:

- Soil
  - residential preliminary remediation goals (PRGs) (U.S. EPA 2004b), except polynuclear aromatic hydrocarbons (PAHs) classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (DON 2001a)
  - environmental screening levels (ESLs) for total petroleum hydrocarbons (TPH) – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)
- Groundwater
  - maximum contaminant levels (MCLs) and advisory level of 15 micrograms per liter (µg/L) for lead (U.S. EPA 2002, DHS 2006)
  - ESLs for TPH (RWQCB 2005)
  - Because AOC 20 is near Seaplane Lagoon, groundwater concentrations were also compared to the following surface water criteria:
    - California Toxics Rule (40 *Code of Federal Regulations* Section 131.38) for saltwater aquatic organisms (saltwater criterion continuous concentration [CCC]) and human-health consumption of organisms only (HHCO)
    - National Recommended Water Quality Criteria (NRWQC) for saltwater aquatic organisms (saltwater CCC) and HHCO (U.S. EPA 2002, 2006)
    - ESLs for TPH – surface water bodies (marine) (RWQCB 2005)

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being assessed. For example, groundwater concentrations from all study areas were compared to MCLs, whether or not the groundwater was considered a potential drinking water source in that area. Groundwater concentrations in areas near surface water bodies were also compared to surface water PSCs even though surface water criteria are not applicable to groundwater. Chemicals of potential concern (COPCs) identified in the health risk evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs.

In addition to the above-listed PSCs, metals concentrations in soil and groundwater at AOC 20 were compared to the following Alameda Point background concentrations to help discriminate between site-related and naturally occurring metals:

- Alameda Point background soil concentrations (95th percentile of the pink data set; Appendix E of the final RI Report of Operable Unit [OU]-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)
- Alameda Point background groundwater concentrations (95th percentile; Appendix E of the final RI Report of OU-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)

For ease of discussion in this report, the Alameda Point 95th percentile concentrations for metals in soil (pink background data set) and groundwater are referred to as "background."

Section 4.3 of the main RI/FS Report provides further discussion on the occurrence and interpretation of metals concentrations in soil and groundwater at IR Site 35.

1.4 PREVIOUS INVESTIGATIONS

During two previous investigations at AOC 20, soil and groundwater samples were collected, and results of these investigations are summarized below. The data were evaluated further as part of the Solid Waste Management Unit (SWMU) Report, discussed below. Locations sampled in AOC 20 are shown on Figure 1-1. Analytical results for soil samples collected within the AOC are summarized in Appendix B.

1.4.1 Environmental Baseline Survey

Five soil samples (023-0019M, -0020, -0020M, -0034M, and -0035M) were collected in AOC 20 during the EBS investigation from 1 to 2 feet below ground surface (bgs) (IT 2001a). Soil samples were analyzed for TPH and metals. These locations were sampled to investigate OWSs 012A and 012B. Reported TPH and metals concentrations were below PSCs.

1.4.2 2002 Polynuclear Aromatic Hydrocarbon Study

One soil boring (32EDC-5-12) was advanced in AOC 20 during the 2002 PAH study (BEI 2005a). Samples were collected from four depth intervals between 0 and 8 feet bgs and analyzed for PAHs. B(a)P equivalent concentrations in all soil samples from this boring were below the PSC.

1.4.3 Solid Waste Management Unit Report

The two OWSs in AOC 20 were included in the SWMU Report (SulTech 2005a). During preparation of the SWMU Report, previously existing data from the EBS investigation were evaluated further. The SWMU Report concluded that since all contaminant concentrations from previous investigations were below PSCs, no further action was recommended.

1.5 ADJACENT SITES

Underground pipelines that historically distributed jet propellant grade 5 and other fuels from locations near Seaplane Lagoon to various locations at Alameda Point were removed (34,500 linear feet) or abandoned in place (24,100 linear feet) between June 1998 and February 1999 (TtEMI 2000a). TPH concentrations reported in confirmation soil and groundwater samples collected following fuel line removal and abandonment were above preliminary remediation criteria screening levels established by the Navy for petroleum-contaminated sites at Alameda Point (DON 2001b). The former fuel line areas were designated CAA-B, and segments of the former fuel line are located south of AOC 20 (Figure 1-1). No further action was recommended for CAA-B because it met the criteria for low-risk fuel site closure set forth by the San Francisco Bay Regional Water Quality Control Board (Water Board) (TtEMI 2003b).

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Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, geology, and potential beneficial groundwater use at AOC 20.

AOC 20 is located west of Saratoga Street. Topography at AOC 20 is relatively flat. The average ground elevation, based on elevation data from the two borings (A20SB01 and A20SB02) advanced during the RI, is 11 feet above mean sea level (MSL). The average depth to water in the two RI borings was approximately 5 feet bgs. Groundwater depth was measured in temporary casings prior to groundwater sample collection. Total dissolved solids (TDS) concentrations measured in groundwater samples from two borings were 366 and 594 milligrams per liter (mg/L), and the average TDS concentration was 480 mg/L.

The groundwater monitoring well nearest to AOC 20 is M10-02, located just north of the west end of AOC 20 in IR Site 10. A review of groundwater depths in this well over time (August 1991 through December 2003) shows a range in depth to water from approximately 6 to 8 feet bgs. The deepest historical groundwater measured in this well is approximately 6 feet MSL. This value, if subtracted from the ground elevation at AOC 20, would suggest that groundwater in the vicinity of this AOC may have been present at 5 feet bgs.

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is south at AOC 20. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Based on tidal studies performed at other Alameda Point sites, minimal tidal influence is expected at AOC 20, located approximately 500 feet from Seaplane Lagoon. Results of the tidal study at nearby sites (see Section 2 of the main RI/FS Report) showed significant tidal influence in wells within 30 feet of Seaplane Lagoon and minimal tidal influence in a well approximately 100 feet inland of Seaplane Lagoon, indicating a significant decrease in tidal influence over a relatively short distance.

Soil encountered in the two RI borings consisted of poorly graded sand. These sands are expected to be entirely fill material. Fine-grained bay sediment (Young Bay Mud) was not encountered in these borings; however, it is expected to exist at approximately 18 feet bgs (see cross section E-E′ on Figure 2-8 in the main RI/FS Report). The Marsh Crust was not encountered in the borings. As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust may be present beneath AOC 20 although it was not encountered in the borings advanced to 10 feet bgs during the RI. RI boring logs for the study area are included in Appendix D.

Based on the location of AOC 20 west of Saratoga Street, groundwater at AOC 20 would not be considered a drinking water source. In a letter dated July 21, 2003, the Navy received concurrence from the Water Board that groundwater west of Saratoga Street meets exemption criteria for the municipal and domestic water supply designation in the California State Water Resources Control Board source of drinking water policy Resolution (Res.) 88-63 (SWRCB 1988) and California Regional Water Quality Control Board Res. 89-39 (RWQCB 2003).

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Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for AOC 20. Sitewide data quality objectives (DQOs) for the evaluation of OWSs are presented in Table 3-2 of the main RI/FS Report.

3.1 APPROACH

Previous investigations did not identify TPH or metals at concentrations above PSCs at the two soil sampling locations that targeted the OWSs. The regulatory agencies requested additional soil and grab groundwater samples at each of the two OWS locations in AOC 20 to assess whether soil and/or groundwater have been impacted by possible releases of contaminants.

3.2 SCOPE

Soil and groundwater samples were collected from two borings adjacent to and on the assumed downgradient side of each OWS during the 2005 RI sampling. Three soil samples (at 1 to 2, 2 to 4, and 4 to 5 feet bgs) were collected from each boring. Grab groundwater samples were collected from temporary well casings screened from 5 to 10 feet bgs placed inside the borings.

Soil and groundwater samples were analyzed for volatile organic compounds (VOCs), extractable-range TPH, and metals. Groundwater samples were also analyzed for TDS. Because AOC 20 is located near Seaplane Lagoon, groundwater was also analyzed for low-detection-level mercury for comparison to the surface water PSC. A sampling summary for samples collected during the RI and previous investigations is summarized in Table 3-1. Sampling locations from all investigations are shown on Figure 1-1.

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Section 4
NATURE AND EXTENT OF CONTAMINATION

This section discusses sampling and analysis from previous investigations and from the RI, along with the concentration ranges and spatial distributions of the analytes identified at AOC 20. Soil and groundwater samples were collected at four locations during the EBS (IT 2001a), the 2002 PAH Study (BEI 2005a), and the RI (Table 3-1 and Figure 1-1). Results for analytes reported in groundwater at concentrations above PSCs are illustrated on Figure 4-1. Metals reported in soil and groundwater at concentrations above background are discussed in detail in Section 4.3.3 of the main RI/FS Report. Metals discussion in this section focuses primarily on concentrations above PSCs. Regardless of concentration, all reported metals (except required human trace nutrients) were included in the risk evaluation (Section 6).

Concentration ranges of soil and groundwater results are presented in Tables 4-1 and 4-2. Soil and groundwater analytical results are summarized in Tables 4-3 and 4-4. Additionally, a comparison of groundwater analytical results to surface water PSCs is presented in Table 4-5. Complete analytical results for historical and RI samples collected within the AOC are included in Appendices B and G, respectively.

4.1 SOIL SAMPLING RESULTS

Analytical soil sampling results are discussed for each class of chemicals investigated at AOC 20.

4.1.1 Volatile Organic Compounds

The VOCs cis-1,2-dichloroethene (DCE), methylene chloride, and toluene were reported in soil from borings A20SB01 and A20SB02. VOC concentrations were below PSCs.

4.1.2 Polynuclear Aromatic Hydrocarbons

Eight PAHs were reported in soil from boring 32EDC-5-12. B(a)P equivalent concentrations were below PSCs.

4.1.3 Total Petroleum Hydrocarbons

Diesel-range TPH and motor oil–range TPH were reported in soil from boring 023-004-019. TPH concentrations were below PSCs.

4.1.4 Metals

Twenty metals were reported in soil from borings 023-0019, 023-0020, A20SB01, and A20SB02 at concentrations below PSCs and background. Arsenic was reported at concentrations above the PSC (PRG of 0.062 milligrams per kilogram [mg/kg]) but below the background concentration of 9.14 mg/kg.

4.2 GROUNDWATER SAMPLING RESULTS

Analytical groundwater sampling results are discussed for each class of chemicals investigated at AOC 20.

4.2.1 Volatile Organic Compounds

The VOCs 2-butanone, toluene, and trichloroethene were reported in groundwater from boring A20SB02. VOC concentrations were below PSCs.

4.2.2 Total Petroleum Hydrocarbons

Two TPH compounds were reported in groundwater from boring A20SB02 at 5 to 10 feet bgs. Diesel-range TPH and jet propellant grade 5 (JP-5)–range TPH were reported at concentrations of 3,200 and 2,600 µg/L, respectively. These concentrations were above the PSC (ESL of 100 µg/L). TPH results were also compared to surface water criteria and were above the surface water ESL of 640 µg/L.

4.2.3 Metals

Eleven metals were reported above the detection limit in groundwater from borings A20SB01 and A20SB02. Arsenic was the only metal reported at concentrations above the PSC. Arsenic was reported at 11 and 26.9 µg/L in the groundwater samples from borings A20SB01 and A20SB02, respectively. These concentrations were above the MCL of 10 µg/L and surface water PSC (NRWQC HHCO of 0.14 µg/L]). Arsenic concentrations are believed to represent background. While the arsenic concentration reported in the sample from boring A20SB02 was above the background 95th percentile concentration of 20.72 µg/L, it was below the maximum background concentration of 40.7 µg/L.

Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for AOC 20. It discusses the conceptual site model, the physical and chemical changes that might occur to contaminants present at AOC 20, and the mechanisms that could potentially transfer the contaminants from the study area. The conceptual site model facilitates understanding of the present AOC conditions by integrating AOC-specific physical characteristics with the nature and extent of contaminants in the physical systems. Section 5.2 includes an evaluation of the mobility and persistence of compounds above PSCs and not attributable to background at AOC 20. Section 5.3 discusses potential migration pathways.

5.1 AOC 20 CONCEPTUAL SITE MODEL

AOC 20 is located west of Saratoga Street. Topography at the study area is flat and the entire AOC is paved. The surface water nearest to AOC 20 is Seaplane Lagoon, located approximately 500 feet to the south.

Based on a review of RI borings logs, the subsurface lithology at AOC 20 consists of poorly graded sand. The Marsh Crust was not encountered in the borings. Shallow groundwater of the first water-bearing zone beneath AOC 20 occurs in the fill material; the underlying Young Bay Mud would be expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. Groundwater flow direction is south, and average depth to water is approximately 5 feet bgs. Tidal influence at AOC 20 is expected to be negligible based on tidal studies performed at other Alameda Point sites. Groundwater at AOC 20 would not be considered a drinking water source based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.

TPH and arsenic are the chemicals reported above PSCs in groundwater at the AOC. Arsenic was reported in both groundwater samples collected at AOC 20 (at 11 and 26.9 µg/L) and is believed to represent background concentrations. The concentration of 26.9 µg/L is above the PSC and the background 95th percentile but below the maximum background concentration of 40.7 µg/L. The higher arsenic concentration is co-located at A20SB02 with reports of diesel-range TPH (3,200 µg/L) and JP-5–range TPH (2,600 µg/L), and likely represents greater reduced groundwater conditions associated with biodegradation of the TPH near A20SB02 compared to A20SB01. TPH was not reported above laboratory detection limits in the other sample (A20SB01) or in the duplicate sample from A20SB02. Arsenic in groundwater is believed to be naturally occurring as discussed in Section 4.3 of the main RI/FS Report.

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in the environment tends to remain in place. The tendency toward immobility and

persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Section 5 of the main RI/FS Report discusses the physical and chemical properties of contaminants, and their chemical class (e.g., TPH) that affect their transport and persistence in the environment. Also discussed in Section 5 of the main RI/FS Report are mobility and persistence of naturally occurring metals.

TPH is generally composed of a spectrum of hydrocarbon molecule sizes, from the short-chain volatiles (e.g., benzene, toluene, ethylbenzene, and xylenes [BTEX], and naphthalene) to long-chain oils. TPH is subject to biodegradation in the subsurface, with constituents that comprise the lighter end of fuels (gasoline and BTEX) being more readily biodegradable under aerobic conditions. These constituents also tend to be more volatile, more soluble, more mobile, and generally more toxic than the longer-chain hydrocarbons. Heavier fuels (motor oil and heavier end of diesel spectrum) do not typically have appreciable amounts of soluble constituents and tend to adhere to soil particles or other substrate in the subsurface, thus being less mobile. Aging or weathering of TPH will remove the light-end hydrocarbons, including volatiles, first. The lack of appreciable concentrations of fuel-related volatile constituents (BTEX) reported in soil and groundwater indicates that the TPH present in the subsurface at AOC 20 has been subject to weathering and is not a significant source of soluble or volatile constituents to groundwater or air.

5.3 CONTAMINANT MIGRATION

The migration pathways evaluated for relevance to AOC 20 include atmospheric transport (i.e., vapors and airborne fugitive dust), transport via surface water runoff, and groundwater transport from AOC 20 (to adjacent areas and to Seaplane Lagoon). Diesel-range TPH and JP-5–range TPH were the contaminants identified at AOC 20. Only low concentrations of volatile and soluble fuel constituents (e.g., toluene and cis-1,2-DCE) were reported in soil and groundwater, thus eliminating atmospheric transport by vapors as a significant migration pathway and making significant transport from soil to groundwater unlikely. Additionally, the study area is paved. Therefore, significant transport by airborne dust or by surface water runoff is also unlikely.

The most likely migration pathway for contaminants at AOC 20 is groundwater transport, described as follows.

- Groundwater transport of TPH from AOC 20 to adjacent areas and to Seaplane Lagoon is possible. TPH concentrations in groundwater are above PSCs. However, based on the VOC results for the groundwater samples, it appears that the fuels in groundwater may be weathered. Also, the concentrations in groundwater were not consistently reported in the primary and the duplicate sample.

Section 6
TIER 1 EVALUATION

This section summarizes the Tier 1 risk evaluation results for AOC 20. In a Tier 1 evaluation, risk for a residential exposure scenario is assessed with the assumption that no remedial action would take place at the study area. This section also presents a qualitative uncertainty evaluation that identifies and characterizes the effects of uncertainties on the risk results.

A Tier 1 evaluation is a screening-level approach that calculates total cumulative risk values using published risk-based guidelines from the United States Environmental Protection Agency (U.S. EPA), California Environmental Protection Agency (Cal/EPA), and Water Board. The Tier 1 evaluation includes all chemicals identified in at least one sample except for PAHs in soil. PAHs in soil are not included because site-specific remediation goals for PAHs are being developed. The approach used to estimate risk is described in Section 6 of the main RI/FS Report. Tier 1 information is provided in Appendix J.

Cancer risk and noncancer values for AOC 20 are shown in Table 6-1. Risk drivers for cancer and noncancer risk are presented in Table 6-2.

6.1 COPC IDENTIFICATION

The data selection and identification of COPCs are based on a compilation of all usable data for soil and groundwater. All chemicals reported in at least one sample collected during the RI and/or included in the historical data were included as Tier 1 COPCs, except calcium, magnesium, potassium, and sodium, which are known to be required human trace nutrients.

There are 19 Tier 1 COPCs in soil at AOC 20: 16 metals based on 7 to 11 samples, and 3 VOCs based on 6 samples.

There are 10 COPCs in groundwater at AOC 20: seven metals and three VOCs based on two to three samples.

6.2 RISK CHARACTERIZATION

The cancer risk and noncancer hazard values were calculated using the Tier 1 protocol from Cal/EPA (2005). The maximum concentration of each COPC in soil and groundwater was compared with a risk-based guideline to estimate cancer and noncancer risks. Two results are presented for three exposure groups, the total risk and a second value that does not include risk associated with metals concentrations that are below background.

For soil and groundwater data for the three exposure groups at AOC 20, the calculated cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 4×10^{-3} and 2

  Without metals below background: 4×10^{-3} and 1

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 4×10^{-5} and 1

  Without metals below background: 3×10^{-8} and 0.4

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 4×10^{-3} and 0.8

  Without metals below background: $4x\ 10^{-3}$ and 0.8

For residential use of groundwater, the Exposure Group 3 total cancer risk is due to arsenic in groundwater. One of two groundwater samples had a concentration of arsenic above the background 95th percentile concentration but below the maximum concentration in the background data set. The noncancer hazard value is below 1.

6.3 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation represent any potential health concerns at AOC 20. The results are consistent with the site history and previous investigations. This approximately 0.6-acre site is adequately characterized with three investigations and a Tier 1 evaluation based on 7 to 11 soil samples for metals and organic chemicals, and 2 to 3 groundwater samples.

The potential impact of vapors to indoor air for the three VOCs reported in groundwater is negligible. The cancer risk and noncancer hazard index (HI) based on the tap water PRGs are well below 10^{-6} and 1, respectively, and the PRG is higher than the ESL for protection of indoor air. The uncertainty associated with the omission of the dermal pathway for groundwater is low because exposure from the dermal pathway for the Tier 1 COPCs would not result in an increase in the cancer risk or HI for residential use of groundwater (Exposure Groups 1 and 3). Cancer risk and hazard values are reported in one significant figure, so small changes will not necessarily result in an overall increase. This finding is based on the ratio of dermal exposure to ingestion for each Tier 1 COPC.

6.4 CONCLUSIONS

The total cancer risks are above the risk management range for exposure pathways including residential use of groundwater (Exposure Groups 1 and 3). The cancer risk above the risk management range is due to arsenic in groundwater. The maximum concentration of arsenic of 26.9 µg/L is above the background 95th percentile concentration of 20.72 µg/L but below the background maximum concentration of 40.7 µg/L. The other groundwater sample at AOC 20 had a concentration of arsenic of 11 µg/L.

For exposure pathways for soil and VOCs in groundwater (Exposure Group 2) the cancer risk and noncancer HI without background are below 10^{-6} and 1, respectively.

Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points of the RI at AOC 20, including the nature and extent of contamination and results of the Tier 1 risk evaluation. These results form the basis of responses to the DQO decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendations presented below.

7.1 SUMMARY

Previous investigations at AOC 20 did not identify TPH or metals at concentrations above PSCs at the two soil locations that targeted two OWSs. The regulatory agencies requested additional soil and groundwater samples at each of the two OWS locations in the AOC to assess whether soil and/or groundwater have been impacted by possible releases of contaminants.

Analytical results of soil sampling at AOC 20 indicate that reported concentrations were below PSCs. For groundwater, diesel-range and JP-5–range TPH were reported at concentrations above groundwater and surface water PSCs (TPH ESLs). Both the diesel-range and JP-5–range TPH exceedances in groundwater were in a sample from boring A20SB02. TPH were not reported at concentrations above the detection limits in soil samples collected from this boring. Furthermore, TPH were not reported at concentrations above the detection limits in the duplicate groundwater sample from boring A20SB02 or in the groundwater sample from boring A20SB01.

Arsenic was reported in one groundwater sample collected during the RI at a concentration of 26.9 µg/L, which is above the PSC (federal MCL of 10 µg/L). The arsenic concentration reported in the groundwater sample from A20SB02 was also above the background 95th percentile (20.72 µg/L) but below the maximum background concentration (40.7 µg/L) and is believed to represent background. Arsenic concentrations reported in soil samples were above the PRG but below the background concentration for soil (9.14 mg/kg).

Groundwater at AOC 20 would not be considered a drinking water source based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.

Results of the Tier 1 risk evaluation show a total cancer risk of 4×10^{-3} with an HI of 2. The total cancer risk and HI without metals below background is 4×10^{-3} and 1, respectively. The cancer risk is largely due to arsenic in groundwater (4×10^{-3}). Arsenic in groundwater is believed to be naturally occurring and within the background range. Without residential use of groundwater and metals below background, the cancer risk is 3×10^{-8}, with an HI of 0.4.

7.2 AOC 20 CONCLUSIONS AND RECOMMENDATIONS

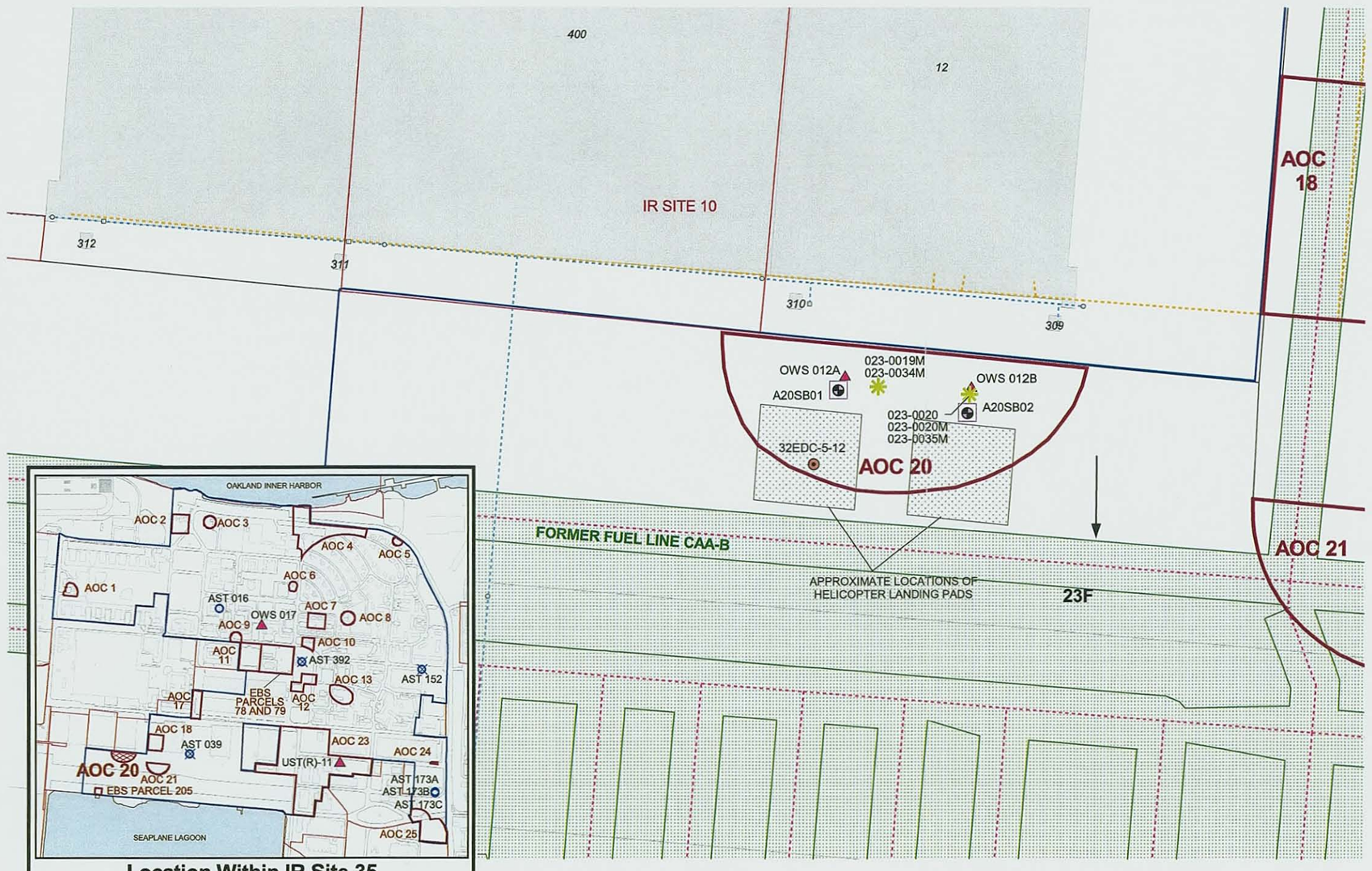
The RI was conducted using the seven-step U.S. EPA DQO process (U.S. EPA 2000); DQOs were developed for AOC 20 in the Work Plan (BEI 2006). The RI has addressed these DQOs, as summarized in Table 7-1.

The data collected during the RI were sufficient to perform a Tier 1 risk evaluation and support decisions on the necessity for remedial actions at AOC 20. TPH in groundwater was the primary chemical reported above PSCs; arsenic in groundwater was reported above the PSC and background, but is considered to be naturally occurring.

No further action is recommended at AOC 20 as part of IR Site 35. Further evaluation of the extent of TPH and arsenic in groundwater is not recommended for the following reasons.

- TPH data should be evaluated along with CAA-B under the TPH Program to determine whether the Water Board's criteria for closure of low-risk fuel sites are met.
- Without metals below background, total cancer risk associated with soil and residential use of groundwater is 4×10^{-3} and the HI is 1. However, the cancer risk is predominantly due to arsenic in groundwater, and arsenic is considered to be naturally occurring. Without metals below background and without residential use of groundwater, cancer risk is below the risk management range and the HI is below 1. Additionally, because AOC 20 is located west of Saratoga Street, residential use of groundwater is unlikely.

FIGURES



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 71 EBS PARCEL
- CORRECTIVE ACTION AREA (CAA)
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- FUEL LINE (ABANDONED IN-PLACE)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

EBS SOIL SAMPLING LOCATION WITH SAMPLE ID
- FUELS AND METALS ANALYSES ONLY

PAH STUDY SOIL SAMPLING LOCATION WITH STATION ID
- SVOCs ANALYSIS ONLY

RI SOIL SAMPLING LOCATION WITH STATION ID
- VOCs, FUELS, AND METALS ANALYSES ONLY

RI GROUNDWATER SAMPLING LOCATION WITH STATION ID
- VOCs, FUELS, AND METALS ANALYSES ONLY

N

Location Within IR Site 35

1500 0 1500 Feet

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOCs – VOLATILE ORGANIC COMPOUNDS

100 0 100 Feet

RI/FS Report for IR Site 35

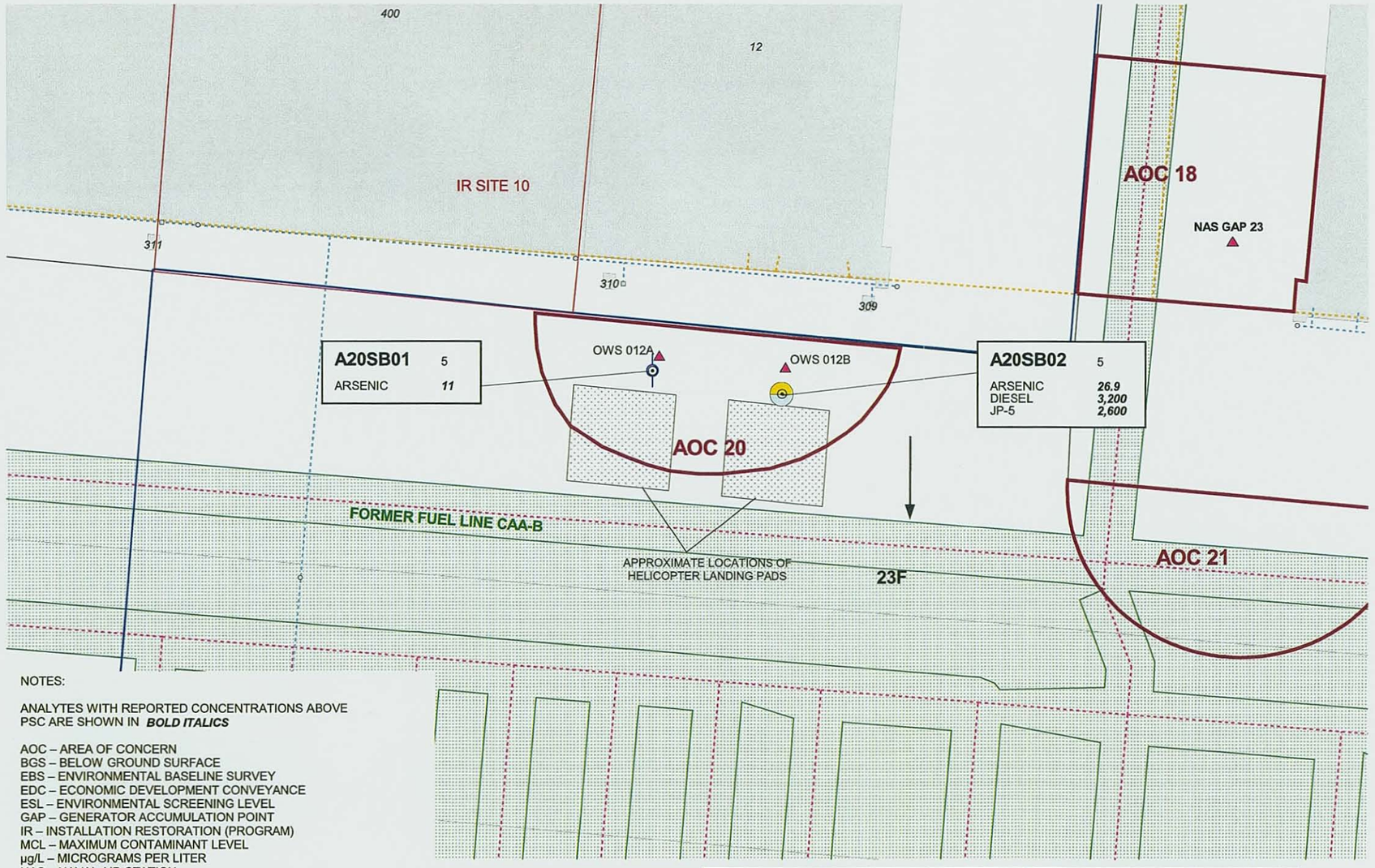
Figure 1-1

Study Area and Sampling Locations
Area of Concern 20

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 6/30/06
File No.: 077L14458
Job No.: 23818-077
Rev No.: C



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 71 EBS PARCEL
- CORRECTIVE ACTION AREA (CAA)
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- FUEL LINE (ABANDONED IN-PLACE)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL GROUNDWATER SAMPLING LOCATION
- RI GROUNDWATER SAMPLING LOCATION

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC FOR :

- FUELS

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC AND GREATER THAN BACKGROUND FOR :

- METALS

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :

- FUELS

N

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

A20SB01 5
ARSENIC 11

ANALYTE — CONCENTRATION in µg/L

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
ESL – ENVIRONMENTAL SCREENING LEVEL
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
MCL – MAXIMUM CONTAMINANT LEVEL
µg/L – MICROGRAMS PER LITER
NAS – NAVAL AIR STATION
NA – NOT APPLICABLE
OWS – OIL/WATER SEPARATOR
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
TPH – TOTAL PETROLEUM HYDROCARBONS

Analyte	PSC	Lowest Surface Water PSC	Background 95th Percentile
ARSENIC	10 µg/L (California MCL)	0.14 µg/L (NRWQC HHCO)	20.72 µg/L
DIESEL	100 µg/L (TPH Groundwater ESL)	640 µg/L (ESL Marine)	NA
JP-5	100 µg/L (TPH Groundwater ESL)	640 µg/L (ESL Marine)	NA

RI/FS Report for IR Site 35

Figure 4-1

Groundwater Sampling Results for Analytes Above PSC – Area of Concern 20

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/26/07
File No.: 077L14492
Job No.: 23818-077
Rev No.: D

TABLES

Table 3-1
Sample Analysis Summary, AOC 20

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE					
				VOCs	PAHs	TPH	Metals	Mercury	TDS
Soil									
32EDC-5-12	C032C807	PAH Study	0–0.5		X				
32EDC-5-12	C032C808	PAH Study	0.5–2		X				
32EDC-5-12	C032C809	PAH Study	2–4		X				
32EDC-5-12	C032C810	PAH Study	4–8		X				
023-004-019	023-0019M	EBS	1–1.5			X[a]	X		
023-004-019	023-0034M (FD)	EBS	1–1.5			X[a]	X		
023-004-020	023-0020[b]	EBS	1.5–2			X[a]	X		
023-004-020	023-0020M[b]	EBS	1.5–2			X[a]	X		
023-004-020	023-0035M[b] (FD)	EBS	1.5–2			X[a]	X		
A20SB01	C077S321	Site 35 RI	1–2	X		X[c]	X		
A20SB01	C077S322	Site 35 RI	2–3	X		X[c]	X		
A20SB01	C077S323	Site 35 RI	4–5	X		X[c]	X		
A20SB02	C077S324	Site 35 RI	1–2	X		X[c]	X		
A20SB02	C077S325	Site 35 RI	2.5–4	X		X[c]	X		
A20SB02	C077S326	Site 35 RI	4–5	X		X[c]	X		
Groundwater									
A20SB01	C077G081	Site 35 RI	5–10	X		X[c]	X	X	X
A20SB02	C077G082 (FD)	Site 35 RI	5–10	X					
A20SB02	C077G083	Site 35 RI	5–10	X		X[c]	X	X	X
A20SB02	C077G084 (FD)	Site 35 RI	5–10			X[c]			X

References:
PAH Study (BEI 2005a)
EBS (IT 2001a)

Notes:
[a] analyzed for gasoline-, diesel-, and motor oil–range TPH
[b] sample 023-0020 was analyzed by a fixed-base laboratory; samples 023-0020M and -0035M were analyzed by a mobile or screening laboratory; samples 023-0020/-0020M/-0035M were collected from the same location
[c] analyzed for diesel-, JP-5–, and motor oil–range TPH

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
EBS – environmental baseline survey
FD – field duplicate
JP-5 – jet propellant grade 5
PAH – polynuclear aromatic hydrocarbon
RI – remedial investigation
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

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Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 20

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
Volatile Organic Compounds (µg/kg)										
cis-1,2-dichloroethene	6	1	17	0	0.29	0.29	0.29	43,000	—[c]	—
methylene chloride	6	2	33	0	5.9	9.5	13	9,100	—	—
toluene	6	1	17	0	3.6	3.6	3.6	520,000	—	—
Fuels (µg/kg)										
diesel	11	2	18	0	11,000	12,000	12,000	—	100,000	—
motor oil	11	2	18	0	430,000	440,000	440,000	—	500,000	—
Semivolatile Organic Compounds (µg/kg)										
benz(a)anthracene	4	1	25	0	1.6	1.6	1.6	620	—	—
benzo(b)fluoranthene	4	1	25	0	2.1	2.1	2.1	620	—	—
benzo(k)fluoranthene	4	1	25	0	1.6	1.6	1.6	380 [d]	—	—
benzo(g,h,i)perylene	4	1	25	No PSC	2.2	2.2	2.2	—	—	—
chrysene	4	1	25	0	2	2	2	3,800 [d]	—	—
fluoranthene	4	1	25	0	2.5	2.5	2.5	2,300,000	—	—
indeno(1,2,3-cd)pyrene	4	1	25	0	1.3	1.3	1.3	620	—	—
pyrene	4	1	25	0	2.9	2.9	2.9	2,300,000	—	—
Metals (mg/kg)										
aluminum	7	7	100	0	3,530	3,800	4,060	76,000	—	13,960
arsenic	11	10	91	0	1.3	1.9	2.3	0.062 [d]	—	9.14
barium	11	11	100	0	25.2	44	88	5,400	—	93.68
beryllium	11	10	91	0	0.12	0.18	0.29	150	—	1.27
cadmium	11	4	36	0	0.16	0.23	0.33	37	—	1.72
calcium	7	7	100	No PSC	1,840	2,100	2,300	—	—	16,800
chromium	11	11	100	0	26	29	31	210	—	54.84
cobalt	11	11	100	0	3.4	4	5.6	900	—	14.30
copper	11	11	100	0	4.7	7.3	16	3,100	—	39.14
iron	7	7	100	0	6,400	8,300	9,250	23,000	—	22,280
lead	11	11	100	0	1.8	2.4	4.1	150 [d]	—	37.66
magnesium	7	7	100	No PSC	1,760	2,000	2,200	—	—	7,304
manganese	7	7	100	0	75.6	86	100	1,800	—	383.0
mercury	11	2	18	0	0.02	0.021	0.022	23	—	0.52
nickel	11	11	100	0	16.9	22	25.3	1,600	—	55.72
potassium	7	7	100	No PSC	428	530	583	—	—	1,232
sodium	7	1	14	No PSC	119	120	119	—	—	1,230
thallium	11	1	9.1	0	1.8	1.8	1.8	5.2	—	0.50
vanadium	11	11	100	0	15	18	21	78	—	47.34
zinc	11	11	100	0	12	15	18	23,000	—	67.48

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

Acronyms/Abbreviations:

AOC – area of concern
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
TPH – total petroleum hydrocarbons

Table 4-2
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, AOC 20

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background	Minimum [a]	Average [a]	Maximum [a]	California MCL	TPH ESL	Background (95th Percentile)	Surface Water Aquatic TPH ESL	Surface Water CTR CCC	Surface Water CTR HHCO	Surface Water NRWQC CCC	Surface Water NRWQC HHCO
VOCs (µg/L)															
2-butanone	3	1	33	No PSC	3.9	3.9	3.9	—[b]	—	—	—	—	—	—	—
toluene	3	1	33	0	0.17	0.17	0.17	150	—	—	—	—	200,000	—	15,000
trichloroethene	3	1	33	0	0.24	0.24	0.24	5	—	—	—	—	81	—	30
Fuels (µg/L)															
diesel	3	1	33	1	3,200	3,200	3,200	—	100	—	640	—	—	—	—
JP-5	3	1	33	1	2,600	2,600	2,600	—	100	—	640	—	—	—	—
Metals (µg/L)															
aluminum	2	1	50	0	187	190	187	1,000	—	1,070	—	—	—	—	—
arsenic	2	2	100	1	11	19	26.9	10[c]	—	20.72	—	36	—	36	0.14
barium	2	2	100	0	1.3	3.2	5.1	1,000	—	569.5	—	—	—	—	—
calcium	2	2	100	No PSC	1,400	2,600	3,790	—	—	—	—	—	—	—	—
iron	2	2	100	No PSC	47.4	75	103	—	—	6,586	—	—	—	—	—
magnesium	2	1	50	No PSC	1,290	1,300	1,290	—	—	—	—	—	—	—	—
manganese	2	2	100	No PSC	2	3.5	4.9	—	—	1,741	—	—	—	—	—
mercury	4	2	50	0	0.00306	0.0068	0.0105	2	—	—	—	0.025	0.051	0.94	—
potassium	2	2	100	No PSC	3,200	4,700	6,180	—	—	—	—	—	—	—	—
sodium	2	2	100	No PSC	52,000	64,000	75,400	—	—	—	—	—	—	—	—
vanadium	2	2	100	No PSC	11.5	20	29.1	—	—	26.27	—	—	—	—	—
General Chemistry (µg/L)															
solids, total dissolved	3	3	100	No PSC	366,000	510,000	594,000	—	—	—	—	—	—	—	—

Notes:
- [a] data review qualifiers are not included in this table
- [b] dash indicates not applicable or not established
- [c] Federal MCL

Acronyms/Abbreviations:
- AOC – area of concern
- CCC – criterion continuous concentration
- CTR – California Toxics Rule
- ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
- HHCO – human-health consumption of organisms only
- JP-5 – jet propellant grade 5
- µg/L – micrograms per liter
- MCL – maximum contaminant level
- NRWQC – National Recommended Water Quality Criteria
- PSC – preliminary screening criteria (MCL, ESL, CTR, and NRWQC)
- TPH – total petroleum hydrocarbons
- VOC – volatile organic compound

Table 4-3
Soil Sampling Results, AOC 20

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: 023-004-019 / Sample: 023-0019M / [a]Depth Interval: 1 - 1.5 / Collection Date: 28-Jun-95	023-004-019 / 023-0034M (FD) / 1 - 1.5 / 28-Jun-95	023-004-020 / 023-0020 / 1.5 - 2 / 28-Jun-95	023-004-020 / 023-0020M / 1.5 - 2 / 28-Jun-95	023-004-020 / 023-0035M (FD) / 1.5 - 2 / 28-Jun-95	32EDC-5-12 / C032C807 / 0 - 0.5 / 17-May-02	32EDC-5-12 / C032C808 / 0.5 - 2 / 17-May-02	32EDC-5-12 / C032C809 / 2 - 4 / 17-May-02	32EDC-5-12 / C032C810 / 4 - 8 / 17-May-02
VOCs														
cis-1,2-dichloroethene	43,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
toluene	520,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons														
diesel	—	—	100,000	—	µg/kg	11,000	12,000	10,000 U	1,000 U	1,000 U	NA	NA	NA	NA
motor oil	—	—	500,000	—	µg/kg	430,000	440,000	21,000 U	26,000 U	26,000 U	NA	NA	NA	NA
SVOCs														
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	1.6 J	5.3 U	5.7 U	6 U
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	2.1 J	5.3 U	5.7 U	6 U
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	1.6 J	5.3 U	5.7 U	6 U
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	2.2 J	5.3 U	5.7 U	6 U
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	2 J	5.3 U	5.7 U	6 U
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	2.5 J	5.3 U	5.7 U	6 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	1.3 J	5.3 U	5.7 U	6 U
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	2.9 J	5.3 U	5.7 U	6 U
Metals														
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	3720	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	**1.5**[d]	**1.8**	**0.83 U**[e]	**1.6**	**1.3**	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	30	50	37.4	77	88	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	0.26	0.29	0.15 U	0.21	0.2	NA	NA	NA	NA
cadmium	37	—	—	1.72	mg/kg	0.24	0.33	0.06 U	0.17	0.16	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	2,000	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	31	29	28.9	27	26	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	4.9	5.6	3.7	3.8	3.4	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	16	9.1	6.8 J	11	6.6	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	6,400 J	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	2.6	4.1	2	1.8	1.9	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	1,760	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	75.6	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	mg/kg	0.11 U	0.11 U	0.16 U	0.1 U	0.1 U	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	23	24	16.9	20	18	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	532	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	119	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	mg/kg	0.27 U	0.27 U	*1.8*[f]	0.25 U	0.26 U	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	21	21	15.3	16	15	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	18	18	14.9	16	12	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 20

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: A20SB01 / Sample: C077S321 / [a]Depth Interval: 1 - 2 / Collection Date: 13-Dec-05	A20SB01 / C077S322 / 2 - 3 / 13-Dec-05	A20SB01 / C077S323 / 4 - 5 / 13-Dec-05	A20SB02 / C077S324 / 1 - 2 / 13-Dec-05	A20SB02 / C077S325 / 2.5 - 4 / 13-Dec-05	A20SB02 / C077S326 / 4 - 5 / 13-Dec-05
VOCs											
cis-1,2-dichloroethene	43,000	—[b]	—	—	µg/kg	5 U	5 U	6 U	0.29 J	6 U	6 U
methylene chloride	9,100	—	—	—	µg/kg	50 U	5.9 J	60 U	13 J	60 U	60 U
toluene	520,000	—	—	—	µg/kg	5 U	5 U	6 U	3.6 J	6 U	6 U
Petroleum Hydrocarbons											
diesel	—	—	100,000	—	µg/kg	1,000 U	1,100 U	1,200 U	1,000 U	1,200 U	1,200 U
motor oil	—	—	500,000	—	µg/kg	10,000 U	11,000 U	12,000 U	10,000 U	12,000 U	12,000 U
SVOCs											
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA
Metals											
aluminum	76,000	—	—	13,960	mg/kg	4,060	3,660	3,530	3,770	4,040	3,810
arsenic	0.39	0.062	—	9.14	mg/kg	**2.1**	**2.3**	**2.2**	**1.9**	**2**	**2.1**
barium	5,400	—	—	93.68	mg/kg	29.5	45	37.6	25.2	36.5	27.7
beryllium	150	—	—	1.27	mg/kg	0.15 J	0.13 J	0.12 J	0.12 J	0.14 J	0.13 J
cadmium	37	—	—	1.72	mg/kg	0.5 U	0.5 U	0.6 U	0.5 U	0.6 U	0.6 U
calcium	—	—	—	16,800	mg/kg	2,300	2,200	2,140	1,990	2,090	1,840
chromium	210	—	—	54.84	mg/kg	29.5	30.8	27.4	26.7	29.9	28.2
cobalt	900	—	—	14.30	mg/kg	3.9 J	3.6 J	3.6 J	3.9 J	4.1 J	3.9 J
copper	3,100	—	—	39.14	mg/kg	5.3	4.8	4.7	5.2	5.3	5.4
iron	23,000	—	—	22,280	mg/kg	9,250	8,890	8,080	8,510	8,880	8,310
lead	400	150	—	37.66	mg/kg	3.2	2.8	2	2.4	2.1	1.8
magnesium	—	—	—	7,304	mg/kg	2,120	1,820	1,810	2,120	2,200	2,070
manganese	1,800	—	—	383.0	mg/kg	100 J	87.2 J	80.4 J	87 J	91.1 J	83.7 J
mercury	23	—	—	0.52	mg/kg	0.1 U	0.1 U	0.1 U	0.02 J	0.1 U	0.022 J
nickel	1,600	—	—	55.72	mg/kg	25.3	21.6	21.9	23.1	24.7	24.1
potassium	—	—	—	1,232	mg/kg	560	428	484	558	559	583
sodium	—	—	—	1,230	mg/kg	92.3 U	87.8 U	60.7 U	135 U	54.2 U	60.1 U
thallium	5.2	—	—	0.50	mg/kg	*2 U*[e]	*2 U*[e]	*2 U*[e]	*2 U*[e]	*2 U*[e]	*2 U*[e]
vanadium	78	—	—	47.34	mg/kg	20.9	20.1	16.9	17.8	19	16.9
zinc	23,000	—	—	67.48	mg/kg	15.4	13	13.2	14.5	15.2	17

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[d] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL
[e] detection limit is above criteria
[f] italicized font indicates result above background

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit

Table 4-4
Groundwater Sampling Results, AOC 20

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	A20SB01 C077G081 5 - 10 14-Dec-05	A20SB01 C077G082 (FD) 5 - 10 14-Dec-05	A20SB02 C077G083 5 - 10 14-Dec-05	A20SB02 C077G084 (FD) 5 - 10 14-Dec-05
VOCs									
2-butanone	—[b]	—	—	—	µg/L	2 U	2 U	3.9	NA
toluene	1,000	150	—	—	µg/L	0.5 U	0.5 U	0.17 J	NA
trichloroethene	5	5	—	—	µg/L	0.5 U	0.5 U	0.24 J	NA
Petroleum Hydrocarbons									
diesel	—	—	100	—	µg/L	50 U	NA	**3,200**[c]	50 U
JP-5	—	—	100	—	µg/L	50 U	NA	**2,600**	50 U
Metals									
aluminum	1,000	1,000	—	1,070	µg/L	100 U	NA	187	NA
arsenic	10	50	—	20.72	µg/L	**11**	NA	***26.9***[d]	NA
barium	2,000	1,000	—	569.5	µg/L	5.1	NA	1.3 J	NA
calcium	—	—	—	—	µg/L	3,790	NA	1,400	NA
iron	—	—	—	6,586	µg/L	47.4 J	NA	103	NA
magnesium	—	—	—	—	µg/L	1,290 J	NA	280 U	NA
manganese	—	—	—	1,741	µg/L	4.9 J	NA	2 J	NA
potassium	—	—	—	—	µg/L	6,180	NA	3,200	NA
sodium	—	—	—	—	µg/L	75,400	NA	52,000	NA
vanadium	—	—	—	26.27	µg/L	11.5	NA	*29.1*	NA
Low-Level Mercury									
mercury	2	2	—	—	µg/L	0.00306	NA	0.0105	NA
General Chemistry									
solids, total dissolved	—	—	—	—	µg/L	366,000	NA	577,000	594,000

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

[c] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL

[d] italicized font indicates result above background

Table 4-4
Groundwater Sampling Results, AOC 20

Acronyms/Abbreviations:
- AOC – area of concern
- Cal – California
- ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
- FD – field duplicate
- Fed – federal
- GW – groundwater
- JP-5 – jet propellant grade 5
- µg/L – micrograms per liter
- MCL – maximum contaminant level
- NA – not analyzed
- TPH – total petroleum hydrocarbons
- VOC – volatile organic compound

Review Qualifiers:
- J – indicates an estimated value
- U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit

Table 4-5
Groundwater Sampling Results Compared to
Surface Water Preliminary Screening Criteria, AOC 20

Analyte	PRELIMINARY SCREENING CRITERIA: SW TPH ESL	CTR CCC	CTR HHCO	NRWQC CCC	NRWQC HHCO	Background	Result Units	Station ID: A20SB01 / Sample: C077G081 / [a] Depth Interval: 5 - 10 / Collection Date: 14-Dec-05	A20SB01 / C077G082 (FD) / 5 - 10 / 14-Dec-05	A20SB02 / C077G083 / 5 - 10 / 14-Dec-05	A20SB02 / C077G084 (FD) / 5 - 10 / 14-Dec-05
VOCs											
2-butanone	—[b]	—	—	—	—	—	µg/L	2 U	2 U	3.9	NA
toluene	—	—	200,000	—	15,000	—	µg/L	0.5 U	0.5 U	0.17 J	NA
trichloroethene	—	—	81	—	30	—	µg/L	0.5 U	0.5 U	0.24 J	NA
Petroleum Hydrocarbons											
diesel	640	—	—	—	—	—	µg/L	50 U	NA	**3,200**[c]	50 U
JP-5	640	—	—	—	—	—	µg/L	50 U	NA	**2,600**	50 U
Metals											
aluminum	—	—	—	—	—	1,070	µg/L	100 U	NA	187	NA
arsenic	—	36	—	36	0.14	20.72	µg/L	**11**	NA	***26.9***[d]	NA
barium	—	—	—	—	—	569.5	µg/L	5.1	NA	1.3 J	NA
calcium	—	—	—	—	—	—	µg/L	3,790	NA	1,400	NA
iron	—	—	—	—	—	6,586	µg/L	47.4 J	NA	103	NA
magnesium	—	—	—	—	—	—	µg/L	1,290 J	NA	280 U	NA
manganese	—	—	—	—	—	1,741	µg/L	4.9 J	NA	2 J	NA
potassium	—	—	—	—	—	—	µg/L	6,180	NA	3,200	NA
sodium	—	—	—	—	—	—	µg/L	75,400	NA	52,000	NA
vanadium	—	—	—	—	—	26.27	µg/L	11.5	NA	*29.1*	NA
Low-Level Mercury											
mercury	—	0.025	0.051	0.94	—	—	µg/L	0.00306	NA	0.0105	NA
General Chemistry											
solids, total dissolved	—	—	—	—	—	—	µg/L	366,000	NA	577,000	594,000

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] bolded font indicates result exceeds criteria (TPH ESL, CTR CCC, CTR HHCO, NRWQC CCC, NRWQC HHCO)
[d] italicized font indicates result exceeds background

Table 4-5
Groundwater Sampling Results Compared to
Surface Water Preliminary Screening Criteria, AOC 20

Acronyms/Abbreviations:

AOC – area of concern
CCC – criterion continuous concentration
CTR – California Toxics Rule
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
HHCO – human-health consumption of organisms only
JP-5 – jet propellant grade 5
µg/L – micrograms per liter
NA – not analyzed
NRWQC – National Recommended Water Quality Criteria
SW – surface water
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:

J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit

Table 6-1
Tier 1 Evaluation Results by Exposure Group, AOC 20

Exposure Group [a]	Cancer Risk	Hazard Index
1. All soil and groundwater exposure pathways		
Total [b]	4E-03	2
Without metals below background	4E-03	1
2. Exposure pathways for soil and vapors from VOCs in groundwater		
Total [b]	4E-05	1
Without metals below background	3E-08	0.4
3. Exposure pathways for residential use of groundwater		
Total [b]	4E-03	0.8
Without metals below background	4E-03	0.8

Notes:

[a] PAHs are not included

[b] includes all COPCs

Acronyms/Abbreviations:

AOC – area of concern

COPC – chemical of potential concern

PAH – polynuclear aromatic hydrocarbon

VOC – volatile organic compound

Table 6-2
Tier 1 Evaluation Results by Risk Driver, AOC 20

Study Area	Analyte Name	TOTAL		WITHOUT BACKGROUND	
		Hazard Quotient	Cancer Risk	Hazard Quotient	Cancer Risk
AOC 20					
Soil					
	arsenic	—*	4E-05	—	—
	Total for soil	**1**	**4E-05**	**0.4**	**3E-08**
Groundwater					
	arsenic	—	4E-03	—	4E-03
	Total for groundwater	**0.8**	**4E-03**	**0.8**	**4E-03**
	Total for soil and groundwater	**2**	**4E-03**	**1**	**4E-03**

Note:
* dash indicates not applicable

Acronym/Abbreviation:
AOC – area of concern

Table 7-1
Summary of RI Results and Recommendations, AOC 20

DQO Problem	DQO Decision Questions	Nature and Extent	Tier 1 Evaluation	Recommendation
Previous investigations did not identify TPH or metals at concentrations above the PSCs at the two soil sampling locations that targeted the OWSs. The regulatory agencies requested additional soil and grab groundwater samples at each of the two OWS locations in AOC 20 to assess whether soil and/or groundwater have been impacted by possible releases of contaminants.	Are contaminants present at concentrations that contribute to an unacceptable risk to potential future residents?	NA	HI without metals below background is 4×10^{-3} and 1. The cancer risk is largely due to arsenic in groundwater (4×10^{-3}). Arsenic in groundwater is believed to be naturally occurring. Without residential use of groundwater and metals below background, cancer risk is 3×10^{-8} (below the risk management range), with an HI of 0.4. Additionally, AOC 20 is located west of Saratoga Street, making residential use of groundwater unlikely.	No further action.
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?	NA	Arsenic was above the surface water PSC but is considered to be naturally occurring. Diesel-range TPH and JP-5–range TPH were reported at concentrations above PSCs but not reported above the detection limit in a duplicate groundwater sample from the same location.	No further action.
	Are contaminants present in soil or groundwater that indicate releases have occurred from the OWSs?	Two arsenic concentrations were above PSCs, but arsenic is naturally occurring. Diesel-range TPH and JP-5–range TPH were reported at concentrations above PSCs but were not reported above the detection limit in a duplicate groundwater sample from same location.	NA	TPH data should be evaluated along with CAA-B under the Alameda Point TPH Program to determine whether San Francisco Bay Regional Water Quality Control Board's criteria for closure of low-risk fuel sites are met.

Table 7-1 (continued)

Acronyms/Abbreviations:
AOC – area of concern
CAA – corrective action area
DQO – data quality objective
HI – hazard index
JP-5 – jet propellant grade 5
NA – not applicable
OWS – oil/water separator
PSC – preliminary screening criterion
RI – remedial investigation
TPH – total petroleum hydrocarbons

ATTACHMENT Q

AREA OF CONCERN 21

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL
REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT
ATTACHMENT Q, AREA OF CONCERN 21
IR SITE 35, TRANSFER PARCEL EDC-5
ALAMEDA POINT
ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 21. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station Alameda), Alameda, California

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

AOC 21 is an approximately 0.7-acre area in the southwestern portion of Transfer Parcel Economic Development Conveyance (EDC)-5 along the northwestern edge of Environmental Baseline Survey (EBS) Parcel 23F (Figure 1-1). The portion of the parcel covered by the AOC is entirely paved open space. Two segments of former fuel line Corrective Action Area (CAA)-B run through the southern and western portions of the study area.

1.2 HISTORICAL USE

EBS Parcel 23F, in which AOC 21 is located, was historically used as a taxiway and parking apron. No buildings were located on AOC 21 (Photograph 1-1). Chemicals stored in the area included synthetic oils, Freon, trichlorofluoroethane, and paint. Hazardous wastes were also stored in the area (IT 2001a).

1.3 PRELIMINARY SCREENING CRITERIA AND BACKGROUND METALS

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this AOC the following:

- Soil
  - residential preliminary remediation goals (PRGs) (U.S. EPA 2004b), except polynuclear aromatic hydrocarbons (PAHs) classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene equivalent concentration screening level of 620 micrograms per kilogram (DON 2001a)
  - environmental screening levels (ESLs) for total petroleum hydrocarbons (TPH) – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)
- Groundwater
  - maximum contaminant levels (MCLs) and advisory level of 15 micrograms per liter (µg/L) for lead (U.S. EPA 2002, DHS 2006)
  - ESLs for TPH (RWQCB 2005)

Photograph 1-1
AOC 21, View to South

- Because AOC 21 is near Seaplane Lagoon, groundwater concentrations from locations within AOC 21 were also compared to the following surface water criteria:
  - California Toxics Rule (40 *Code of Federal Regulations* Section 131.38) for saltwater aquatic organisms (saltwater criterion continuous concentration [CCC]) and human-health consumption of organisms only (HHCO)
  - National Recommended Water Quality Criteria for saltwater aquatic organisms (saltwater CCC) and HHCO (U.S. EPA 2002, 2006)
  - ESLs for TPH – surface water bodies (marine) (RWQCB 2005)

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being assessed. For example, groundwater concentrations from all study areas were compared to MCLs, whether or not the groundwater was considered a potential drinking water source in that area. Groundwater concentrations in areas near surface water bodies were also compared to surface water PSCs even though surface water criteria are not applicable to groundwater. Chemicals of potential concern (COPCs) identified in the health risk evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs.

In addition to the above-listed PSCs, lead results in soil and groundwater at AOC 21 were compared to the following Alameda Point background concentrations to help discriminate between site-related and naturally occurring metals:

- Alameda Point background soil concentrations (95th percentile of the pink data set; Appendix E of the final RI Report of Operable Unit [OU]-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)
- Alameda Point background groundwater concentrations (95th percentile; Appendix E of the final RI Report of OU-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)

For ease of discussion in this report, the Alameda Point 95th percentile concentrations for metals in soil (pink background data set) and groundwater are referred to as "background."

Section 4.3 of the main RI/FS Report provides further discussion regarding the occurrence and interpretation of metals concentrations in soil and groundwater at IR Site 35.

1.4 PREVIOUS INVESTIGATIONS

During two previous investigations at AOC 21, soil and groundwater samples were collected, and results of these investigations are summarized below. Locations sampled in the AOC are shown on Figure 1-1. Analytical results for samples collected within the AOC are summarized in Appendix B. Additionally, an investigation of the former fuel lines in CAA-B resulted in the in-place closure of the lines present in the southern and western portions of AOC 21.

1.4.1 Environmental Baseline Survey

Six soil samples (023-0050, -0052, -0053, -0055, -0059, and -0060) were collected in AOC 21 during the EBS at depths from 1 to 4 feet below ground surface (bgs) (IT 2001a). Four groundwater samples (023-0051, -0054, -0056, and -0061) were also collected in this AOC. Soil and groundwater samples were analyzed for volatile organic compounds (VOCs), TPH, and semivolatile organic compound (SVOCs). Diesel-range and gasoline-range TPH concentrations in soil sample 023-0052 were above the PSC (ESL of 100 milligrams per kilogram [mg/kg]). Other reported concentrations in soil and groundwater were below PSCs. Trichloroethene (TCE) was reported in groundwater samples collected at the AOC, but not at concentrations above the PSC.

1.4.2 Corrective Action Data Gap Investigation

The corrective action data gap investigation was conducted at Alameda Point in 2001. The investigation included the collection of additional samples at five EBS parcels, including EBS Parcel 23F, which encompasses AOC 21 (TtEMI 2001a). One soil boring (PA02-04) was advanced along the southern boundary of the AOC during the investigation. Two soil samples (2 to 3 and 5 to 6 feet bgs) and one groundwater sample were collected from the boring and analyzed for VOCs, TPH, and lead. Reported concentrations were below PSCs.

1.5 ADJACENT SITES

Underground pipelines that historically distributed jet propellant grade 5 and other fuels from locations near Seaplane Lagoon to various locations at Alameda Point were removed (34,500 linear feet) or abandoned in place (24,100 linear feet) between June 1998 and February 1999 (TtEMI 2000a). TPH concentrations reported in confirmation soil and groundwater samples collected following fuel line removal and abandonment were above preliminary remediation criteria screening levels established by the Navy for petroleum-contaminated sites at Alameda Point (DON 2001b). The former fuel line areas were designated former fuel line CAA-B, and two segments of the former fuel line run through the southern and western portions of AOC 21 (Figure 1-1). The portions of the former fuel lines that run through AOC 21 were abandoned in place. No further action was recommended for former fuel line CAA-B because it met the criteria for low-risk fuel site closure requirements set forth by the San Francisco Bay Regional Water Quality Control Board (Water Board) (TtEMI 2003b).

Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, geology, and potential groundwater beneficial use at AOC 21.

AOC 21 is located west of Saratoga Street. Topography at AOC 21 is relatively flat. The average ground elevation, based on elevation data from the two borings (A21SB01 and A21SB02) advanced during the RI, is 10 feet above mean sea level (MSL). The average depth to water in the two RI borings was approximately 4 feet bgs. Groundwater depth was measured in temporary casings prior to groundwater sample collection. Total dissolved solids (TDS) concentrations measured in groundwater samples from A21SB01 and A21SB02 were 230 and 487 milligrams per liter (mg/L). The TDS concentration measured in the duplicate sample from A21SB02 was 515 mg/L. The average TDS concentration measured at AOC 21 was 410 mg/L.

The groundwater monitoring well nearest to AOC 21 is M10-02, located approximately 400 feet northwest in IR Site 10. A review of groundwater depths in this well over time (August 1991 through December 2003) shows depth to water from approximately 6 to 8 feet bgs. The deepest historical groundwater measured in this well is approximately 6 feet above MSL. This value, if subtracted from the ground elevation at AOC 21, suggests that depth to water in the vicinity of this AOC has been up to 4 feet bgs, which agrees with the depth to water measured in the temporary casings during the 2005 RI sampling.

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is south at the AOC. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations.

Based on tidal studies performed at other Alameda Point sites, tidal influence is expected to be negligible at AOC 21, located approximately 300 feet from Seaplane Lagoon. Results of the tidal study at nearby sites (see Section 2 in the main RI/FS Report) showed significant tidal influence in wells located within 30 feet of Seaplane Lagoon and minimal tidal influence in a well located approximately 100 feet inland of Seaplane Lagoon. These results indicate a significant decrease in tidal influence over a relatively short distance.

Soil encountered in the two RI borings consisted of poorly graded sand. This sand is expected to be entirely fill material. Fine-grained bay sediment (Young Bay Mud) was not encountered; however, it is expected to exist at approximately 18 feet bgs at AOC 21 (see cross section E-E' on Figure 2-8 in the main RI/FS Report). The Marsh Crust was not encountered in the borings. As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust may be present beneath AOC 21, although it was not encountered in the borings advanced to 10 feet bgs during the RI. RI boring logs for the AOC are included in Appendix D.

Based on the location of AOC 21 west of Saratoga Street, groundwater at AOC 21 would not be considered a drinking water source. In a letter dated July 21, 2003, the Navy received concurrence from the Water Board that groundwater west of Saratoga Street meets exemption criteria for the municipal and domestic water supply designation in the California State Water Resources Control Board source of drinking water policy Resolution (Res.) 88-63 (SWRCB 1988) and California Regional Water Quality Control Board Res. 89-39 (RWQCB 2003).

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Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for AOC 21. The RI was conducted in accordance with data quality objectives (DQOs) for the evaluation of AOCs presented in Table 3-1 of the main RI/FS Report.

3.1 APPROACH

Although reported TCE concentrations in previous groundwater samples were below PSCs, the Site Inspection Report for Transfer Parcel EDC-5 recommended further evaluation at AOC 21 based on the results of screening-level risk calculations (cancer risk associated with TCE in these samples was greater than 10^{-6}) (BEI 2005b). Groundwater downgradient of the sampling locations with TCE had not been evaluated. Groundwater samples were collected to confirm that TCE concentrations are below PSCs.

3.2 SCOPE

Soil and groundwater samples were collected during the 2005 RI sampling from two borings. Three soil samples (with depths from between 1.5 and 6.5 feet bgs) were collected from each boring. Additionally, grab groundwater samples were collected from temporary casings screened from 5 to 10 feet bgs placed inside the borings. All soil and grab groundwater samples were analyzed for VOCs. Groundwater samples were also analyzed for TDS. Table 3-1 includes a summary of samples collected during the RI and previous investigations. Figure 1-1 shows sampling locations for all investigations.

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Section 4

NATURE AND EXTENT OF CONTAMINATION

This section discusses sampling and analysis from previous investigations and from the RI and presents the concentration ranges and spatial distributions of the analytes identified at AOC 21. Soil and groundwater samples were collected at seven locations during the EBS (IT 2001a), the corrective action data gap investigation (TtEMI 2001a), and the RI (Table 3-1 and Figure 1-1). Results are illustrated on Figures 4-1 and 4-2. Statistical summaries of soil and groundwater results are presented in Tables 4-1 and 4-2. Soil and groundwater analytical results are summarized in Tables 4-3 and 4-4. Groundwater analytical results are compared to surface water PSCs in Table 4-5. Distribution of analytes reported at concentrations above PSCs are illustrated on Figures 4-1 and 4-2, for soil and groundwater, respectively. Complete analytical results for historical and RI samples collected within the AOC are included in Appendices B and G, respectively.

4.1 SOIL SAMPLING RESULTS

Analytical soil sampling results are discussed for each class of chemicals investigated at AOC 21.

4.1.1 Volatile Organic Compounds

Acetone, carbon disulfide, ethylbenzene, and total xylenes were the only VOCs reported at concentrations above detection limits in soil samples from borings 023-0050, 023-0052, 023-0053, 023-0059, and A21SB02. Reported VOC concentrations were below PSCs.

4.1.2 Semivolatile Organic Compounds

Only two SVOCs, bis(2-ethylhexyl)phthalate and dibenzofuran, were reported in soil samples collected from borings 023-0052 and 023-0059. SVOC concentrations were below PSCs.

4.1.3 Total Petroleum Hydrocarbons

Diesel-range TPH and gasoline-range TPH were reported at concentrations above the PSC (ESL of 100 mg/kg) in one boring (023-0052). Maximum concentrations of 5,200 J (diesel-range TPH) and 850 J (gasoline-range TPH) mg/kg, respectively, were reported in one sample at 1 to 2 feet bgs from boring 023-0052. TPH concentrations in the deeper soil sample collected at this location (023-0053) and TPH concentrations in surrounding soil samples were below PSCs. This boring is located within CAA-B.

4.1.4 Metals

The only metals analysis conducted was for lead. Lead was not reported above the laboratory detection limit in soil samples collected from boring PA02-04.

4.2 GROUNDWATER SAMPLING RESULTS

Analytical groundwater sampling results are presented for each class of chemicals investigated at AOC 21.

4.2.1 Volatile Organic Compounds

Carbon disulfide, cis-1,2-dichloroethene, toluene, total xylenes, and TCE were reported in groundwater samples from borings 023-0051, 023-0054, 023-0056, A21SB01, and A21SB02. VOC concentrations were below PSCs.

4.2.2 Semivolatile Organic Compounds

SVOCs were not reported above laboratory detection limits in groundwater samples collected at AOC 21.

4.2.3 Total Petroleum Hydrocarbons

Two TPH compounds were reported in two groundwater samples collected from borings 023-0054 and 023-0061. Diesel-range TPH and gasoline-range TPH were reported at maximum concentrations of 620 J and 190 J µg/L, respectively. The concentrations were above the PSC (ESL of 100 µg/L). AOC 21 results were also compared to surface water criteria and were below the surface water ESL of 640 µg/L. These concentrations are from locations on the border with or within CAA-B.

4.2.4 Metals

The only metals analysis conducted was for lead. Lead was not reported above the laboratory detection limit in the groundwater sample collected from boring PA02-04.

Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for AOC 21. It discusses the conceptual model, the physical and chemical changes that might occur to contaminants present at AOC 21, and the mechanisms that could potentially transfer the contaminants from the study area. The conceptual site model facilitates understanding of the present AOC conditions by integrating AOC-specific physical characteristics with the nature and extent of contaminants in the physical systems. Section 5.2 includes an evaluation of the mobility and persistence of compounds above PSCs not attributable to background at AOC 21. Section 5.3 discusses potential migration pathways.

5.1 AOC 21 CONCEPTUAL SITE MODEL

AOC 21 is located west of Saratoga Street. Topography at the study area is flat and the entire AOC is paved. The surface water nearest to AOC 21 is Seaplane Lagoon, located approximately 300 feet to the south.

Soil encountered in the two RI borings consisted of poorly graded sand. Neither Young Bay Mud nor the Marsh Crust was encountered in the borings that extended to approximately 10 feet bgs. As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust may be present beneath AOC 21. Shallow groundwater of the first water-bearing zone beneath AOC 21 occurs in the fill material; the underlying Young Bay Mud would be expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. Groundwater flow direction is to the south, and average depth to water is approximately 4 feet bgs. Tidal influence at AOC 21 is expected to be negligible based on tidal studies performed at other Alameda Point sites. Groundwater would not be considered a drinking water source based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.

Petroleum hydrocarbons (diesel-range and gasoline-range TPH) were reported in soil and groundwater at concentrations above PSCs. The soil sample with TPH concentrations above PSCs was collected from 0 to 1 foot bgs. TPH concentrations in the deeper soil sample collected at this location and TPH concentrations in surrounding soil samples were below PSCs. Gasoline-range TPH was reported in a groundwater sample from one boring, and diesel-range TPH was reported in groundwater samples from two borings at concentrations above the PSC. TPH concentrations were not reported in downgradient RI groundwater samples. These borings are located on the border or within CAA-B.

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in the environment tends to remain in place. The tendency toward immobility and persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants.

TPH is generally composed of a spectrum of hydrocarbon molecule sizes, from the short-chain volatiles (e.g., benzene, toluene, ethylbenzene, and xylenes [BTEX], and naphthalene) to long-chain oils. TPH is subject to biodegradation in the subsurface, with constituents that comprise the lighter end of fuels (gasoline, BTEX) being more readily biodegradable under aerobic conditions. These constituents also tend to be more volatile, more soluble, more mobile, and generally more toxic than the longer-chain hydrocarbons. Heavier fuels (motor oil and heavier end of diesel spectrum) do not typically have appreciable amounts of soluble constituents and tend to adhere to soil particles or other substrate in the subsurface, thus being less mobile. Aging or weathering of TPH will remove the light-end hydrocarbons, including volatiles, first. The lack of appreciable concentrations of fuel-related volatile constituents (BTEX) reported in soil and groundwater indicates that the TPH present in the subsurface at AOC 21 has been subject to weathering and is not a significant source of soluble or volatile constituents to groundwater or air.

5.3 CONTAMINANT MIGRATION

The migration pathways evaluated for relevance to AOC 21 include atmospheric transport (i.e., vapors and airborne fugitive dust), transport via surface water runoff, and groundwater transport from AOC 21 (to adjacent areas and to Seaplane Lagoon). Gasoline- and diesel-range TPH are the contaminants identified at AOC 21. Only low concentrations of volatile and soluble fuel constituents were reported in soil and groundwater, thus eliminating atmospheric transport by vapors from consideration and making significant transport from soil to groundwater unlikely. Additionally, the study area is paved. Therefore, significant transport by airborne dust or by surface water runoff is also unlikely.

The most likely migration pathway for contaminants at AOC 21 is groundwater transport. Although possible, groundwater transport of TPH from AOC 21 to adjacent areas does not appear to be occurring based on the finding that TPH concentrations above groundwater PSCs were not reported in the AOC 21 downgradient samples. Additionally, although groundwater may migrate from AOC 21 to Seaplane Lagoon, this pathway is not significant because all groundwater concentrations reported in samples collected from AOC 21 are below the surface water PSCs.

Section 6
TIER 1 EVALUATION

This section summarizes the Tier 1 risk evaluation results for AOC 21. In a Tier 1 evaluation, risk for a residential exposure scenario is assessed with the assumption that no remedial action would take place at the study area. This section also presents a qualitative uncertainty evaluation that identifies and characterizes the effects of uncertainties on the risk results.

A Tier 1 evaluation is a screening-level approach that calculates total cumulative risk values using published risk-based guidelines from the United States Environmental Protection Agency (U.S. EPA), California Environmental Protection Agency, and Water Board. The Tier 1 evaluation includes all chemicals identified in at least one sample except for PAHs in soil. PAHs in soil are not included because site-specific remediation goals for PAHs are being developed. The approach used to estimate risk is described in Section 6 of the main RI/FS Report. Tier 1 information is provided in Appendix J.

Cancer risk and noncancer values for AOC 21 are shown in Table 6-1. Risk drivers for cancer and noncancer risk are presented in Table 6-2.

6.1 COPC IDENTIFICATION

The data selection and identification of COPCs are based on a compilation of all usable data for soil and groundwater. All chemicals reported in at least one sample collected during the RI and/or included in the historical data were included as Tier 1 COPCs.

There are 6 Tier 1 COPCs in soil at AOC 21: two non-PAH SVOCs based on 6 samples and four VOCs based on 12 samples.

There are five Tier 1 COPCs in groundwater, all VOCs based on seven and eight samples.

6.2 RISK CHARACTERIZATION

For soil and groundwater data for the three exposure groups at AOC 21, the calculated cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 1×10^{-6} and 0.07

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 2×10^{-8} and 0.04

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 1×10^{-6} and 0.03

The total cancer risks are at or below 10^{-6} for soil and groundwater, and the noncancer hazard indices (HIs) are below 1 for all three exposure groups.

6.3 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation represent any potential health concerns at AOC 21. The results are consistent with the site history and previous investigations. This approximately 0.7-acre site is adequately characterized with three investigations.

The potential impact of vapors to indoor air for the five VOCs reported in groundwater is negligible. The cancer risk and noncancer HI based on the tap water PRGs are 1×10^{-6} and 0.03, respectively, and the PRG is higher than the ESL protective of indoor air. The uncertainty associated with the omission of the dermal pathway for groundwater is low because exposure from the dermal pathway for the Tier 1 COPCs would not result in an increase in the cancer risk or HI for residential use of groundwater (Exposure Groups 1 and 3). Cancer risk and hazard values are reported in one significant figure, so small changes will not necessarily result in an overall increase. This finding is based on the ratio of dermal exposure to ingestion for each Tier 1 COPC.

6.4 CONCLUSIONS

For all three exposure groups, the cancer risks are at or below 10^{-6} for soil and groundwater and the noncancer HIs are below 1. In accordance with the Work Plan (BEI 2006), samples were not analyzed for metals.

Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at AOC 21, including the nature and extent of contamination and results of the Tier 1 risk evaluation. These results form the basis of responses to the DQO decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendations presented below.

7.1 SUMMARY

The primary focus of investigations conducted at AOC 21 was to assess soil and groundwater quality in an area historically used as a taxiway and parking apron that also had some chemical storage. Previous investigations identified low concentrations of TCE in groundwater; the Site Inspection Report recommended this area for further assessment based on a screening-level cancer risk above 10^{-6} (BEI 2005b). Soil and groundwater samples were collected at seven locations during previous investigations and the RI.

The only constituent reported above PSCs at AOC 21 was TPH. Diesel-range TPH and gasoline-range TPH were reported at concentrations above the PSC (TPH ESL) in soil and groundwater samples from one boring. Diesel-range TPH in groundwater above the PSC was also reported at a second boring. Reported TPH concentrations defined the lateral and vertical extent in soil, and downgradient RI groundwater samples were below laboratory detection limits for TPH. These borings are located on the border or within CAA-B. TCE was reported in groundwater samples from RI borings at concentrations below the PSC (MCL of 5 µg/L).

Groundwater at AOC 21 would not be considered a drinking water source based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.

Results of the Tier 1 risk evaluation show a cancer risk of 1×10^{-6} and a noncancer HI of 0.07 for all soil and groundwater exposure pathways.

7.2 AOC 21 CONCLUSIONS AND RECOMMENDATIONS

The RI was conducted using the seven-step U.S. EPA DQO process (U.S. EPA 2000); DQOs were developed for AOC 21 in the Work Plan (BEI 2006). The RI has addressed these DQOs, as summarized in Table 7-1.

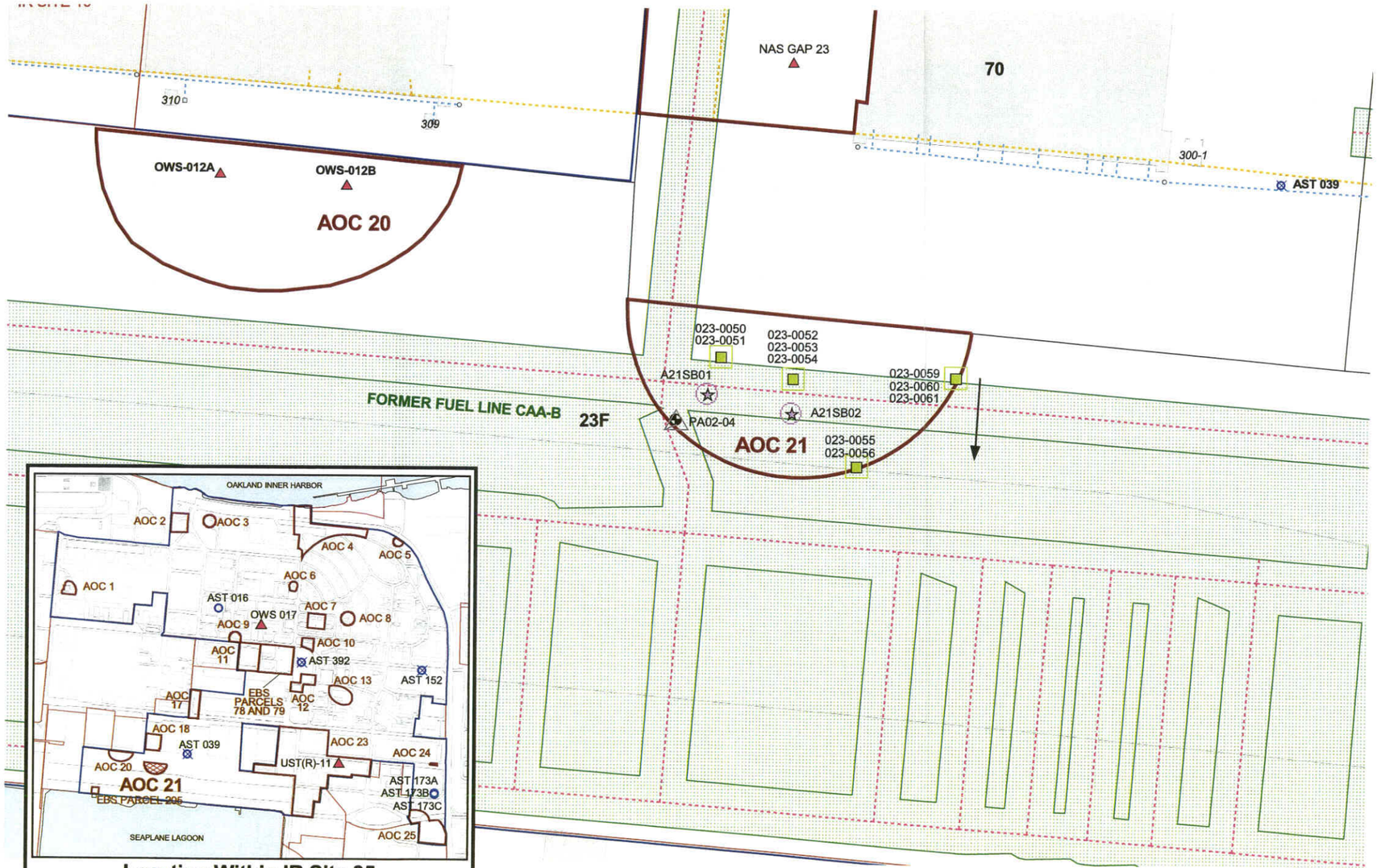
Data collected during the RI were sufficient to perform a Tier 1 risk evaluation and support decisions on the necessity for remedial actions at AOC 21. TPH in groundwater was the only chemical reported above PSCs.

No further action is recommended for AOC 21. Further evaluation of the extent of TPH in soil and groundwater and TCE in groundwater is not recommended for the following reasons.

- TPH data should be evaluated along with CAA-B under the TPH Program to see if the Water Board's criteria for closure of low-risk fuel sites are met.

- For all soil pathways and for residential use of groundwater, cancer risk is 1×10^{-6} and noncancer HI is below 1.

FIGURES



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 71 EBS PARCEL
- CORRECTIVE ACTION AREA (CAA)
- SWMU LOCATION
- ABOVEGROUND STORAGE TANK (REMOVED)
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- FUEL LINE (ABANDONED IN-PLACE)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

N

CORRECTIVE ACTION DATA GAP INVESTIGATION SOIL SAMPLING LOCATION WITH STATION ID
- VOCs, FUELS, AND METALS ANALYSES ONLY

CORRECTIVE ACTION DATA GAP INVESTIGATION GROUNDWATER SAMPLING LOCATION WITH STATION ID
- VOCs, FUELS, AND METALS ANALYSES ONLY

EBS SOIL SAMPLING LOCATION WITH SAMPLE ID
- VOCs, SVOCs, AND FUELS ANALYSES ONLY

EBS GROUNDWATER SAMPLING LOCATION WITH SAMPLE ID
- VOCs, SVOCs, AND FUELS ANALYSES ONLY

RI SOIL SAMPLING LOCATION WITH STATION ID
- VOCs ANALYSIS ONLY

RI GROUNDWATER SAMPLING LOCATION WITH STATION ID
- VOCs ANALYSIS ONLY

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
NAS – NAVAL AIR STATION
OWS – OIL/WATER SEPARATOR
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOCs – VOLATILE ORGANIC COMPOUNDS

RI/FS Report for IR Site 35

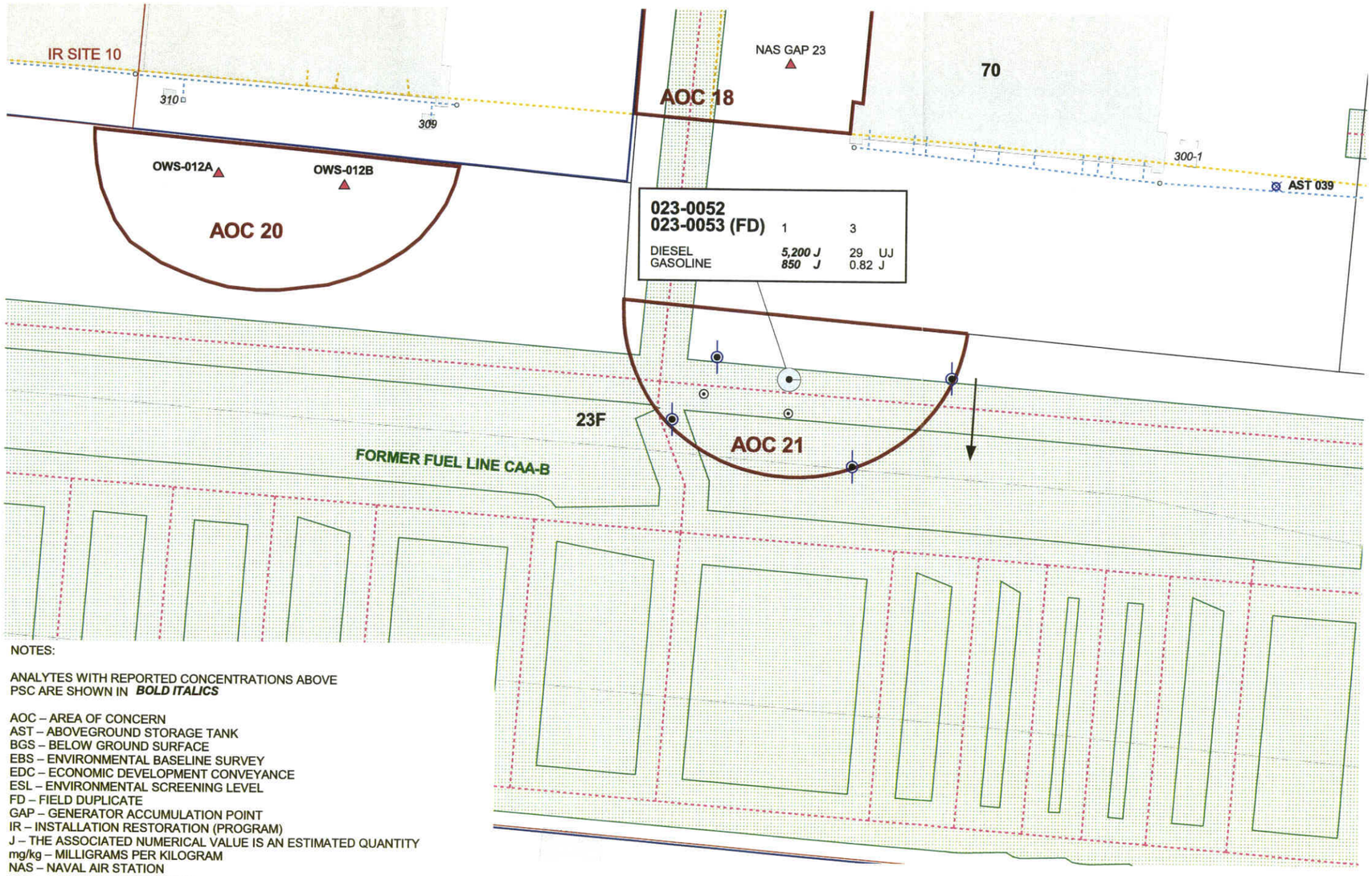
Figure 1-1

Study Area and Sampling Locations
Area of Concern 21

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 7/3/06
File No.: 077L14459
Job No.: 23818-077
Rev No.: C



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 71 EBS PARCEL
- CORRECTIVE ACTION AREA (CAA)
- SWMU LOCATION
- ABOVEGROUND STORAGE TANK (REMOVED)
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- FUEL LINE (ABANDONED IN-PLACE)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL SOIL SAMPLING LOCATION
- RI SOIL SAMPLING LOCATION

SOIL SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC FOR :

- FUELS

SOIL SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :

- FUELS

N

SAMPLE ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

023-0052 / 023-0053 (FD)			
DIESEL	5,200 J	29	UJ
GASOLINE	850 J	0.82	J

ANALYTE — CONCENTRATION in mg/kg — REVIEW QUALIFIER

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
ESL – ENVIRONMENTAL SCREENING LEVEL
FD – FIELD DUPLICATE
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
mg/kg – MILLIGRAMS PER KILOGRAM
NAS – NAVAL AIR STATION
OWS – OIL/WATER SEPARATOR
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
TPH – TOTAL PETROLEUM HYDROCARBONS
UJ – THE ANALYTE WAS NOT REPORTED ABOVE THE DETECTION LIMIT. THE SAMPLE QUANTITATION LIMIT IS AN ESTIMATED QUANTITY

Analyte	PSC
DIESEL	100 mg/kg (TPH Residential Soil ESL)
GASOLINE	100 mg/kg (TPH Residential Soil ESL)

RI/FS Report for IR Site 35

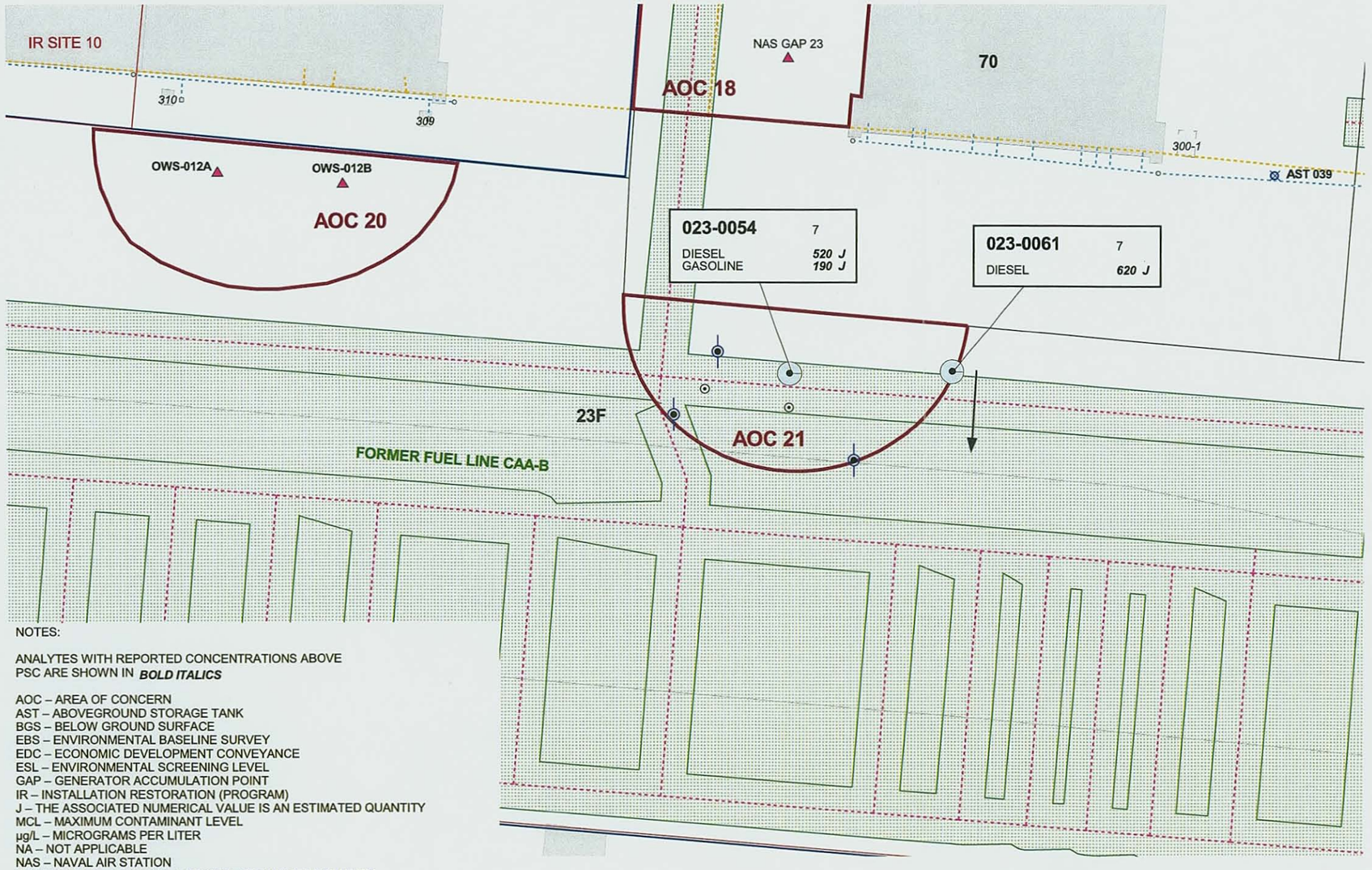
Figure 4-1

Soil Sampling Results for Analytes Above PSC – Area of Concern 21

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 7/3/06
File No.: 077L14493
Job No.: 23818-077
Rev No.: C



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 71 EBS PARCEL
- CORRECTIVE ACTION AREA (CAA)
- SWMU LOCATION
- ABOVEGROUND STORAGE TANK (REMOVED)
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- FUEL LINE (ABANDONED IN-PLACE)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL GROUNDWATER SAMPLING LOCATION
- RI GROUNDWATER SAMPLING LOCATION

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC FOR :

- FUELS

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :

- FUELS

N

SAMPLE ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

023-0061 7
DIESEL *620 J*

ANALYTE — CONCENTRATION in µg/L — REVIEW QUALIFIER

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
ESL – ENVIRONMENTAL SCREENING LEVEL
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
MCL – MAXIMUM CONTAMINANT LEVEL
µg/L – MICROGRAMS PER LITER
NA – NOT APPLICABLE
NAS – NAVAL AIR STATION
NRWQC HHCO – NATIONAL RECOMMENDED WATER QUALITY CRITERIA HUMAN HEALTH CONSUMPTION OF ORGANISM
OWS – OIL/WATER SEPARATOR
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
TPH – TOTAL PETROLEUM HYDROCARBONS

Analyte	PSC	Lowest Surface Water PSC
DIESEL	100 µg/L (TPH Groundwater ESL)	640 µg/L (ESL Marine)
GASOLINE	100 µg/L (TPH Groundwater ESL)	640 µg/L (ESL Marine)

RI/FS Report for IR Site 35

Figure 4-2

Groundwater Sampling Results for Analytes Above PSC – Area of Concern 21

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 7/3/06
File No.: 077L14542
Job No.: 23818-077
Rev No.: C

TABLES

Table 3-1
Sample Analysis Summary, AOC 21

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE				
				VOCs	SVOCs	TPH	Lead	TDS
Soil								
023-005-030	023-0050	EBS	3–4	X	X	X[a]		
023-005-031	023-0052	EBS	1–2	X	X	X[a]		
023-005-031	023-0053	EBS	3–4	X	X	X[a]		
023-005-032	023-0055	EBS	3–4	X	X	X[a]		
023-005-034	023-0059	EBS	1–2	X	X	X[a]		
023-005-034	023-0060	EBS	3–4	X	X	X[a]		
PA02-04	030-CAP-274	Corrective Action Data Gap Inv.	2–3	X		X[b]	X	
PA02-04	030-CAP-275	Corrective Action Data Gap Inv.	5–6	X		X[b]	X	
A21SB01	C077S341	Site 35 RI	1.5–2	X				
A21SB01	C077S342	Site 35 RI	3–3.5	X				
A21SB01	C077S343	Site 35 RI	5–5.5	X				
A21SB02	C077S344	Site 35 RI	1.5–2	X				
A21SB02	C077S345	Site 35 RI	2–2.5	X				
A21SB02	C077S346	Site 35 RI	6–6.5	X				
Groundwater								
023-005-030	023-0051	EBS	7–8	X	X	X[a]		
023-005-031	023-0054	EBS	7–8	X	X	X[a]		
023-005-032	023-0056	EBS	7–8	X	X	X[a]		
023-005-034	023-0061	EBS	7–8	X	X	X[a]		
PA02-04	030-CAP-297	Corrective Action Data Gap Inv.	0–10	X		X[b]	X	
A21SB01	C077G091	Site 35 RI	5–10	X				X
A21SB02	C077G092	Site 35 RI	5–10	X				X
A21SB02	C077G093 (FD)	Site 35 RI	5–10	X				X

References:
EBS (IT 2001a)
Corrective Action Data Gap Inv. (TtEMI 2001a)

Notes:
[a] analyzed for gasoline-, diesel-, and motor oil–range TPH
[b] analyzed for gasoline-, diesel-, JP-5–, and motor oil–range TPH

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
EBS – environmental baseline survey
FD – field duplicate
Inv. – investigation
JP-5 – jet propellant grade 5
RI – remedial investigation
SVOC – semivolatile organic compound
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 21

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC	Minimum [a]	Average [a]	Maximum [a]	Federal Residential PRG	TPH ESL
VOCs (µg/kg)									
acetone	12	2	17	0	27	32	37	14,000,000	—[b]
carbon disulfide	12	1	8.3	0	2.4	2.4	2.4	360,000	—
ethylbenzene	14	1	7.1	0	830	830	830	400,000	—
xylenes, total	14	2	14	0	53	4,000	8,000	270,000	—
Fuels (µg/kg)									
diesel	8	1	13	1	5,200,000	5,200,000	5,200,000	—	100,000
gasoline	8	2	25	1	820	430,000	850,000	—	100,000
SVOCs (µg/kg)									
bis(2-ethylhexyl)phthalate	6	2	33	0	68	300	540	35,000	—
dibenzofuran	6	1	17	0	830	830	830	150,000	—

Notes:

[a] data review qualifiers are not included in this table

[b] dash indicates not applicable or not established

Acronyms/Abbreviations:

AOC – area of concern
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/kg – micrograms per kilogram
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-2
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, AOC 21

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC	Minimum [a]	Average [a]	Maximum [a]	California MCL	TPH ESL	Surface Water Aquatic TPH ESL	Surface Water CTR CCC	Surface Water CTR HHCO	Surface Water NRWQC CCC	Surface Water NRWQC HHCO
Volatile Organic Compounds (µg/L)														
carbon disulfide	7	3	43	No PSC	0.33	0.83	1.5	—[b]	—	—	—	—	—	—
cis-1,2-dichloroethene	8	3	38	0	0.63	0.68	0.76	6	—	—	—	—	—	—
toluene	8	4	50	0	0.19	1.7	6	150	—	—	—	200,000	—	15,000
trichloroethene	8	5	63	0	0.59	1.3	2	5	—	—	—	81	—	30
xylenes, total	8	1	13	0	2	2	2	1,800	—	—	—	—	—	—
Fuels (µg/L)														
diesel	5	2	40	2	520	570	620	—	100	640	—	—	—	—
gasoline	5	1	20	1	190	190	190	—	100	3,700	—	—	—	—
General Chemistry (µg/L)														
solids, total dissolved	3	3	100	No PSC	230,000	410,000	515,000	—	—	—	—	—	—	—

Notes:
[a] data review qualifiers are not included in this table
[b] dash indicates not applicable or not established

Acronyms/Abbreviations:
AOC – area of concern
CCC – criterion continuous concentration
CTR – California Toxics Rule
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
HHCO – human-health consumption of organisms only
µg/L – micrograms per liter
MCL – maximum contaminant level
NRWQC – National Recommended Water Quality Criteria
PSC – preliminary screening criteria (MCL, ESL, CTR, and NRWQC)
TPH – total petroleum hydrocarbons

Table 4-3
Soil Sampling Results, AOC 21

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	023-005-030 / 023-0050 / 3 - 4 / 01-Nov-95	023-005-031 / 023-0052 / 1 - 2 / 01-Nov-95	023-005-031 / 023-0053 / 3 - 4 / 01-Nov-95	023-005-032 / 023-0055 / 3 - 4 / 01-Nov-95	023-005-034 / 023-0059 / 1 - 2 / 01-Nov-95	023-005-034 / 023-0060 / 3 - 4 / 01-Nov-95	A21SB01 / C077S341 / 1.5 - 2 / 13-Dec-05	A21SB01 / C077S342 / 3 - 3.5 / 13-Dec-05	A21SB01 / C077S343 / 5 - 5.5 / 13-Dec-05	A21SB02 / C077S344 / 1.5 - 2 / 13-Dec-05	A21SB02 / C077S345 / 2 - 2.5 / 13-Dec-05	A21SB02 / C077S346 / 6 - 6.5 / 13-Dec-05	PA02-04 / 030-CAP-274 / 2 - 3 / 03-May-00	PA02-04 / 030-CAP-275 / 5 - 6 / 03-May-00
VOCs																			
acetone	14,000,000	—[b]	—	—	µg/kg	27 J	1,400 UJ	420 UJ	27 UJ	37 J	22 UJ	100 U	100 U	100 U	100 U	100 U	100 U	NA	NA
carbon disulfide	360,000	—	—	—	µg/kg	12 U	1,400 U	60 U	12 U	10 U	11 U	100 U	100 U	100 U	100 U	100 U	2.4 J	NA	NA
ethylbenzene	400,000	—	—	—	µg/kg	12 U	830 J	60 U	12 U	10 U	11 U	20 U	20 U	30 U	20 U	20 U	20 U	10 U	10 U
total xylenes	270,000	—	—	—	µg/kg	12 U	8,000	53 J	12 U	10 U	11 U	NA	NA	NA	NA	NA	NA	10 U	10 U
Petroleum Hydrocarbons																			
diesel	—	—	100,000	—	µg/kg	29,000 UJ	**5,200,000 J**[c]	29,000 UJ	30,000 UJ	25,000 U	28,000 UJ	NA	NA	NA	NA	NA	NA	10,000 U	10,000 U
gasoline	—	—	100,000	—	µg/kg	600 U	**850,000 J**	820 J	600 U	520 U	570 U	NA	NA	NA	NA	NA	NA	500 U	500 UJ
SVOCs																			
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	390 U	540 J	390 U	390 U	68 J	380 U	NA	NA	NA	NA	NA	NA	NA	NA
dibenzofuran	150,000	—	—	—	µg/kg	390 U	830 J	390 U	390 U	340 U	380 U	NA	NA	NA	NA	NA	NA	NA	NA
Metals						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Acronyms/Abbreviations:
AOC – area of concern
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/kg – micrograms per kilogram
NA – not analyzed
ND – not detected
PRG – preliminary remediation goal
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-4
Groundwater Sampling Results, AOC 21

Analyte	PRELIMINARY SCREENING CRITERIA: Fed MCL	Cal MCL	Groundwater TPH ESL	Background	Result Units	Station ID: 023-005-030	023-005-031	023-005-032	023-005-034	A21SB01	A21SB02	A21SB02	PA02-04
						Sample: 023-0051	023-0054	023-0056	023-0061	C077G091	C077G092	C077G093 (FD)	030-CAP-297
						[a]Depth Interval: 7 - 8	7 - 8	7 - 8	7 - 8	5 - 10	5 - 10	5 - 10	0 - 10
						Collection Date: 01-Nov-95	01-Nov-95	01-Nov-95	01-Nov-95	13-Dec-05	13-Dec-05	13-Dec-05	03-May-00
VOCs													
carbon disulfide	—[b]	—	—	—	µg/L	1 U	1 U	1 U	1 U	0.33 J	1.5	0.67	NA
cis-1,2-dichloroethene	70	6	—	—	µg/L	NA	NA	NA	NA	0.76	0.63	0.64	1 U
toluene	1,000	150	—	—	µg/L	1 U	1 U	6	1 U	0.19 J	0.27 J	0.25 J	1 U
trichloroethene	5	5	—	—	µg/L	2	2	1 U	1 U	1.3	0.59	0.66	1.3 UJ
total xylenes	10,000	1,800	—	—	µg/L	1 U	2	1 U	1 U	NA	NA	NA	1 U
Petroleum Hydrocarbons													
diesel	—	—	100	—	µg/L	100 U	**520 J**[c]	100 U	**620 J**	NA	NA	NA	100 U
gasoline	—	—	100	—	µg/L	50 U	**190 J**	50 U	50 U	NA	NA	NA	50 U
SVOCs						ND	ND	ND	ND	NA	NA	NA	NA
Metals						NA	NA	NA	NA	NA	NA	NA	ND
General Chemistry													
solids, total dissolved	—	—	—	—	µg/L	NA	NA	NA	NA	230,000	487,000	515,000	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Acronyms/Abbreviations:
AOC – area of concern
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
µg/L – micrograms per liter
MCL – maximum contaminant level
NA – not analyzed
ND – not detected
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-5
Groundwater Sampling Results Compared to
Surface Water Preliminary Screening Criteria, AOC 21

Analyte	PRELIMINARY SCREENING CRITERIA: SW TPH ESL	CTR CCC	CTR HHCO	NRWQC CCC	NRWQC HHCO	Background	Result Units	Station ID: 023-005-030	023-005-031	023-005-032	023-005-034	A21SB01	A21SB02	A21SB02	PA02-04
								Sample: 023-0051	023-0054	023-0056	023-0061	C077G091	C077G092	C077G093 (FD)	030-CAP-297
								[a]Depth Interval: 7 - 8	7 - 8	7 - 8	7 - 8	5 - 10	5 - 10	5 - 10	0 - 10
								Collection Date: 01-Nov-95	01-Nov-95	01-Nov-95	01-Nov-95	13-Dec-05	13-Dec-05	13-Dec-05	03-May-00
VOCs															
carbon disulfide	—[b]	—	—	—	—	—	µg/L	1 U	1 U	1 U	1 U	0.33 J	1.5	0.67	NA
cis-1,2-dichloroethene	—	—	—	—	—	—	µg/L	NA	NA	NA	NA	0.76	0.63	0.64	1 U
toluene	—	—	200,000	—	15,000	—	µg/L	1 U	1 U	6	1 U	0.19 J	0.27 J	0.25 J	1 U
trichloroethene	—	—	81	—	30	—	µg/L	2	2	1 U	1 U	1.3	0.59	0.66	1.3 UJ
total xylenes	—	—	—	—	—	—	µg/L	1 U	2	1 U	1 U	NA	NA	NA	1 U
Petroleum Hydrocarbons															
diesel	640	—	—	—	—	—	µg/L	100 U	520 J	100 U	620 J	NA	NA	NA	100 U
gasoline	3,700	—	—	—	—	—	µg/L	50 U	190 J	50 U	50 U	NA	NA	NA	50 U
SVOCs								ND	ND	ND	ND	NA	NA	NA	NA
Metals								NA	NA	NA	NA	NA	NA	NA	ND
General Chemistry															
solids, total dissolved	—	—	—	—	—	—	µg/L	NA	NA	NA	NA	230,000	487,000	515,000	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Acronyms/Abbreviations:
AOC – area of concern
CCC – criterion continuous concentration
CTR – California Toxics Rule
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
HHCO – human-health consumption of organisms only
µg/L – micrograms per liter
NA – not analyzed
ND – not detected
NRWQC – National Recommended Water Quality Criteria
SVOC – semivolatile organic compound
SW – surface water
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 6-1
Tier 1 Evaluation Results by Exposure Group, AOC 21

Exposure Group [a]	Cancer Risk	Hazard Index
1. All soil and groundwater exposure pathways		
Total [b]	1E-06	0.07
Without metals below background	NM	NM
2. Exposure pathways for soil and vapors from VOCs in groundwater		
Total [b]	2E-08	0.04
Without metals below background	NM	NM
3. Exposure pathways for residential use of groundwater		
Total [b]	1E-06	0.03
Without metals below background	NM	NM

Notes:
[a] PAHs are not included
[b] includes all COPCs

Acronyms/Abbreviations:
AOC – area of concern
COPC – chemical of potential concern
NM – no metals data
PAH – polynuclear aromatic hydrocarbon
VOC – volatile organic compound

Table 6-2
Tier 1 Evaluation Results by Risk Driver, AOC 21

Study Area		TOTAL		WITHOUT BACKGROUND	
		Hazard Quotient	Cancer Risk	Hazard Quotient	Cancer Risk
AOC 21					
Soil	Total for soil	0.04	2E-08	0.04	2E-08
Groundwater	Total for groundwater	0.03	1E-06	0.03	1E-06
	Total for soil and groundwater	0.07	1E-06	0.07	1E-06

Acronym/Abbreviation:
AOC – area of concern

Table 7-1
Summary of RI Results and Recommendations, AOC 21

DQO Problem	DQO Decision Questions	Nature and Extent	Tier 1 Evaluation	Recommendation
AOC 21 has historically been used as a taxiway and parking apron. Chemicals were reportedly stored in this area. Previous investigations identified low concentrations of TCE in groundwater; the SI recommended this area for further assessment based on cancer risk above 10^{-6}.	Have the nature and extent of contamination been defined?	Yes. The vertical extent of TPH above PSCs has been defined in soil. Concentrations of TPH in downgradient groundwater samples are below PSCs. The downgradient extent of TCE above laboratory reporting limits is defined.	NA	TPH data should be further evaluated along with CAA-B under the Navy's Alameda Point TPH Program to see if the Water Board's criteria for closure of low-risk fuel sites are met. No further action is recommended for other chemicals identified at AOC 21.
	Are contaminants present in soil or groundwater that pose unacceptable risk to potential future residents?	NA	No. The Tier 1 risk evaluation indicates a cancer risk of 1×10^{-6} (at the low end of the risk management range) and a noncancer HI of 0.07 for all soil exposure pathways and for residential use of groundwater.	No further action.
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?	NA	No. Contaminants in groundwater are not expected to pose unacceptable risk to potential aquatic receptors. However, it is recommended that TPH data should be further evaluated along with CAA-B under the Navy's Alameda Point TPH Program to see if the Water Board's criteria for closure of low-risk fuel sites are met.	No further action.

Acronyms/Abbreviations:

AOC – area of concern
CAA – corrective action area
DQO – data quality objective
HI – hazard index
NA – not applicable
PAH – polynuclear aromatic hydrocarbon
PSC – preliminary screening criterion
RI – remedial investigation
SI – site inspection
TCE – trichloroethene
TPH – total petroleum hydrocarbons
Water Board – San Francisco Bay Regional Water Quality Control Board

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ATTACHMENT R

AREA OF CONCERN 23

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT ATTACHMENT R, AREA OF CONCERN 23 IR SITE 35, TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

Prepared by:

BECHTEL ENVIRONMENTAL, INC.
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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 23. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station [NAS] Alameda), Alameda, California.

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 PRELIMINARY SCREENING CRITERIA AND BACKGROUND METALS

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this AOC are the following.

- Soil
  - residential preliminary remediation goals (PRGs) (U.S. EPA 2004b), except polynuclear aromatic hydrocarbons (PAHs) classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (µg/kg) (DON 2001a)
  - environmental screening levels (ESLs) for total petroleum hydrocarbons (TPH) – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)
- Groundwater
  - maximum contaminant levels (MCLs) and advisory level for lead (U.S. EPA 2002, DHS 2006)
  - ESLs for TPH – water (RWQCB 2005)
  - Because portions of AOC 23 are near Seaplane Lagoon, groundwater concentrations in the southern area of this AOC were also compared to the following surface water criteria:
    - California Toxics Rule (Title 40 *Code of Federal Regulations* Section 131.38) for saltwater aquatic organisms (saltwater criterion continuous concentration [CCC]) and human-health consumption of organisms only (HHCO)
    - National Recommended Water Quality Criteria (NRWQC) for saltwater aquatic organisms (saltwater CCC) and HHCO (U.S. EPA 2002, 2006)
    - ESLs for TPH – surface water bodies (marine) (RWQCB 2005)

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being assessed. For example, groundwater concentrations from all study areas were compared to MCLs, whether or not the groundwater was considered a potential drinking water

source in that area. Groundwater concentrations in the southern portion of AOC 23 were also compared to surface water PSCs even though surface water criteria are not applicable to groundwater. Chemicals of potential concern (COPCs) identified in the health risk evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs.

In addition to the above-listed PSCs, metals concentrations in soil and groundwater at AOC 23 were compared to the following Alameda Point background concentrations to help discriminate between site-related and naturally occurring metals:

- Alameda Point background soil concentrations (95th percentile of the data set; Appendix E of the final RI Report of Operable Unit [OU]-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)
- Alameda Point background groundwater concentrations (95th percentile; Appendix E of the final RI Report of OU-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)

For ease of discussion in this report, the Alameda Point 95th percentile concentrations for metals in soil (pink background data set) and groundwater are referred to as "background."

Section 4.3 of the main RI/FS Report provides further discussion on the occurrence and interpretation of metals concentrations in soil and groundwater at IR Site 35.

1.2 BACKGROUND

AOC 23 is an approximately 15.2-acre area in the south-central portion of Transfer Parcel Economic Development Conveyance (EDC)-5 (Figure 1-1). AOC 23 was established to address soil and groundwater contaminants in areas previously used for chemical storage or handling at eight Environmental Baseline Survey (EBS) parcels (EBS Parcels 71, 72, 110, 121, 123, 124, 125, and 126). Additionally, the regulatory agencies requested further evaluation of NAS Generator Accumulation Point (GAP) 29 and Naval Aviation Depot (NADEP) GAP 43, Oil/Water Separator (OWS) 067, and Solid Waste Management Unit (SWMU) AOC 098. Each of these EBS parcels is discussed individually in the sections that follow.

1.2.1 EBS Parcel 71

EBS Parcel 71 is in the northwestern portion of AOC 23. Subsequent to the completion of the EBS, EBS Parcel 71 was subdivided into two parcels: EBS Parcel 71 and EBS Parcel 71A. Therefore, the current extent of EBS Parcel 71 is a subset of the original EBS Parcel 71 that was included in the 1994 EBS. One building (Building 544) is present on EBS Parcel 71. Buildings 45A and 45B were also historically located on the parcel and reportedly connected to one another, although only evidence of Building 45B is currently observable (BEI 2005b). A washdown area known as WD-041B was located in the northern portion of EBS Parcel 71. EBS Parcel 71 is adjacent to IR Site 6, where chlorinated hydrocarbons have been reported in groundwater and PAHs have been reported in soil.

1.2.1.1 HISTORICAL USE

The EBS reported that there was no significant chemical storage at EBS Parcel 71 (25 gallons of desiccant was stored); however, the Parcel Evaluation Plan (PEP) reported that metals, fuels, solvents, and lubricating oils were stored in a shed. EBS Parcel 71 was historically used as a location for a general storage shed (Building 45B) and a liquid oxygen/nitrogen facility (Building 544). During the EBS, several stains were observed in the open space, including gray stains, oily stains from runoff, and a large area covered with oil from support equipment. Various spills and incidents were recorded, including diesel and hydraulic fluid spills under the shed, oil and paint stains from washdown activities in the vicinity of former Buildings 45A and 45B, and minor stains associated with vehicle parking (IT 2001a). None of these stains were visible during a site visit by Bechtel Environmental, Inc., in August 2005. Additionally, batteries were stored on a pallet in a shed area where washdown of maintenance equipment occurred.

1.2.1.2 PREVIOUS INVESTIGATIONS

Several investigations were conducted at EBS Parcel 71, and results of these investigations are summarized below. Locations sampled in EBS Parcel 71 in AOC 23 are shown on Figures 1-1 and 1-2 for soil and groundwater, respectively.

Phases 2B and 3 Investigation

In 1991, 13 soil samples were collected and analyzed from three locations in EBS Parcel 71 (B06-08 through B06-10) during the Phase 2B and 3 investigation (PRC Environmental and Montgomery 1992). This study was conducted to assess whether contamination exists in the vicinity of IR Site 6, which is adjacent to the western edge of EBS Parcel 71. Samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and metals. Analytical results indicated the presence of PAHs at concentrations above the PSC in samples from two locations (B06-09 and B06-10). In addition, iron was reported in a sample from B06-09 at a concentration above the PSC.

Environmental Baseline Survey

Some EBS soil samples analyzed (collected in 1995) at EBS Parcel 71 were located within a portion of Corrective Action Area (CAA)-B where fuel lines were removed between June 1998 and February 1999 (071-0002; 071M-003, -003M, -004, -004M, -012, and -014). Soil associated with these samples was likely removed during the fuel pipeline closure activities. The results are discussed in this section and noted. Also, EBS samples denoted with an "M" were analyzed by a mobile laboratory; the correlative sample number without the "M" was analyzed by a stationary laboratory.

Soil samples were collected from three locations in and around the washdown area during the EBS to address the storage and use of chemicals in that area (ERM-West 1994a). Four soil samples (071-0001, -0002, and duplicate pair 071-0003, and -0005) were initially collected in this area from 3 to 3.5 feet below ground surface (bgs) and analyzed for VOCs, TPH, and metals. Motor oil–range TPH was above the PSC in one sample

(071-0002); this sampling location is within CAA-B, and soil associated with this sample was probably removed as part of subsequent pipeline removal activities. All other analytes were reported below PSCs in samples from the washdown area.

Two soil samples (071I-001 and 071I-001M) were collected from between 5 to 9 feet bgs along the industrial waste sewer corridor and analyzed for VOCs, TPH, SVOCs, pesticides, PCBs, herbicides, organic lead, butyltin, metals, oil and grease, and reactivity. These samples were also adjacent to the washdown area. Gasoline- and diesel-range TPH was reported in one sample (071I-001) at concentrations above PSCs. No other analytes were reported above PSCs.

Two soil samples (071S-002 and 071S-002M) were collected at 4 to 4.5 feet bgs to investigate the sanitary sewer line and were analyzed for VOCs, TPH, SVOCs, and metals. All analytes were reported at concentrations below PSCs.

Six storm sewer soil samples (071M-002, -002M, -003, -003M, -004, and -004M) were collected from between 6.5 to 8.5 feet bgs and analyzed for VOCs, TPH, SVOCs, pesticides, PCBs, butyltin, oil and grease, metals, and reactivity. Benzene and gasoline-range TPH was the only analytes reported at concentrations above PSCs (in sample 071M-004M). This sampling location is within CAA-B, and soil associated with this sample likely was removed as part of subsequent pipeline removal activities.

As a result of the initial storm sewer sampling, three soil samples (071M-012, -014, and -020) were collected from between 3 and 5.5 feet bgs, and seven groundwater samples (071M-010, -011, -013, and -015 through -018) were collected and analyzed for VOCs, TPH, and SVOCs. In one groundwater sample (071M-013), B(a)P was reported at a concentration above the PSC. Motor oil–range TPH was also reported in two groundwater samples at concentrations above the PSC (071M-011 and -013); these samples were located within a portion of CAA-B where fuel pipelines and some associated contaminated soil were removed as part of closure activities. The remaining analytes were reported at concentrations below PSCs.

Additional soil and groundwater samples (071M-019, -020, and -021) were collected from one location outside the boundaries of EBS Parcel 71 (in EBS Parcel 124) at depths between 4.5 and 8.5 feet bgs to address the EBS concern about storm sewers. The samples were analyzed for VOCs, TPH, and SVOCs. Motor oil–range TPH was reported at concentrations above the PSC in two groundwater samples (071M-019 and 071M-021; duplicate samples from same location); diesel-range TPH was reported in one groundwater sample (071M-017) above the PSC. All other analytes were reported at concentrations below PSCs.

Operable Units 1 and 2 Data Gap Investigation

Data gap samples in EBS Parcel 71 were collected in association with the investigation of a storm sewer exposure pathway (TtEMI 2002c). To determine whether storm sewer bedding materials were acting as a preferential pathway for contaminant migration, soil and groundwater samples were collected at location S06-DGS-VE02, which is along a storm sewer line on the downgradient edge of a known plume. Vacuum excavation was

used to advance the boring immediately adjacent to the storm sewer line and to collect undisturbed samples of the bedding material. Soil samples were analyzed for geotechnical parameters, and groundwater samples were analyzed for VOCs, SVOCs, and TPH. Results of geotechnical analyses indicated the permeability of the storm drain system bedding material and native fill soils was similar, and it was concluded that the bedding materials would not be a preferential conduit for the transport of contaminants in groundwater. No contaminants were reported at concentrations above PSC in the soil or groundwater samples.

2002 Polynuclear Aromatic Hydrocarbon Study

Two soil borings (32EDC-5-66 and 32EDC-5-67) were advanced in EBS Parcel 71 during the 2002 PAH study (BEI 2005a). Samples were collected from four depth intervals between 0 and 8 feet bgs and analyzed for PAHs. Concentrations of PAHs in all soil samples from these borings were below the PSC.

Remedial Investigation for IR Sites 6, 7, 8, and 16

IR Site 6, which is adjacent to the western side of EBS Parcel 71 and the northern side of EBS Parcel 72, is characterized by PAHs in the soil and a VOC plume in groundwater, as described in the final RI Report for IR Sites 6, 7, 8, and 16 (TtEMI 2004). The outer margin of this plume is at or near the border with AOC 23 (EBS Parcels 71 and 72). The most recent data collected during the basewide monitoring program (ITSI 2005) indicate that groundwater contamination at IR Site 6 (groundwater impacted with TPH and chlorinated VOCs, primarily cis-1,2-dichloroethene and vinyl chloride) may extend eastward into EBS Parcel 71.

Solid Waste Management Unit Report

Washdown area WD-041B was described in the SWMU Report prepared in 2005 (SulTech 2005a). The SWMU Report stated that drains were present in a washdown area outside of the northeast corner of Building 41; however, an OWS was not present. Material listed as managed in this area included wastewater from cleaning aircraft or large machinery. The SWMU Report for Transfer Parcel EDC-5 recommended no further action for WD-041B.

Underground Storage Tank Investigations

One monitoring well was installed in 1994 at EBS Parcel 71 (13-MW-03) during underground storage tank (UST) investigations. This well was sampled as part of basewide sampling activities and groundwater was analyzed for VOCs. VOCs were generally not reported above laboratory detection limits and concentrations were all below PSCs.

1.2.2 EBS Parcel 72

EBS Parcel 72 is in the western portion of AOC 23. Two buildings (Buildings 77 and 77A) were historically located on EBS Parcel 72, but only Building 77 remains. This

parcel is adjacent to and hydraulically downgradient from IR Site 6, where TPH and chlorinated hydrocarbons have been reported in groundwater and PAHs have been reported in soil.

1.2.2.1 HISTORICAL USE

Building 77 at EBS Parcel 72 was historically used as a heating plant, an air cargo terminal, and an electrical distribution shelter. An old storage building (Building 77A) was historically located in the northwestern corner of the parcel.

1.2.2.2 PREVIOUS INVESTIGATIONS

Sampling was conducted at EBS Parcel 72 during the EBS (IT 2001a). As part of the EBS concern for pesticide use in landscaped and unpaved areas, soil samples (072-0001 through -0003) were collected from three locations and analyzed for pesticides and PCBs. These analytes were reported at concentrations below the PSC. Although there are no potential releases known to be associated with historical activities at the parcel, TPH and chlorinated hydrocarbons are known to be present in groundwater hydraulically upgradient at adjacent IR Site 6. Locations sampled during the EBS are shown on Figure 1-1.

1.2.3 EBS Parcel 110

EBS Parcel 110 is in the northeastern portion of AOC 23. Two buildings (Buildings 271 and 590) were located on EBS Parcel 110 (Photographs 1-1, 1-2, and 1-3). Presently, only Building 271 remains. The base map also indicates Building 309-1 also was present at EBS Parcel 110; however, no information is available in the EBS or PEP reports regarding this former structure. Railroad tracks traverse the parcel from the northwestern corner to the southern portion of the parcel.

1.2.3.1 HISTORICAL USE

EBS Parcel 110 was historically used as a hazardous/flammable materials storehouse (Building 271) and an industrial waste pump station (Building 590). Gas cylinder storage and miscellaneous chemical storage occurred indoors. Stored chemicals included paint thinner, corrosion resistant coating, floor polish, trichlorotrifluoroethane, trichloroethene (TCE), chromic acid, sodium fluorosilicate, Freon, acetylene, sulfur hexafluoride, monoethanolamine, and transmission fluid.

Aerial photographs and EBS inspection information indicate that undocumented spills may have occurred. During the EBS, white staining (approximately 4 by 10 feet) was observed in the battery charging area, and other dark, oil-like stained areas (approximately 4 by 6 feet) were present in the area surrounding the storehouse. A storage yard for helicopter blades, Conex boxes, and furniture was present in the open space adjacent to the storehouse. A concrete vault containing fluid and a pile of metal shavings were present during the EBS inspection, but the exact locations could not be visually verified in 2005 (BEI 2005b). Stains were noted during the EBS throughout the

Photograph 1-1
Building 271 Stained Area (East), View to South

Photograph 1-2
Building 271 Stained Area (West), View to North

Photograph 1-3
Location of Former Structure 590, View to Northwest

storage yard, including oil, grease, and tar-like stains. Stains were still visible on concrete on the east and west sides of the building during an August 2005 site walk. The PEP stated that stains were on concrete and were considered minor. Therefore, no parcel-specific sampling was recommended.

1.2.3.2 PREVIOUS INVESTIGATIONS

Two investigations were conducted at EBS Parcel 110, and results of these investigations are summarized below. Locations sampled in EBS Parcel 110 in AOC 23 are shown on Figure 1-1.

Environmental Baseline Survey

Soil samples (110-0001M and 110-0002M) were collected from two locations along railroad lines at depths between 1 and 2.5 feet bgs and analyzed for TPH, SVOCs, PCBs, and lead to investigate whether these areas along the railroad lines may have been impacted by releases from engines and railcars (IT 2001a). No analytes were reported at concentrations above PSCs.

Additional soil samples (110I-001, 110I-001M, 110I-002, 110I-002M, 110P-001, and 110P-001M) were collected at three locations along the industrial waste sewer lines at depths between 5 and 9 feet bgs and analyzed for a combination of the following: VOCs, TPH, SVOCs, herbicides, organophosphate pesticides, PCBs, organic lead, butyltin, oil and grease, metals, and reactivity. Iron was reported at a concentration above PSC in a sample from 110P-001. No other analytes were reported at concentrations above PSCs.

Two additional EBS sampling locations were also located within the boundaries of EBS Parcel 110; however, samples from these locations (123-0013, 123-0021, and 124-0004) were collected to address environmental issues in adjacent parcels (EBS Parcels 123 and 124) and thus are discussed in the subsections for those EBS parcels below.

2002 Polynuclear Aromatic Hydrocarbon Study

Two soil borings (32EDC-5-80 and 32EDC-5-91) were advanced in EBS Parcel 110 during the 2002 PAH study (BEI 2005a). Samples were collected from four depth intervals between 0 and 8 feet bgs and analyzed for PAHs. Concentrations of PAHs in all soil samples from these borings were below the PSC.

1.2.4 EBS Parcel 121

EBS Parcel 121 is in the eastern portion of AOC 23. A portion of former Building 79-2 was the only structure historically present on EBS Parcel 121. IR Site 3, an area with known groundwater contamination (chlorinated hydrocarbons, TPH, and benzene) and soil contamination (metals, PAHs, and TPH) is located immediately south of EBS Parcel 121 and is separated from EBS Parcel 121 on the east by Building 564.

1.2.4.1 HISTORICAL USE

EBS Parcel 121 was historically used for open space storage and a garden shop, which was later demolished and converted to a parking lot. Minor stains associated with vehicle parking were noted during the EBS. Potential runoff from the neighboring junkyard area was also noted.

1.2.4.2 PREVIOUS INVESTIGATIONS

No analytical results from soil or groundwater sampling have been reported from previous investigations at EBS Parcel 121.

1.2.5 EBS Parcel 123

EBS Parcel 123 is in the east-central portion of AOC 23. Historically, six buildings were located on EBS Parcel 123: Buildings 67, 79-2, 98, 263, 393, and 412 (Building 412 was observed to be numbered "411" during a site walk in August 2005). Presently, five of these buildings remain (Buildings 67, 98, 263, 393, and 412). Five SWMUs are located on this parcel: SWMU AOC 098 and OWS 067 in the southern portion of the parcel, NAS GAPs 15 and 29 in the northern portion of the parcel, and UST(R)-11. The UST (known alternatively as Tank 393) was located between West Trident Avenue and Building 393. IR Site 3 is located immediately south of EBS Parcel 123 and is part of a larger area characterized by groundwater contamination (chlorinated hydrocarbons, TPH, and benzene) and soil contamination (metals, PAHs, and TPH). Railroad tracks run north-to-south and north-to-southeast across the west-central portion of the parcel.

1.2.5.1 HISTORICAL USE

EBS Parcel 123 was used as barracks, an aircraft ground support equipment shop, a switching substation, a field maintenance shop, a hazardous/flammable materials storehouse, an electrical substation, an industrial waste pump station, and for painting and sandblasting operations. The following chemicals were used or stored in buildings at the parcel: gasoline, fuels, diesel, oils, acetylene, argon, degreasing solution, fertilizer, solvents, corrosion inhibitors, break fluid, aluminum paint, and spray enamels. Hazardous wastes including flammables, corrosives, batteries, aerosols, paint, used rags, and used spill kits were stored inside Building 98 and the building's fenced-in enclosure.

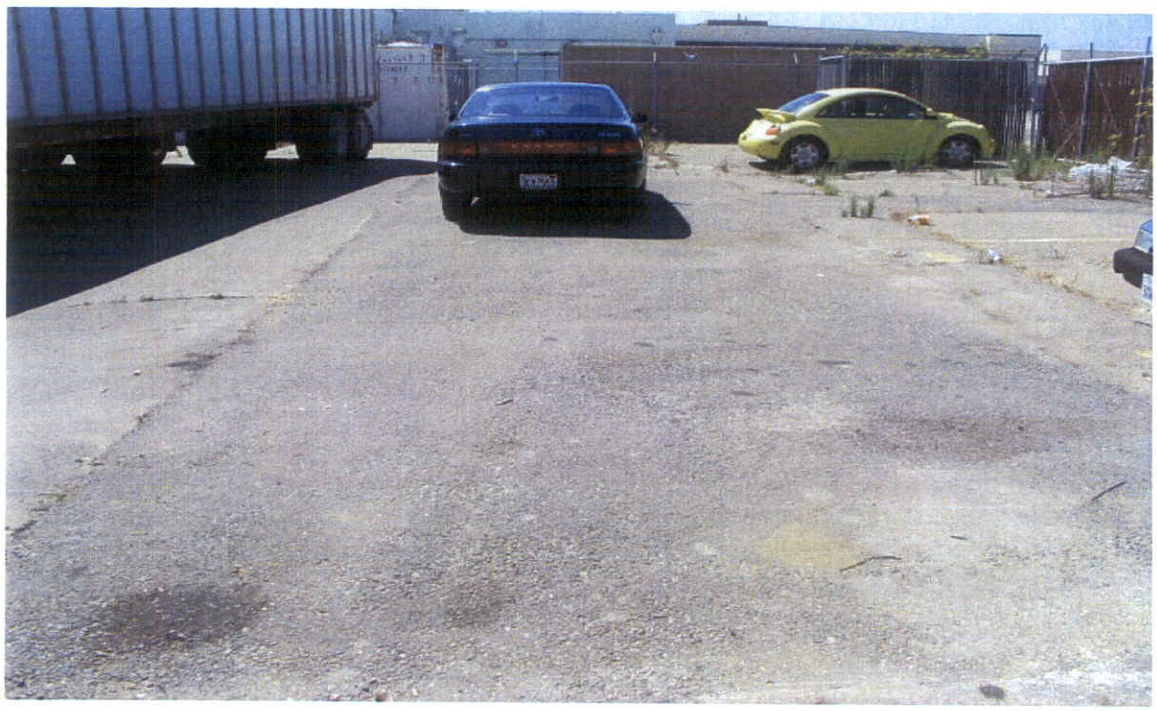
The asphalt floor of Building 98 was observed during the EBS investigation to be heavily stained and deteriorated. Building 263, an aircraft ground support equipment shop, was used historically for storage of oil, gasoline, diesel, and acetylene. During the EBS inspection, intense petroleum odors and stains were noted. An OWS was present near Building 67, a building used for repair activities that were reported to involve heavy metals, solvents, and petroleum products. Additionally, batteries, paint thinner, paint, primer, diesel and gasoline, and other chemicals were stored in the yard of Building 67. Stains were observed in the shop areas of Building 67.

Building 393 was used for painting and sandblasting activities and for minor maintenance activities. Paint and oil stains were observed during the EBS inspection; however, the stains on the concrete were considered minor.

Building 412, an electrical substation, had scattered stains on the concrete floor. Transformers at the building were reported to have leaked. The stains were considered minor, and the EBS recommended that the stains be addressed as part of the electrical equipment program.

During the EBS open space survey, storage of miscellaneous materials including diesel generators, modular trailers, and diesel fueling trailers was observed. The open space was also used for forklift/truck parking, boat/truck storage and repair, fuel transfer to and from boats, vehicle washing and steam cleaning (near a former paint booth), deployment gear storage, an equipment recycling and storage area, and a salvage and reuse storage area. Approximately 500 gallons of petroleum products, halogenated and nonhalogenated organic compounds, and corrosives was stored near Building 393. A leaking drum of lubricating oil appearing to potentially have impacted a nearby storm drain was observed in this area (Figure 1-1).

Heavy stains were observed in the open space between Buildings 67 and 393 during the EBS inspection and aerial photograph review (Figure 1-1). Stains were also observed north and south of Building 67. Previous sampling at the parcel during the removal of UST(R)-11 (used to store solvents, paints, and waste oils) indicated the presence of petroleum-related compounds (e.g., benzene, toluene, ethylbenzene, and xylenes [BTEX] and TPH) and metals including cadmium, chromium, lead, mercury, and zinc in soil (Photograph 1-4). UST(R)-11, which had a capacity of 600 gallons, was removed in November 1994. Closure of UST(R)-11 was in response to a request from the California



Photograph 1-4
Former Location of UST(R)-11, View to West

Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control in February 2000.

SWMU AOC 098 was used for storage of hazardous wastes, including waste petroleum products, corrosives, metals, asbestos, nonhalogenated organic compounds, solvents, lubricating oil, and corrosion inhibitors. SWMU AOC 098 was recommended for no further action in the SWMU Report (SulTech 2005a). SWMU AOC 098 is located inside Building 98 and was used as a 60-day temporary accumulation point where hazardous wastes were stored in 55-gallon drums on top of the concrete floor.

NAS GAP 15 and NAS GAP 29 were used for storage of waste paint material, solvents, thinner, rags, and waste oil and have been recommended for no further action in the SWMU Report. Originally, NAS GAP 15 was located northeast of Building 67, but was deactivated in 1991 and a new SWMU (NAS GAP 29) was sited northwest of Building 67. NAS GAP 29 was made inactive in 1997.

OWS 067 received waste materials collected from the parking area south of the automotive repair shop. The OWS was recommended for further investigation in the SWMU Report (SulTech 2005a).

1.2.5.2 PREVIOUS INVESTIGATIONS

Four investigations were conducted at EBS Parcel 123, and results of these investigations are summarized below. Locations sampled in EBS Parcel 123 in AOC 23 are shown on Figures 1-1 and 1-2 for soil and groundwater, respectively.

Environmental Baseline Survey

A target area was identified to address stains observed at Building 98 in EBS Parcel 123 (IT 2001a). Eight soil samples (123-0001, -0001M, -0002M, -0003M, -0015, -0015M, -0016M, and -0017M) were collected from three locations at depths between 1 and 4.5 feet bgs in the most heavily stained areas and analyzed for VOCs (subsurface soil samples only), TPH, SVOCs, and metals. No analytes were reported at concentrations above PSCs.

Four surface soil samples (123-0004M, -0005, -0005M, and -0020M) were collected from two locations to investigate odors and the most heavily stained areas at Building 263; the samples were analyzed for TPH. TPH constituents were not reported at concentrations above PSCs.

Four soil samples (123-0006M, -0007, -0007M, and -0008M) were collected at 1 to 2 feet bgs from three locations near Building 67 to address the most heavily stained areas. The samples were analyzed for TPH, SVOCs, PCBs, and metals. No analytes were reported at concentrations above PSCs.

A target area was identified to address the stained area south of Building 67. No sampling was recommended in the area north of Building 67 because sampling had previously been conducted and no contamination was found. Six soil samples (123-0009M, -0010, -0010M, -0018M, -0019, and -0019M) were collected from two locations at depths from 2 to 4.5 feet bgs and analyzed for VOCs (subsurface soil sample only), TPH, SVOCs, and metals. No analytes were reported at concentrations above PSCs.

A target area was identified to address heavy stains in the open space between Buildings 67 and 393. Soil samples (123-0011M and 123-0012M) were collected from two locations at depths from 2 to 2.5 feet bgs and analyzed for TPH, SVOCs, and metals. One sample (123-0011M) had a concentration of motor oil–range TPH above the PSC. No other analytes were reported at concentrations above PSCs.

An EBS target area was identified to address the concern about railroad tracks. Four surface soil samples (123-0014 and 123-0014M from EBS Parcel 123, and 123-0013M and 123-0021M from EBS Parcel 110, immediately to the north) were collected from two locations and analyzed for TPH, SVOCs, PCBs, and lead. Sample 123-0014 was also analyzed for VOCs. No analytes were reported at concentrations above PSCs.

Two soil samples (123I-001 and 123I-001M) were collected from depths of 6.5 to 7 feet bgs at one location to address concerns about the industrial waste sewer corridor. The samples were analyzed for VOCs, TPH, SVOCs, herbicides, pesticides, PCBs, butyltin, organic lead, oil and grease, metals, and reactivity. No analytes were reported at concentrations above PSCs.

Phase 2C sampling was conducted to address potential contamination from both the northeast and northwest locations of NAS GAPs 15 and 29 near Building 67 as well as UST(R)-11. Six soil samples (123-0022 through -0026, and -0044) were collected from five locations at depths between 0 and 2.5 feet bgs at the former location of NAS GAP 29. These samples were analyzed for VOCs, TPH, pesticides, PCBs, and metals,

and SVOCs (123-0024 only). One soil sample (123-0022) had concentrations of a PCB (Aroclor 1260) and arsenic above PSCs, and one soil sample (123-0024) had a concentration of diesel-range TPH above the PSC.

Five surface soil samples (123-0027 through 123-0031) were collected to evaluate NAS GAP 15 (it was incorrectly reported in the EBS as NAS GAP 29). These samples were analyzed for VOCs, TPH, pesticides, PCBs, and metals, and one sample for SVOCs also (123-0028 only). No analytes were reported at concentrations above PSCs.

Four HydroPunch groundwater samples (123-0040 through 123-0043) were collected to evaluate UST(R)-11; samples were analyzed for VOCs (including methyl tert-butyl ether [MTBE]), TPH, pesticides, PCBs, and metals. Arsenic was reported in groundwater in two samples (123-0042 and 123-0043) at concentrations above the PSC; diesel-range TPH was reported in two groundwater samples (123-0041 and -0043), and motor oil–range TPH was reported in one groundwater sample (123-0041) at concentrations above PSCs.

According to the EBS, soil samples collected from the postremoval excavation pit for UST(R)-11 were found to have gasoline, diesel, motor oil, and jet fuel at concentrations below EBS screening criteria; groundwater samples also had these contaminants at concentrations below EBS screening criteria. The EBS also reported that soil samples collected during a follow-on investigation of the UST were reported to have gasoline, diesel, motor oil, and jet fuel at concentrations below EBS screening criteria.

No Further Action Report for UST(R)-11

Two soil samples were collected from the backhoe bucket during the removal of this UST in November 1994 (TtEMI 2002a). The soil samples were analyzed for BTEX, TPH, chlorinated hydrocarbons, and metals. A groundwater sample was also collected immediately after the excavation of the UST from the water in the excavation pit. The groundwater sample was analyzed for BTEX, TPH, chlorinated hydrocarbons, and metals. None of the analytes were reported in the soil or groundwater samples at concentrations above PSCs.

Two additional surface soil samples were collected from just beneath the pavement prior to the excavation and removal of the vent line and underground piping associated with UST(R)-11 in January 1995. These samples were analyzed for BTEX, TPH, chlorinated hydrocarbons, and metals. No analytes were reported at concentrations above PSCs.

The no further action report concluded that UST(R)-11 was adequately characterized based on EBS sampling efforts, and no further action was recommended for the UST (TtEMI 2002a).

Follow-On Remedial Investigation Sampling

Two follow-on investigations occurred within the boundaries of Transfer Parcel EDC-5: one in 1994 (PRC Environmental and Montgomery 1996) and one in 1998 (TtEMI and Uribe 1998). The purpose of these investigations was to provide additional lithologic, chemical, and hydrogeologic information for selected IR sites at Alameda Point. The goals of the investigations were to assess the nature and extent of soil and groundwater

contamination for an RI/FS. During these investigations, soil and groundwater samples were collected at three locations (03GB025, 03GB036, and 03GB240) in EBS Parcel 123 because of their proximity to IR Site 3. Soil and groundwater was analyzed for VOCs and TPH. Motor oil–range TPH was reported in two groundwater samples (03GB036 and 03GB240) at concentrations above the PSC. No other analytes were reported at concentrations above PSCs.

2002 Polynuclear Aromatic Hydrocarbon Study

Two soil borings (32EDC-5-90 and 32EDC-5-100) were advanced in EBS Parcel 123 during the 2002 PAH study (BEI 2005a). Samples were collected from four depth intervals between 0 and 8 feet bgs and analyzed for PAHs. Concentrations of PAHs in all soil samples from these borings were below the PSC.

1.2.6 EBS Parcel 124

EBS Parcel 124 is in the central portion of AOC 23. Four buildings were historically located on EBS Parcel 124: Buildings 13, 59, 262, and 444. Only Building 13 is currently present on the parcel and in the same location as the three former building sites.

1.2.6.1 HISTORICAL USE

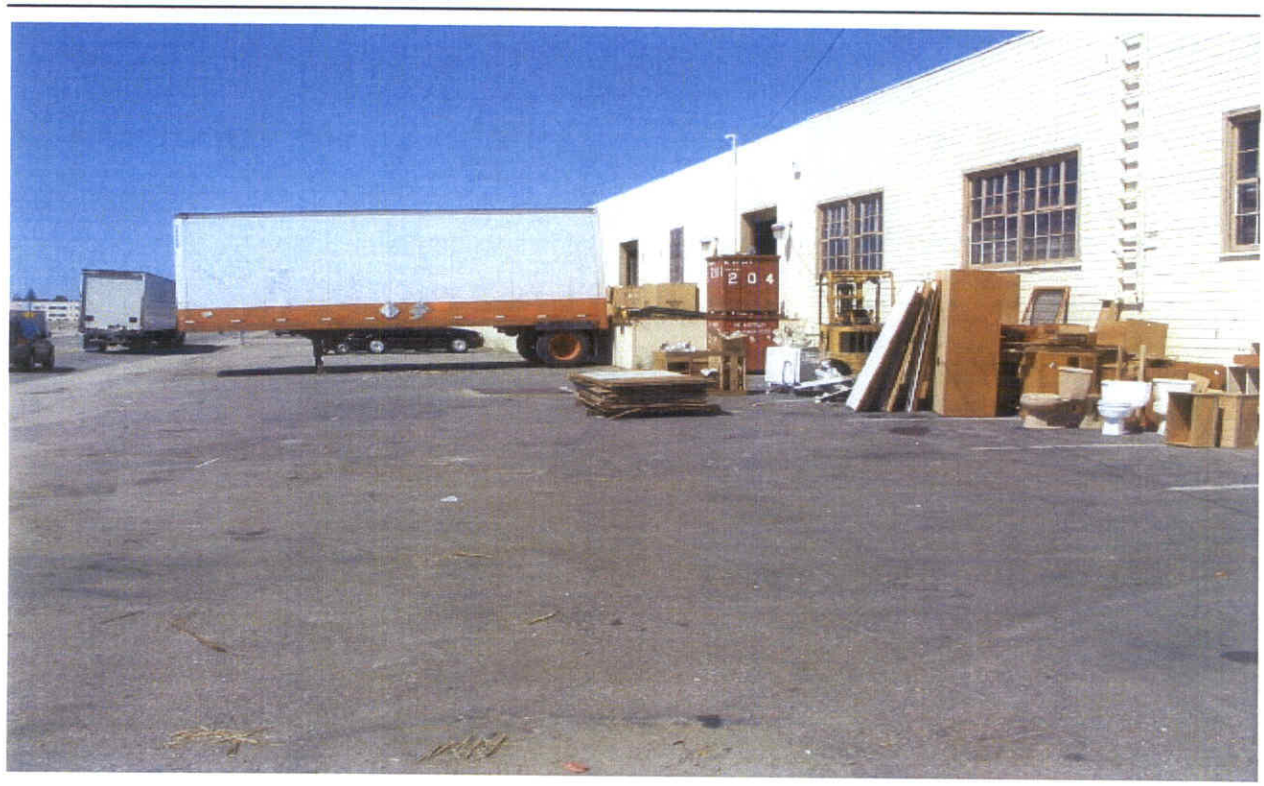
EBS Parcel 124 was historically used for lumber storage (Buildings 262 and 444), as a hazardous/flammable materials storehouse (Building 13), and for public works maintenance storage (Building 13) (Photograph 1-5). In general, hazardous wastes were stored in the southern half of Building 13, and hazardous materials were stored in the northern half. During the EBS, several stains were noted inside and outside Building 13 (stains inside the building cover approximately 40 percent of the floor space in the southern portion and 30 percent in the northern portion). A portion of the parcel was used for sorting trash and scrap material (salvage and reuse).

1.2.6.2 PREVIOUS INVESTIGATIONS

Two investigations were conducted at EBS Parcel 124, and results of these investigations are summarized below. Locations sampled in EBS Parcel 124 in AOC 23 are shown on Figure 1-1.

Environmental Baseline Survey

To address the stains in and around Building 13, samples were collected in the southernmost portion of the building to represent the "worst case" of stain impact (IT 2001a). Nine soil samples were collected (124-0001, -0001M, -0002M, -0003M, -0005, -0005M, -0006M, -0007M, and -0008M) from three locations at depths between 1 and 4.5 feet bgs in this target area and analyzed for VOCs (subsurface samples only), TPH, SVOCs, PCBs, and metals. Motor oil–range TPH was reported in one soil sample (124-0003M) at a concentration above the PSC. No other analytes were reported at concentrations above PSCs.



Photograph 1-5
Building 13 (Western Side), View to North

Additional samples included two soil vapor samples collected at EBS Parcel 124 as part of the IR Site 3 investigation. These samples are not shown on any figures because concentrations of BTEX and hydrocarbons were below reporting limits in both samples.

One surface soil sample (124-0004M) was collected outside the boundaries of EBS Parcel 124 (in EBS Parcel 110) to address the EBS concern about railroad tracks. The sample was analyzed for TPH, SVOCs, PCBs, and lead. Motor oil–range TPH was reported in this soil sample (124-0004M) at a concentration above the PSC. No other analytes were reported at concentrations above PSCs.

Additional soil and groundwater samples (071M-019, -020, and -021) were collected from one other location in EBS Parcel 124 to address environmental issues in the adjacent parcel (EBS Parcel 71) and thus are discussed with EBS Parcel 71 above.

2002 Polynuclear Aromatic Hydrocarbon Study

Two soil borings (32EDC-5-78 and 32EDC-5-79) were advanced in EBS Parcel 124 during the 2002 PAH study (BEI 2005a). Samples were collected from four depth intervals between 0 and 8 feet bgs and analyzed for PAHs. B(a)P equivalent concentrations in all soil samples from this boring were below the PSC.

1.2.7 EBS Parcel 125

EBS Parcel 125 is located in the southern portion of AOC 23. Building 66 is located on this parcel. A hazardous waste storage area (NADEP GAP 43) was at the southern end of Building 66. IR Site 21 is adjacent to EBS Parcel 125 to the south and is part of a larger area characterized by the presence of chlorinated hydrocarbons, PAHs, metals, and benzene contamination in groundwater and PAH contamination in soil.

1.2.7.1 HISTORICAL USE

EBS Parcel 125 was used for nozzle testing and overhauling, pneumatic/hydraulic accessory testing, plant services for aircraft overhauling, an engineering laboratory, and air and engine aircraft overhauling. Chemicals stored inside Building 66 included halogenated and nonhalogenated organic chemicals, acid, monochloride methane, paint, petroleum products, and metals. Chemicals stored outside Building 66 included halogenated and nonhalogenated organic chemicals, calibration fluid, and dry-cleaning solvents.

Radioactive materials (cesium and uranium oxide) were present in the ignition shop of Building 66. Hazardous waste was stored at Building 66 (both indoors and outdoors) and included paper towels and gloves contaminated with jet propellant grade 5 (JP-5) as well as aerosol cans, oil/water residue, spent JP-5, spent ENVIROSOLV 652 with traces of JP-5, and filters contaminated with ethylbenzene, naphthalene, and oils. Hazardous wastes were stored in drums. During the EBS, stains and pools or active leaks were observed to cover approximately 90 percent of the floor of Building 66. A leaking pipe was observed on the roof of Building 66; however, the leak may have been water. Additionally, a 10-by-3-foot stain was observed on the west side of Building 66 (location of hazardous waste storage area) during the EBS. Minor stains associated with vehicle parking were also observed during the EBS.

NADEP GAP 43 was used to store aerosol paint, solvent, lacquer, JP-5, type II fuel, oil, and trichlorotrifluoroethane. The GAP area was recommended for no further action in the SWMU Report.

1.2.7.2 PREVIOUS INVESTIGATIONS

Four investigations were conducted at EBS Parcel 125, and results of these investigations are summarized below. Locations sampled in EBS Parcel 125 in AOC 23 are shown on Figures 1-1 and 1-2 for soil and groundwater, respectively.

Environmental Baseline Survey

During the EBS, nine soil samples (125-0001, -0001M, -0002M, -0003M, -0004, -0004M, -0005M, -0006M, and -0007M) were collected from three locations within the stained areas in Building 66 at depths between 0.5 and 5 feet bgs to assess the most likely source of impacts at the parcel (IT 2001a). Samples were analyzed for VOCs (subsurface areas only), TPH, and SVOCs. Only diesel-range TPH (125-0002M) and gasoline-range

TPH (125-0003M and 125-0007M; duplicate samples) were reported at concentrations above PSCs.

Two soil samples (125M-001 and -001M) were collected from one location in EBS Parcel 125 at depths of 9 to 10 feet bgs to address concerns about the storm sewer corridor. The samples were analyzed for VOCs, TPH, SVOCs, pesticides, PCBs, tributyltin, oil and grease, and metals. Motor oil–range TPH (125M-001M) was reported at a concentration above the PSC. All other analytes were reported at concentrations below PSCs.

Operable Units 1 and 2 Data Gap Investigation

Data gap samples collected at EBS Parcel 125 were used to gather information to delineate the contaminant plumes in groundwater (TtEMI 2002c). To further define VOC and TPH plumes at IR sites in OUs 1 and 2, groundwater samples were collected from monitoring wells and from direct-push borings. Analytical results from samples collected at one location in EBS Parcel 125 (S21-DGS-DP20), analyzed for VOCs, SVOCs, and TPH, indicated the presence of vinyl chloride at concentrations above the PSC. The data gap report concluded that groundwater contamination (benzene, vinyl chloride, and TPH) was migrating to EBS Parcel 125 from adjacent areas (IR Sites 4, 11, and 21).

2002 Polynuclear Aromatic Hydrocarbon Study

One soil boring (32EDC-5-77) was advanced in EBS Parcel 125 during the 2002 PAH study (BEI 2005a). Samples were collected from four depth intervals between 0 and 8 feet bgs and analyzed for PAHs. Concentrations of PAHs in all soil samples from this boring were below the PSC.

Corrective Action Data Gap Investigation

This investigation was conducted at Alameda Point in 2001 and included the collection of additional samples at EBS Parcel 125 (TtEMI 2001a). During this investigation, soil samples were collected from one boring (EP125-01) in EBS Parcel 125 and analyzed for VOCs, TPHs, and metals to investigate the potential presence of petroleum-related contaminants from historical engine-testing activities. No analytes were reported at concentrations above PSCs.

1.2.8 EBS Parcel 126

EBS Parcel 126 is in the southern portion of AOC 23. Three buildings were historically located on EBS Parcel 126 (Buildings 99, 399, and 411). Two of these buildings still remain (Buildings 399 and 411). EBS Parcel 126 is adjacent to IR Sites 3 and 21, and CAA-3A to the east.

1.2.8.1 HISTORICAL USE

EBS Parcel 126 was historically used for NADEP and compressor support and as an electrical substation. During the EBS, an employee stated in an interview that the area

was formerly used for smelting operations to recover aluminum (prior to the construction of Building 398 on Parcel 127). During the EBS site inspection, non-PCB-containing transformer fluid was stored in drums on a concrete pad at the electrical substation. Stains were observed below the transformer and drums on the north side of Building 411 on the concrete pads. The Phase I EBS site inspection noted that the transformers were filled with non-PCB-containing oil, and a sticker on the transformers indicated that they were sampled in 1993 (IT 2001a). However, prior to the Toxic Substances Control Act, which was promulgated in 1976, most oil-containing transformers contained PCBs. Corrosives and nonhalogenated organics (microbicides) were stored in the compressor support building. An approximately 500-square-foot oil stain was also observed at Building 399.

1.2.8.2 PREVIOUS INVESTIGATIONS

Two investigations were conducted at EBS Parcel 126, and results of these investigations are summarized below. Locations sampled in EBS Parcel 126 in AOC 23 are shown on Figures 1-1 and 1-2 for soil and groundwater, respectively.

Environmental Baseline Survey

Seven soil samples (126-0001M, -0002, -0002M, -0006M, -0007, -0007M, and -0008M) were collected from two locations at depths of 0 to 4.5 feet bgs near the large oil stain at Building 399 during the EBS (IT 2001a). All samples were analyzed for TPH; subsurface samples were also analyzed for VOCs. In sample 126-0001M and 126-0008M (duplicates), motor oil–range TPH and diesel-range TPH was reported at concentrations above PSCs. All other TPH concentrations were below PSCs.

Three soil samples (126-0004M, -0005, and -0005M) were collected in the open space areas of EBS Parcel 126 and adjacent EBS Parcel 127 at depths between 0 and 1 foot bgs to address reported smelting operations and heavy stains observed (in aerial photographs). Samples were analyzed for TPH and metals. Motor oil–range TPH (126-0004M) and thallium (126-0005) were the only analytes reported in soil at a concentration above PSCs.

To confirm contamination identified in previous samples, five additional soil samples (126-0009, -0010, -0012, -0015, and -0016) at depths from 0 to 8.5 feet bgs were collected from within EBS Parcel 126 and adjacent EBS Parcel 127 and analyzed for TPH, SVOCs, pesticides and PCBs (except 126-0015 and -0016), and metals. Two groundwater samples (126-0011 and -0017) were collected from within EBS Parcel 126 and analyzed for TPH; sample 126-0017 was also analyzed for SVOCs, pesticides and PCBs. Arsenic and iron were reported above PSCs in two soil samples (126-0009 and 126-0010), and diesel was reported above the PSC in one groundwater sample (126-0017). All other analytes were reported at concentrations below PSCs.

Six additional soil samples (127S-001, -001M, -011, -011M, -002, and -002M) were collected from two locations at depths from 3 to 6.5 feet bgs within the boundaries of EBS Parcel 126 to investigate EBS sanitary sewer concerns. Soil samples were analyzed

for VOCs, TPH, SVOCs, pesticides, PCBs, and metals. No analytes were reported at concentrations above PSCs.

Operable Units 1 and 2 Data Gap Investigation

To further define VOC and TPH plumes at IR sites in OUs 1 and 2, groundwater samples were collected from a monitoring well (398-MW1) located in AOC 23 in EBS Parcel 126 during the data gap investigation. Although no analytes were reported at concentrations above PSCs, data gap samples collected at the adjacent EBS Parcel 125 indicated the presence of shallow groundwater contamination (i.e., benzene and vinyl chloride) that could potentially migrate to EBS Parcel 126 from adjacent IR Sites 4, 11, and 21.

Basewide Groundwater Monitoring Program

A basewide groundwater monitoring program (BGMP) was implemented in 2002 and is ongoing at Alameda Point (ITSI 2005). The purpose of the program is to inventory, assess, and evaluate the adequacy of the current monitoring well network, as well as to evaluate groundwater quality at Alameda Point. None of the BGMP wells are located within AOC 23 in Parcel 126. However, BGMP wells located south (OU2B-MW05 and M07B-01) of Parcel 126 had reported concentrations of 1,1-dichloroethane (DCA), cis-1,2-dichloroethene (DCE), and TCE. A well located east of Parcel 126 (398-MW4) had no VOCs reported above detection limits during sampling conducted in spring 2006 (ITSI 2006). All reported concentrations were below the PSC. Samples collected in 2003 did not have reported concentrations of the analytes (VOCs, SVOCs, and TPHs) above PSCs, except for one VOC (1,2-DCA) reported in the 2003 groundwater sample. In addition, low concentrations of tetrachloroethene (PCE) and TCE were reported.

1.3 ADJACENT SITES

Three IR sites (IR Sites 3, 6, and 21) and two corrective action areas (CAA-3A and CAA-B) are located adjacent to, or overlapping with, portions of IR Site 35. The sites and areas are discussed below.

1.3.1 IR SITES

IR Site 3, known as the abandoned fuel storage area, is located immediately south and east of EBS Parcels 121 and 123 and is part of a larger area characterized by groundwater contamination (lead and TPH) and soil contamination (Aroclor 1260, benzene, lead, and PAHs). IR Site 3 was formerly the location of five 100,000-gallon concrete and steel USTs (USTs 97A-97E) that were used to store aviation gasoline (AVGAS) and associated pipelines. It is estimated that as much as 365,000 gallons of AVGAS may have leaked from the tanks and fuel distribution pipelines in the 1960s and 1970s. In addition, a nearby fuel pipeline burst in 1972, releasing more AVGAS to the soil. AVGAS has been found in utility ducts, storm drains, and soil samples collected in and around IR Site 3. In addition, a plating shop, zinc smelter, various shops, a degreaser, and a nondestructive testing laboratory were also historically operated on-site. Chemicals of concern identified in soil at IR Site 3 during the OU-2B RI (SulTech 2005b) include

Aroclor 1260, benzene, lead, and PAHs. In addition, lead and TPH groundwater plumes are located on-site. Low concentrations on 1,2-DCA were also reported in several groundwater monitoring wells. Detailed information on contamination at IR Site 3 is presented in the OU-2B RI (SulTech 2005b).

IR Site 6 housed the Aircraft Intermediate Maintenance Department, which is adjacent to the north of EBS Parcel 72 and the west of EBS Parcel 71. IR Site 6 is characterized by a VOC plume in soil and groundwater (including cis-1,2-DCE, PCE, TCE, and vinyl chloride), which also has arsenic, manganese, and bis(2-chloroethyl)ether. IR Site 6 was used to house seaplanes and to repair aircraft components from transient and tenant aircraft. Activities conducted on-site included welding, painting, various shops, use of an avionics laboratory, a solvent dip tank, paint stripping, parts cleaning, and x-ray machine use. A washdown area was present on-site and likely received rinsewater containing solvents. The outer margins of the groundwater plume are at or near the border with AOC 23. The most recent data collected during the basewide monitoring program (ITSI 2005) indicate that groundwater contamination at IR Site 6 likely extends to EBS Parcel 72. In addition, arsenic and PAHs are the primary chemicals of concern in soil, but arsenic most likely represents a natural occurrence. Detailed information on contamination at IR Site 6 is presented in the final RI Report for IR Sites 6, 7, 8, and 16 (TtEMI 2004).

IR Site 21 was known as the ship fitting and repair facility because it was operated as a ship and aircraft maintenance shop. IR Site 21 is located south and east of EBS Parcel 126 and south of EBS Parcel 125, and is part of a larger area characterized by the presence of a commingled, OU-wide groundwater plume (impacting IR Sites 4, 11, and 21) including 1,1,2-trichloroethane, benz(a)anthracene, B(a)P, hexavalent chromium, iron, and manganese. Chemicals of concern in soil at IR Site 21 include arsenic, carbazole, and PAHs. Historical operations on-site included a spray paint booth, solvent and chemical cleaning and degreasing, abrasive blasting, welding, jet engine container overhaul, turbine engine testing, and smelting. USTs 398-1, 398-2, 162-1, 162-2, Aboveground Storage Tank (AST) 113, and fuel pipelines were also historically present on-site. Detailed information on contamination at IR Site 21 is presented in the OU-2B RI (SulTech 2005b).

1.3.2 CORRECTIVE ACTION AREAS

CAA-3A was used as auxiliary power units (Building 398), a cooling air turbine shop, and aircraft engine test cells. USTs 398-1 and 398-2, as well as three ASTs, were located within CAA-3A. CAA-3A is characterized by groundwater and soil contaminated with TPH and low concentrations of chlorinated VOCs (TtEMI 2003a).

The former fuel line CAA-B consisted of three east-west parallel fuel lines and multiple crossings that tie together a series of fueling pits. All fuel lines have been removed or cleaned and closed in place. Contaminated soil above the groundwater table was excavated to a maximum radius of 5 feet from the pipelines (TtEMI 2000a). These activities were conducted between June 1998 and February 1999. Within former fuel line CAA-B, the portion of the site that intersects AOC 23 is known as Area 3. Area 3

consisted of approximately 2,300 linear feet of inactive underground fuel pipeline that was removed from this area. Analytical results from soil and groundwater samples collected during field screening and pipeline removal activities indicated no TPH in soil or groundwater at Area 3. No additional sampling was recommended. Several samples collected at EBS Parcel 71 during the EBS (1995) were located within CAA-B. Surrounding soil was likely removed as part of fuel pipeline removal activities.

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Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, geology, and potential groundwater beneficial use at AOC 23.

Topography at AOC 23 is relatively flat. Average ground elevation at AOC 23 is 11 feet above mean sea level (MSL), based on elevation data from the 40 borings advanced during the RI. The average depth to water in the 40 RI borings was approximately 6 feet bgs. Groundwater depth was measured in temporary casings prior to groundwater sample collection.

Two groundwater monitoring wells exist at the study area. Monitoring well 13-MW-03 is located in the southeast portion of EBS Parcel 71. Monitoring well 398-MW1 is located in the northeastern portion of EBS Parcel 126. A review of groundwater depths in these wells over time (March 2003 through March 2005) shows depth to water from approximately 5 to 7 feet bgs. The deepest historical groundwater measured in either well is approximately 7 feet above MSL.

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is northeast in the northern portion of the site and southwest in the southern portion of the site. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Groundwater flow direction is uncertain in this area. Groundwater flow direction varies across EBS Parcel 123 and AOC 23. Groundwater flow in the northern portion of AOC 23 (including EBS Parcel 123) is influenced by a groundwater elevation low northeast of AOC 23. Groundwater in this area flows northerly, whereas groundwater generally flows southwesterly (toward Seaplane Lagoon) in the southern portion of AOC 23 (and EBS Parcel 123).

The southernmost portion of AOC 23 is located approximately 100 feet from Seaplane Lagoon. Tidal influence is expected to be negligible beneath most of AOC 23, based on tidal studies performed at other Alameda Point sites.

Soil encountered in the 40 borings at AOC 23 consisted of a variety of lithologies. Fill material thickness ranges from the ground surface to 3 to 8.5 feet bgs. Fill material generally consists of silty sand, clayey sand, poorly graded sand, and poorly graded sand with silt and clay. The contact between the fill material and the underlying Bay Sediment Unit (BSU) is generally marked by a change in lithology to fine-grained bay sediments (Young Bay Mud) consisting of silt or lean clay and/or by a distinct color change from a light olive brown to a dark greenish gray. The thickness of fill material was generally less in the eastern portion of the AOC, the thickness increasing toward the west. The general lithology and contacts between the fill material and the BSU and the Young Bay Mud are shown in geologic cross sections (see cross section E-E′ on Figure 2-8 and cross section H-H′ on Figure 2-9). As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust is not likely to be present beneath AOC 23, and it was not encountered in borings advanced to 12 feet bgs during the RI. RI boring logs for the study area are included in Appendix D.

Four soil samples were collected for geotechnical analysis. Three geotechnical soil samples were collected from the vadose zone (artificial fill) at boring A23SB15 (depths of 2.5 to 3.5 feet bgs) and boring A23SB37 (depths of 2 to 3.5 and 5 to 6.5 feet bgs). These were classified as poorly graded sand/silty sand or silty sand. One geotechnical soil sample was

collected from the saturated zone in the Young Bay Mud at boring A23SB15 (depth of 6.5 to 7.5 feet bgs). This was classified as lean clay. The average fraction of organic carbon in the soil samples from AOC 23 is 0.014. Geotechnical results for samples collected at AOC 23 are presented in Table 3-5 of the main RI/FS Report.

AOC 23 is located east of Saratoga Street, and groundwater is classified as a potential municipal or domestic supply source. However, total dissolved solids (TDS) data and observations on groundwater yield suggest that groundwater beneath AOC 23 may meet the exemption criteria based on TDS and groundwater yield. California Regional Water Quality Control Board and United States Environmental Protection Agency (U.S. EPA) exemption criteria for TDS are 3,000 and 10,000 milligrams per liter (mg/L), respectively; for groundwater yield, exemption criteria are 200 and 150 gallons per day. TDS concentrations measured in groundwater samples from 38 borings varied widely (371 mg/L [fresh] to 21,900 mg/L [saline]), but the average TDS measurement was 3,638 mg/L (brackish). Yield at several borings was very low, taking up to 2 days for groundwater to recharge so that sufficient sample volume could be obtained. It is considered unlikely that groundwater yield could be sustained at a rate sufficient to support municipal or domestic drinking water supply.

Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for AOC 23 by EBS Parcel (EBS Parcels 71, 72, 110, 121, 123, 124, 125, and 126). The RI was conducted in accordance with the sitewide data quality objectives for evaluation of AOCs, OWSs, and SWMUs (for UST[R]-11) presented in Tables 3-1 through 3-3, respectively, of the main RI/FS Report. Soil and/or groundwater samples were collected from 40 borings at AOC 23 during the RI. Three soil samples were collected from each borings (at depth internals of 0 to 2, 2 to 4, and 4 to 8 feet bgs). Grab groundwater samples were collected from temporary well casings screened in the first water-bearing zone placed inside the borings. Additionally, one existing groundwater monitoring well was sampled. Analytical methods use for each sample collected during the RI and previous investigations are summarized in Table 3-1. Sampling locations from all investigations are shown on Figure 1-1.

3.1 EBS PARCEL 71

The investigation approach and scope for EBS Parcel 71 focused on two primary areas of the parcel: the washdown area in the northern portion of the parcel, and the southeastern portion of the parcel. However, additional samples were also collected between these areas to further assess previous samples with analyte concentrations above PSCs and to assess previously unsampled areas, as described below.

3.1.1 Approach

The former washdown area (WD-041B) adjacent to Building 41 was identified as a target area in the EBS due to hazardous materials storage. Soil samples collected in and around this washdown area during previous investigations did not have concentrations above PSCs except for one soil sample (B06-10) collected just south of the area that had concentrations of PAHs above the PSC, and one sample (071I-001) collected just north of the area that had concentrations of TPH (gasoline- and diesel-range) above PSCs. However, groundwater samples were not collected in the washdown area, and the regulatory agencies requested additional soil samples in this area.

In the central portion of EBS Parcel 71, iron was identified in one sample as the only metal in soil present at a concentration above the PSC in the central portion of the parcel (B06-09). In addition, PAHs were reported above the PSC in two soil samples from one location (B06-09) in this area.

Samples collected in the southeastern portion of EBS Parcel 71 identified VOCs (specifically benzene) in one soil sample at concentrations above the PSC (071M-004M) and PAHs in a groundwater sample at concentrations above the PSC in a nearby location (071M-013). These samples were within a portion of CAA-B where fuel pipelines and some associated contaminated soil were removed as part of closure activities. Surrounding soil and groundwater samples generally define the extent of the VOC and PAH exceedances in this area. Motor oil–TPH and diesel-range TPH at concentrations above PSCs were also reported in this area in groundwater samples, and gasoline-range

TPH was reported in one soil sample. Groundwater samples collected at EBS Parcel 71 were not analyzed for metals.

3.1.2 Scope

Soil and groundwater sampling was conducted at EBS Parcel 71 during the 2005 RI. Soil and groundwater samples were collected from two borings (A23SB01 and A23SB002) in the former washdown area to assess whether historical activities in this area impacted soil or groundwater. Samples collected from these borings were also used to assess the distribution of PAHs in soil reported at previous boring B06-10. Soil and groundwater samples were analyzed for VOCs, TPH (purgeable-range and extractable-range), SVOCs, pesticides, PCBs, and metals.

Soil and groundwater samples were also collected from a boring south of the washdown/ storage area to assess the distribution of PAHs and confirm iron concentrations in soil (A23SB04). This boring was located on the assumed downgradient side of boring B06-09; soil and groundwater samples were analyzed for VOCs, TPH, PAHs, pesticides, PCBs, and metals.

Soil and groundwater samples were collected from a boring (A23SB05) in the southeastern portion of EBS Parcel 71 at previous boring 071M-004 to confirm the presence of benzene in soil and nearby PAHs identified in groundwater. Soil and groundwater samples were analyzed for VOCs and PAHs.

Soil and groundwater samples were also collected from two borings: one south of the washdown/storage area on the eastern side of EBS Parcel 71 (A23SB03) and one in the southern portion of the parcel (A23SB06). These samples were collected to provide wider coverage in areas not previously sampled. Soil and groundwater samples were analyzed for VOCs, TPH (extractable-range and purgeable-range), SVOCs, pesticides, PCBs, and metals. Groundwater low-detection-level mercury analysis was conducted for samples collected from the southernmost locations (A23SB31 and A23SB32) for comparison to surface water PSCs.

Groundwater samples at EBS Parcel 71 were also analyzed for TDS. Sampling locations from all investigations are shown on Figure 1-1.

3.2 EBS PARCEL 72

The investigation approach and scope for EBS Parcel 72 focused on groundwater concerns from adjacent IR Site 6.

3.2.1 Approach

Previous investigations evaluated soil at EBS Parcel 72 for pesticides and PCBs as part of the EBS concern for pesticide use in landscaped and unpaved areas. Pesticide and PCB concentrations in soil were not reported above PSCs. However, no groundwater samples were collected. In addition, this parcel is adjacent to and hydraulically downgradient of IR Site 6, where chlorinated hydrocarbons have been reported in groundwater.

3.2.2 Scope

During the RI, a groundwater sample was collected from one boring (A23SB07) in the northwestern portion of EBS Parcel 72 to assess the impact to groundwater, if any, from VOCs at IR Site 6. The sample was analyzed for VOCs and TDS.

3.3 EBS PARCEL 110

The investigation approach and scope for EBS Parcel 110 focused on three primary areas: the area around Building 271, the area in the vicinity of the former industrial waste pump station, and previously unsampled storage yard areas in the southwestern portion of the parcel.

3.3.1 Approach

A limited number of samples were collected in EBS Parcel 110 in the vicinity of Building 271. The EBS noted staining within Building 271; however, the stains were on concrete and considered to be of minor concern. Previous investigations did not identify VOCs, SVOCs, PCBs, pesticides, herbicides, metals, and TPH above PSCs; however, no soil samples were historically collected within the stained areas around Building 271 and no groundwater samples were collected. It is also known that Building 271 was used extensively for chemical storage.

No environmental samples were collected from storage yard areas in the southwestern portion of the parcel, or in the vicinity of an industrial waste pump station located in the southern portion of the parcel (in former Building 590).

3.3.2 Scope

During the RI, soil and groundwater samples were collected from five locations around Building 271 to assess the potential impact from chemical storage as follows.

- Soil and groundwater samples were collected from locations in the stained areas east (A23SB10) and west (A23SB13) of Building 271.
- Groundwater samples were collected from a location north of Building 271 (A23SB08– assumed downgradient side) and south of Building 271 (A23SB11).
- Soil and groundwater samples were collected from a location within Building 271 (A23SB40) in the vicinity of the minor staining that was observed on the floor of the building.
- Soil and groundwater samples were collected from a location in the storage yard (A23SB12) to assess whether historical activities might have impacted soil or groundwater and to provide better sample coverage of the parcel.
- Soil and groundwater samples were collected from a location adjacent to former Building 590 (A23SB09) to assess whether contaminants from the pump station impacted soil or groundwater.

All samples were analyzed for VOCs, TPH (purgeable-range and extractable-range), SVOCs, pesticides, PCBs, and metals. Groundwater from five borings (A23SB08 through A23SB12) was also analyzed for TDS.

3.4 EBS PARCEL 121

The investigation approach and scope for EBS Parcel 121 focused on collecting samples from a representative location within the parcel.

3.4.1 Approach

The EBS reported that no chemicals were stored or used at EBS Parcel 121, and no spills were documented during past uses as open space storage area, garden shop, or vehicle parking lot. No sampling had previously been conducted at EBS Parcel 121.

3.4.2 Scope

During the RI, soil and groundwater samples were collected from one centrally located boring (A23SB14) to assess the presence of contaminants in soil and groundwater to provide sampling coverage in this portion of AOC 23, where no samples were previously collected. Soil and groundwater samples from this boring were analyzed for VOCs, TPH (purgeable-range and extractable-range), SVOCs, pesticides, PCBs, and metals. Groundwater was also analyzed for TDS.

3.5 EBS PARCEL 123

The investigation approach and scope for EBS Parcel 123 focused on collecting samples from seven areas of EBS Parcel 123 as follows: the area around Building 98, in the vicinity of OWS 067, the areas around NAS GAP 15 and former GAP 29, stained areas between Buildings 67 and 393, the area around Building 263, and the area around UST(R)-11.

3.5.1 Approach

Because the samples that were collected in Building 98 during the EBS targeted the worst-case scenario for possible releases, and because SWMU AOC 098 was located indoors on top of concrete, no additional sampling was recommended in the EBS, and this area is considered to have a low potential for releases. A groundwater sample collected on the downgradient side of Building 98 during the RI follow-on investigation (03GB036) was analyzed for VOCs and TPH; results did not identify contaminants above PSCs.

OWS 067 is located on the south side of Building 67. No samples were previously collected and analyzed to assess whether OWS-impacted soil or groundwater exists, and the SWMU Report recommended additional sampling at this location (SulTech 2005a).

No contaminants were identified in soil by sampling and analysis performed at NAS GAP 15. Groundwater samples were collected nearby at previous sampling locations

123-0040 through 123-0043. Regulatory agencies requested this area be investigated further.

Soil sampling identified a PCB (Aroclor 1260) and diesel-range TPH above PSCs in two sampling locations at former location of NAS GAP 29. Groundwater samples were not collected at the former location of NAS GAP 29. Groundwater flow direction is uncertain in this area.

Heavy stains were identified between Buildings 67 and 393; however, it was not clear during preparation of the Work Plan (BEI 2006) whether this area was historically sampled in this area. Regulatory agencies requested that this area be investigated further.

Soil samples collected near Building 263 were analyzed for TPH, SVOCs, and metals. TPH was reported above the PSC in one sample; no other analytes were above PSCs.

Analytical results for soil and groundwater samples collected at UST(R)-11 as part of the EBS and tank removal activities showed contaminants at concentrations below screening criteria for soil and at relatively low concentrations in groundwater; only diesel-range TPH and arsenic were reported in groundwater above PSCs (arsenic concentrations were below background). Regulatory agencies requested that this area be investigated further.

3.5.2 Scope

During the RI, four borings were advanced at Building 98 to assess whether possible releases at this building (including SWMU AOC 098) impacted soil or groundwater. Soil and groundwater samples were collected from three of the borings, including one boring advanced on the assumed downgradient side of Building 98 (A23SB22), one boring advanced north (A23SB18), and one boring advanced east (A23SB21) of Building 98. As discussed below, boring A23SB18 also provides information west of Building 263. Only groundwater was collected from one additional boring advanced west (A23SB20) of the building. Soil and groundwater samples from these borings were analyzed for VOCs, TPH (purgeable-range and extractable-range), SVOCs, pesticides, PCBs, and metals. Groundwater samples were also analyzed for TDS. The groundwater sample from boring A23SB22 was not analyzed for pesticides, PCBs, and TDS due to low groundwater yield; sufficient sample volume could not be obtained.

One boring was advanced adjacent to OWS 067 (A23SB26) to assess whether possible releases from the OWS-impacted soil or groundwater. Soil and groundwater samples from this boring were analyzed for VOCs, TPH (purgeable-range and extractable-range), and metals. The groundwater sample was also analyzed for TDS.

Groundwater samples were collected from two locations at NAS GAP 15 (A23SB23 and A23SB24) to address the regulatory agencies' request to investigate this area further, and because no groundwater samples had previously been collected in this immediate area. Groundwater flow direction in this area is uncertain. Therefore, two groundwater samples were collected, one on the north side and one on the south side of NAS GAP 15. The groundwater samples from these borings were analyzed for VOCs, TPH (purgeable-range and extractable-range), SVOCs, pesticides, PCBs, metals, and TDS.

Soil samples were collected from two locations (A23SB15 and A23SB16) around the former location of NAS GAP 29 to delineate the northern extent of PCBs in soil. A groundwater sample was collected from one of these borings (A23SB15) to assess the presence of contaminants in groundwater. Soil and groundwater samples from these borings were analyzed for PCBs and metals. An additional groundwater sample was also collected on the south side of NAS GAP 29 (A23SB17) to provide information for this area as well as the area north of Building 263 (as discussed below). This groundwater sample was analyzed for VOCs, TPH (purgeable-range and extractable-range), SVOCs, PCBs, metals, and TDS.

During the RI, one boring was advanced, and soil and groundwater samples were collected to assess the stained area between Buildings 67 and 393 (A23SB25). Soil and groundwater samples from this boring were analyzed for VOCs, TPH (purgeable-range and extractable-range), SVOCs, pesticides, PCBs, and metals. In addition, groundwater samples were analyzed for TDS.

One boring was advanced on the south side of Building 263 (A23SB19) to assess soil and groundwater, and one boring was advanced on the west side of the railroad tracks (A23SB18). Soil and groundwater samples from these borings were analyzed for VOCs, TPH (purgeable-range and extractable-range), SVOCs, pesticides, PCBs, and metals. In addition, groundwater samples were analyzed for TDS. As mentioned, the groundwater sample proposed on the south side NAS GAP 29 would also provide groundwater data for the area north of Building 263.

As requested by the regulatory agencies, soil and groundwater samples were collected from two locations around UST(R)-11 (A23SB27 and A23SB28) to assess current conditions. These samples were analyzed for VOCs, TPH (extractable-range), and metals. The soil sample from location A23SB28 was also analyzed for SVOCs, pesticides, and PCBs. Groundwater samples were also analyzed for TDS.

3.6 EBS PARCEL 124

The investigation approach and scope for sampling at EBS Parcel 124 focused on the stained areas around Building 13.

3.6.1 Approach

A stained area in Building 13 was selected as a target area for investigation during the EBS. Results from soil and groundwater samples collected in this area did not identify contaminants at concentrations above PSCs. Groundwater was not fully assessed.

3.6.2 Scope

Four groundwater samples were collected around Building 13. The sample collected and analyzed from boring A23SB20 (described above) at EBS Parcel 123 would also provide information for the east side of Building 13. Three groundwater samples were collected at EBS Parcel 124; one on the assumed downgradient (southwestern) side of Building 13 (A23SB32), one on the western side (A23SB31), and one on the northern side

(A23SB30) to assess whether chemicals stored in the building have impacted groundwater. Soil samples were also collected from the location on the western side (A23SB31) of Building 13.

Soil and groundwater samples were analyzed for VOCs, TPH (purgeable-range and extractable-range), SVOCs, pesticides, PCBs, and metals. Groundwater low-detection-level mercury analysis was conducted on samples collected from locations on the western and southwestern side of Building 13 for comparison to surface water PSCs. Groundwater samples were also analyzed for TDS.

3.7 EBS PARCEL 125

The investigation approach and scope for sampling at EBS Parcel 125 focused on the stained areas inside of Building 66, soil and groundwater around the building, and the former NADEP GAP 43.

3.7.1 Approach

A stained area in Building 66 was selected as a target area for investigation during the EBS. Although results from previous soil samples collected beneath the building identified TPH constituents as the only analytes reported at concentrations above a PSC in soil as well as vinyl chloride in one groundwater sample, the samples were not analyzed for a full analytical suite and groundwater was not fully assessed.

NADEP GAP 43 was located indoors on concrete and, as such, was considered in the Resource Conservation and Recovery Act facility assessment (SulTech 2004) to have a low potential for releases. Therefore, NADEP GAP 43 was not specifically targeted for soil or groundwater sampling.

A groundwater sample collected in the southern portion of EBS Parcel 125, adjacent to IR Site 21 (S21-DGS-DP20), had vinyl chloride at a concentration above the PSC; however, it is likely that this area has been impacted by contaminant migration from adjacent IR Site 21. This sample was from a boring located in the assumed downgradient direction from Building 66 and possibly from NADEP GAP 43; however, only limited analyses were performed.

3.7.2 Scope

Soil and groundwater samples were collected from five borings located around Building 66. Boring A23SB38, advanced in EBS Parcel 126 (discussed below), would also provide information for the east side of Building 66. Four borings around Building 66 were sampled at EBS Parcel 125: one on the north side of the building (A23SB33), one on the west side of the building (A23SB34), one on the assumed downgradient (southwest) side of the building (A23SB35), and one on the south side of the building (A23SB36). Boring A23SB36 was located adjacent to, and immediately downgradient of, NADEP GAP 43 to also assess impacts to soil and groundwater from NADEP GAP 43. Soil and groundwater samples collected from these three locations were analyzed for VOCs, TPH (purgeable-range and extractable-range), SVOCs,

pesticides/PCBs, and metals to assess whether possible releases at Building 66 impacted soil or groundwater. Soil and groundwater samples were also collected from one additional boring (A23SB39) installed within Building 66 to characterize conditions beneath the building; samples were analyzed for VOCs and metals. Low-detection-level mercury analysis was conducted on groundwater samples for comparison to the surface water PSC. Groundwater samples from borings A23SB33 through A23SB336 were also analyzed for TDS.

3.8 EBS PARCEL 126

The investigation approach and scope for sampling at EBS Parcel 126 focused on assessing the distribution of metals in soil and VOCs in groundwater.

3.8.1 Approach

Sampling at EBS Parcel 126 identified TPH (diesel- and motor oil–range) and metals (arsenic, thallium, and iron) in soil, and TPH (diesel-range) and VOCs (1,2-DCA) in groundwater at concentrations above PSCs. Groundwater samples were not analyzed for metals.

A groundwater sample collected from well 398-MW1 in the eastern portion of EBS Parcel 126 had low concentrations of TCE and tetrachloroethene (below PSCs). These VOCs are likely to be indicative of the VOC groundwater plume associated with IR Site 21. Groundwater samples from well 398-MW1 were not analyzed for metals.

3.8.2 Scope

Soil and groundwater samples were collected from two locations in EBS Parcel 126: one in the northern portion of the parcel (A23SB37) and one in the southern portion of the parcel (A23SB38) downgradient of the soil sampling locations where metals concentrations were above PSCs. Additionally, one groundwater sample was collected from well 398-MW1. Soil and groundwater samples were analyzed for VOCs and metals. Groundwater samples were also analyzed for TDS.

Section 4
NATURE AND EXTENT OF CONTAMINATION

This section discusses sampling and analysis from previous investigations and from the RI along with the concentration ranges and spatial distributions of the analytes identified at AOC 23. Soil and/or groundwater samples were collected at 132 locations during the Phases 2B and 3 investigation (PRC Environmental and Montgomery 1992), the EBS (IT 2001a), the OUs 1 and 2 data gap investigation (TtEMI 2002c), the 2002 PAH study (BEI 2005a), UST investigations, and the RI (Table 3-1; Figures 4-1 and 4-2 for soil and groundwater, respectively). Metals concentrations detected in soil and groundwater above background are discussed in detail in Section 4.3.3 of the main RI/FS Report. Metals discussion in this section focuses primarily on concentrations above PSCs. Regardless of concentration, all reported metals were included in the risk evaluation (Section 6) except required human trace nutrients.

Statistical summaries of soil and groundwater results are presented in Tables 4-1, 4-2a, and 4-2b. Soil and groundwater analytical results are summarized in Tables 4-3a and b through 4-10a and b, respectively, for each of the seven EBS Parcels. Figures 1-1 and 4-1 also show the storm sewer sediment sampling location (3G) that was collected in association with AOC 12 and discussed in Attachment L. Comparisons of groundwater analytical results to surface water PSCs are summarized in Tables 4-3c, 4-7c, 4-8c, 4-9c, and 4-10c for EBS Parcels 71, 123, 124, 125, and 126, respectively. Distributions of analytes reported at concentrations above PSCs are illustrated on Figures 4-1 and 4-2 for soil and groundwater, respectively. Complete analytical results for historical and RI samples collected within AOC 23 are included in Appendices B and G, respectively.

4.1 SOIL SAMPLING RESULTS

Analytical soil sampling results are discussed for each class of chemicals investigated at AOC 23 and are further described by EBS parcel.

4.1.1 Volatile Organic Compounds

Benzene and vinyl chloride were the only VOCs reported in soil at concentrations above PSCs at AOC 23. Vinyl chloride was reported at a concentration of 210 µg/kg in a soil sample collected at A23SB22 in EBS Parcel 123 from 5 to 6 feet bgs; the concentration was above the PSC (residential PRG of 79 µg/kg). Vinyl chloride was not reported above laboratory detection limits in the sample collected from this boring at 1 to 2 feet bgs, and was reported at 12 µg/kg at 3 to 4 feet bgs, a concentration that is below the PSC. Vinyl chloride or other chlorinated VOCs were not reported above laboratory detection limits in other soil samples analyzed for VOCs beneath and around adjacent Building 13 (124-0005, -0005M, -0006M, -0008M, and 071M-020) and Building 98 (123-016M, -017M, -0001, -0001M, -0015, -0015M, and 03G036).

Benzene was reported at 27,000 µg/kg in EBS sample 071M-004M collected from 7.5 to 8.5 feet bgs at EBS Parcel 71. This concentration was above the residential soil PRG of 640 µg/kg. Results from an RI boring (A23SB05) located near the EBS boring did not verify the presence of benzene in soil (or in groundwater); benzene concentrations were below laboratory detection limits in all samples analyzed from this boring. This was

supported by observations of gravelly fill material from the surface to approximately 8.5 feet bgs in RI boring A23SB05. It appears that the previously reported benzene in soil at this location is no longer present. This sampling location was within CAA-B, and soil associated with this sample was probably removed as part of pipeline removal activities.

Twenty-five VOCs were reported in one or more soil samples at concentrations below PSCs, described as follows by EBS parcel.

- At EBS Parcel 71, 14 VOCs were reported in soil samples at concentrations below PSCs. The most frequently reported (greater than 10 percent) VOCs include acetone, cis-1,2-DCE, methyl tert-butyl ether (MTBE), methylene chloride, PCE, and toluene.
- At EBS Parcel 72, soil samples were not analyzed for VOCs.
- At EBS Parcel 110, no VOCs were reported at concentrations above PSCs. VOCs reported above the detection limit were 2-butanone, acetone, carbon disulfide, cis-1,2-DCE, methylene chloride, TCE, and total xylenes.
- At EBS Parcel 121, no VOCs were reported at concentrations above PSCs. Acetone was the only VOC reported above the detection limit.
- At EBS Parcel 123, 21 VOCs were reported at concentrations below PSCs. The most frequently reported VOCs include 2-butanone, acetone, carbon disulfide, cis-1,2-DCE, MTBE, methylene chloride, and toluene.
- At EBS Parcel 124, no VOCs were reported at concentrations above PSCs. Seven VOCs were reported above the detection limits (2-butanone, acetone, benzene, carbon disulfide, naphthalene, toluene, and total xylenes).
- At EBS Parcel 125, no VOCs were reported at concentrations above PSCs. Five VOCs were reported above the detection limit (2-butanone, benzene, cis-1,2-DCE, PCE, and TCE).
- At EBS Parcel 126, no VOCs were reported at concentrations above PSCs. Eight VOCs were reported above the detection limits (2-butanone, acetone, carbon disulfide, cis-1,2-DCE, isopropylbenzene, MTBE, n-propylbenzene, and toluene).

4.1.2 Semivolatile Organic Compounds

Six non-PAH SVOCs were reported in soil samples from EBS Parcels 71, 110, 121, 123, 125, and 126 (bis[2-ethylhexyl]phthalate, carbazole, di-n-butyl phthalate, diethyl phthalate, pentachlorophenol, and phenol). Concentrations were below PSCs. Soil samples at EBS Parcel 72 were not analyzed for SVOCs.

Seventeen PAHs were reported in one or more soil samples analyzed from AOC 23. Three samples were collected from 0 to 2 feet bgs (from borings A23SB04, A23SB22, and A23SB31); the rest of the samples were collected from deeper than 4 feet bgs (borings B06-09 [two samples], B06-10, A23SB02, A23SB04, A23SB18, A24SB33, and A23SB35). The B(a)P equivalent concentrations in 11 samples at each of the EBS

Parcels described below were above the PSC (620 µg/kg). These exceedances were incorporated into the PAH Areas (Attachment W).

- At EBS Parcel 71, B(a)P equivalent concentrations for six samples at four locations were above the PSC: at location B06-09 from 8 and 14 feet bgs (5,000 and 2,300 µg/kg, respectively); at location B06-10 from 8 feet bgs (780 µg/kg); at location A23SB02 from 4 feet bgs (660 µg/kg); and at location A23SB04 from 0 to 2 and 4 to 8 feet bgs (700 and 6,300 µg/kg, respectively).
- At EBS Parcel 123, B(a)P equivalent concentrations for two samples at two locations were above the PSC: at location A23SB18 from 6.5 to 8 feet bgs (640 µg/kg) and at location A23SB22 from 1 to 2 feet bgs (840 µg/kg).
- At EBS Parcel 124, the B(a)P equivalent concentration in one sample was above the PSC at boring A23SB31 from 1 to 2 feet bgs (880 µg/kg).
- At EBS Parcel 125, B(a)P equivalent concentrations for two samples at two locations were above the PSC: at location A23SB33 from 6.5 to 7.5 feet bgs (1,000 µg/kg) and at location A23SB35 from 4 to 8 feet bgs (1,300 µg/kg).

4.1.3 Pesticides and Polychlorinated Biphenyls

Aroclor 1260 was the only PCB reported at a concentration in soil above a PSC. Aroclor 1260 was reported at 500 J µg/kg in soil sample 123-0022 collected from a depth of 0 to 0.5 foot bgs. (The "J" qualifier indicates the value is estimated.) This is above the residential PRG of 220 µg/kg. However, Aroclor 1260 was reported at 5 µg/kg in duplicate sample 123-044. Aroclor 1260 was either reported below laboratory detection limits or the PSC in samples surrounding the possible exceedance. Aroclor 1260 was not reported above laboratory detection limits in RI samples (A23SB15 and A23SB16) collected at three depths near sample 123-0022.

Two PCBs (Aroclors 1254 and 1260) were reported in soil samples at AOC 23 at concentrations below PSCs as described below. Both of these PCBs were identified as risk contributors (Section 6).

- One PCB (Aroclor 1260) was reported in soil sample 072-0002 from EBS Parcel 72, in soil samples 123-0023, 123-0024, 123-0025, 123-0029, and 123-0044 from EBS Parcel 123, and in soil samples 124-0003M and 124-0004M from EBS Parcel 124.
- Aroclor 1254 was reported in samples 124-0001M and 124-0003M from 1.5 to 2 feet bgs at EBS Parcel 124. The deeper samples (4 to 4.5 feet bgs) did not have reported concentrations of Aroclor 1254. Additionally, the duplicate soil sample (124-0001) did not have reported concentrations of Aroclor 1254.

Pesticides were not reported at concentrations above PSCs.

Five pesticides (4,4'-dichlorodiphenyldichloroethene [DDE], 4,4'-dichlorodiphenyl-trichloroethane [DDT], alpha-chlordane, endosulfan II, and heptachlor epoxide) were reported in soil samples at AOC 23 at concentrations below PSCs as described below.

- At EBS Parcel 71, one pesticide (4,4'-DDT) was reported in boring A23SB02 in the sample from 4 to 8 feet bgs.
- At EBS Parcel 72, one pesticide (alpha-chlordane) was reported in sample 072-0002.
- At EBS Parcel 123, five pesticides were reported in six samples (123-0022, -0023, -0024, -0029, -0044, and the 7- to 8-foot-bgs sample from A23SB09).
- At EBS Parcels 110, 121, 124, and 125, pesticides were not reported in soil samples at concentrations above laboratory detection limits.

4.1.4 Total Petroleum Hydrocarbons

TPH compounds were reported above PSCs in soil samples scattered across AOC 23; there was no apparent pattern to the distribution of TPH. The majority of the compounds present in soil were diesel- and motor oil–range TPH with some concentrations of gasoline-range TPH. Most notably, motor oil–range organics were reported in a soil sample at 27,000 milligrams per kilogram (mg/kg) in the upper 0.5 foot of soil beneath Building 399 in EBS Parcel 126. Building 399 is adjacent to CAA-3A, located immediately east of AOC 23. TPH concentrations reported in soil above PSCs are described below.

Diesel-range organics were reported in soil samples at AOC 23 above the PSC (100 mg/kg) at the following five EBS parcels.

- At EBS Parcel 71, diesel-range TPH was reported in sample 071I-001 from 5 to 9 feet bgs (850 J mg/kg) and in the sample at boring A23SB02 from 4 to 8 feet bgs (210 mg/kg).
- At EBS Parcel 110, diesel-range TPH was reported at location A23SB13 from 4 to 5 feet bgs (130 mg/kg) and at boring A23SB10 from 4 to 5.5 feet bgs (370 mg/kg).
- At EBS Parcel 123, diesel-range TPH was reported in three soil samples: a sample from 0.3 to 1.3 feet bgs at location A23SB26 (440 mg/kg); a sample from 6.5 to 8 feet bgs at location A23SB18 (130 mg/kg); and a sample from 2 to 2.5 feet bgs at location 123-0024 (210 mg/kg).
- At EBS Parcel 125, diesel-range TPH was reported in two soil samples: a sample from 4 to 8 feet bgs at location A23SB35 (470 mg/kg) and a sample from 0.5 to 1 foot bgs at location 125-0002M (300 mg/kg).
- At EBS Parcel 126, diesel-range TPH was reported from 0 to 0.5 foot bgs in sample 126-0001M (1,900 mg/kg).

Motor oil–range TPH was reported in soil samples at AOC 23 above the PSC (500 mg/kg) in the following six EBS parcels.

- At EBS Parcel 71, motor oil–range TPH was reported in sample 071-0002 from 3 to 3.5 feet bgs (670 J mg/kg). This sample is located in CAA-B. Soil associated with this sample was likely removed during subsequent fuel pipeline closure activities for CAA-B.

- At EBS Parcel 110, motor oil–range TPH was reported in sample 124-0004M from 0 to 0.5 foot bgs (700 mg/kg) during the EBS. The sample was collected to investigate an environmental issue from EBS Parcel 124, but the sample itself was collected within the boundaries of EBS Parcel 110.
- At EBS Parcel 123, motor oil–range TPH was reported in soil sample 123-0011M from 2 to 2.5 feet bgs (600 mg/kg).
- At EBS Parcel 124, motor oil–range TPH was reported in soil sample 124-0003M from 1.5 to 2 feet bgs (680 mg/kg).
- At EBS Parcel 125, motor oil–range TPH was reported in soil samples from two locations within EBS Parcel 23: sample 125M-001M from 9 to 10 feet bgs (590 mg/kg) and at location A23SB35 from 4 to 8 feet bgs (970 mg/kg).
- At EBS Parcel 126, motor oil–range TPH was reported in soil samples from two locations within EBS Parcel 123: sample 126-0001M from 0 to 0.5 foot bgs (27,000 mg/kg) and its duplicate sample 126-0008M (18,000 mg/kg), and sample 126-0004M from 0 to 0.5 foot bgs (560 mg/kg).

Gasoline-range TPH was reported in soil samples at AOC 23 above the PSC (100 mg/kg) in the following two EBS parcels.

- At EBS Parcel 71, gasoline-range TPH was reported in sample 071I-001 from 5 to 9 feet bgs (750 J mg/kg) and in sample 071M-004 from 7.5 to 8.5 feet bgs (580 mg/kg). Sample 071M-004 is located in CAA-B. Soil associated with this sample was likely removed during subsequent fuel pipeline closure activities for CAA-B.
- At EBS Parcel 125, gasoline-range TPH was reported in soil sample 125-0003M from 0.5 to 1 foot bgs (2,000 mg/kg) and in duplicate sample 125-0007M from 0.5 to 1 foot bgs (1,700 mg/kg).

In addition, soil samples collected at EBS Parcel 72 were not analyzed for TPH compounds. Gasoline-range TPH was reported at concentrations below the PSC at EBS Parcels 110, 123, 124, and 126 and was not reported above detection limits at EBS Parcel 121. Diesel-range TPH was reported at concentrations below the PSC at EBS Parcels 121 and 124. Motor oil–range TPH was reported at concentrations below the PSC at EBS Parcel 121. JP-5–range TPH was reported in the 1- to 2-foot-bgs sample from boring A23SB27 at 3.8 mg/kg. However, the concentration was below the PSC (100 mg/kg).

4.1.5 Metals

Twenty metals (aluminum, antimony, arsenic, barium, beryllium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, sodium, thallium, vanadium, and zinc) were reported at concentrations above background. Statistical analyses for selected metals in soil at AOC 23 (Appendix H) indicate that the aluminum, arsenic, cadmium, chromium, manganese, and vanadium concentrations were not statistically different from background. Concentrations of arsenic, iron, thallium, and vanadium were present at concentrations above PSCs in soil; however, only the iron and

thallium concentrations were also above background. Iron and thallium concentrations above PSCs are summarized below.

- Twenty samples had concentrations of iron above the PSC of 23,000 mg/kg. The range of iron concentrations at AOC 23 (6,380 J to 49,000 mg/kg) is within the range for other areas of IR Site 35 (5,990 to 49,500 mg/kg).
- One thallium concentration (6.4 J mg/kg) reported in soil was slightly above the PSC (PRG of 5.2 mg/kg); thallium was reported in only 16 of 160 samples analyzed for the metal at AOC 23. The samples with thallium were all historical samples from 1995; thallium was not reported in any of the RI soil samples.

Three possible outliers identified in Section 4.3.1.2 of the main RI/FS Report are discussed below.

- Aluminum at 28,500 mg/kg in a sample collected at A23SB19 from 0.25 to 1.25 feet bgs was identified as an outlier based on the scatter plot of aluminum and iron (Appendix H). This sample also had calcium, copper, potassium, sodium, and vanadium at concentrations above background. The correlation analysis indicated that copper and vanadium were well correlated with aluminum. This sample appears to be an outlier due to the low iron concentration rather than an elevated concentration of aluminum.
- Arsenic at 12.2 mg/kg in a sample collected at A23SB15 from 6.5 to 7.5 feet is not correlated with iron above background. The two shallower soil samples at this location did not have arsenic or any other metals reported above background. It should be noted that this sample was collected from the native BSU. A potential outlier also includes a concentration of 14.2 mg/kg from sample 123-0022 (0 to 0.5 foot bgs) at AOC 23. There are no data for iron in this sample.
- Iron at 46,300 mg/kg in a sample collected at 126-0009 from 0 to 1 foot bgs appears to be an outlier on Figure H-7 of Appendix H. This concentration of iron is unlikely to be a result of Navy activities because arsenic, barium, cobalt, copper, manganese, vanadium, and zinc are also above background concentrations in this sample. Iron is significantly correlated with arsenic, cobalt, copper, manganese, and vanadium throughout soil at IR Site 35.

However, the concentrations of these outliers and other metals are evenly distributed across AOC 23, and there is no apparent pattern indicative of a specific area of release.

No metals were analyzed for in soil samples collected at EBS Parcel 72. The following is more detailed information on the PSC exceedances.

- At EBS Parcel 71, iron was reported at concentrations above its PSC (PRG of 23,000 mg/kg) in three soil samples: B06-9 from 8 to 9.5 feet bgs (35,100 mg/kg) and A23SB02 and A23SB04 both from 4 to 8 feet bgs (36,800 mg/kg and 28,300 mg/kg, respectively). Arsenic was reported at concentrations above its PSC in 29 of 32 samples analyzed. Arsenic was compared to background concentrations at Alameda Point. The maximum reported arsenic concentration (8.6 mg/kg) was below the background concentration (9.14 mg/kg).

- At EBS Parcel 110, iron was reported above the PSC in four soil samples: A23SB09 from 7 to 8 feet bgs (27,300 mg/kg), A23SB10 from 4 to 5.5 feet bgs (49,000 mg/kg), A23SB12 from 4 to 8 feet bgs (38,700 mg/kg), and 110P-001 from 8.5 to 9 feet bgs (23,300 mg/kg). Arsenic was reported at concentrations above the PSC in 18 of 18 samples analyzed. Arsenic was also compared to background concentrations. Arsenic was reported at concentrations slightly above the background concentration (9.14 mg/kg) in three soil samples from EBS Parcel 110: A23SB09 from 7 to 8 feet bgs (9.5 mg/kg), A23SB10 from 4 to 5.5 feet bgs (10.5 mg/kg), and A23SB12 from 4 to 8 feet bgs (9.2 mg/kg).
- At EBS Parcel 121, iron was reported at concentrations above the PSC in a sample from boring A23SB14 at 1 to 2 feet bgs (41,200 mg/kg). Arsenic was reported at concentrations above the PSC in all three of the samples analyzed. Arsenic was also compared to background concentrations at Alameda Point. The maximum reported arsenic concentration of 6.7 mg/kg was below the background concentration (9.14 mg/kg).
- At EBS Parcel 123, iron was reported at concentrations above the PSC in seven samples from five separate locations: A23SB16 from 1.5 to 2 feet bgs (47,600 mg/kg) and 7.5 to 8 feet bgs (33,600 mg/kg); A23SB18 from 6.5 to 8 feet bgs (39,600 mg/kg); A23SB22 from 1 to 2 feet bgs (39,500 mg/kg); A23SB27 from 1 to 2 feet bgs (34,800 mg/kg) and 3 to 4 feet bgs (36,500 mg/kg); and A23SB29 from 1 to 2 feet bgs (37,600 mg/kg).

  Arsenic was reported at concentrations above the PSC in 63 of 66 samples analyzed. Arsenic was also compared to background concentrations at Alameda Point. Arsenic was reported at concentrations above the background concentration (9.14 mg/kg) in three soil samples from three separate locations within EBS Parcel 123: 123-0022 from 0 to 0.5 foot bgs (14.3 mg/kg); A23SB15 from 6.5 to 7.5 feet bgs (12.2 mg/kg); and A23SB29 from 1 to 2 feet bgs (9.9 mg/kg). In addition, vanadium was reported at concentrations above the PSC in two samples: A23SB16 from 1.5 to 2 feet bgs (127 mg/kg) and A23SB22 from 1 to 2 feet bgs (81.2 mg/kg).

  Three samples in EBS Parcel 123 were identified as possible outliers in the sitewide statistical evaluation (Section 4.3.1.2 of the main RI/FS Report) as follows: aluminum at 28,500 mg/kg in a sample collected at A23SB19 from 0.25 to 1.25 feet bgs; arsenic at 12.2 mg/kg in a sample collected at A23SB15 from 6.5 to 7.5 feet bgs (this sample was collected from the native BSU); and arsenic at 14.2 mg/kg in sample collected at 123-0022 from 0 to 0.5 foot bgs.
- At EBS Parcel 124, iron was reported at a concentration above the PSC in one soil sample (A23SB31) from 7 to 8 feet bgs (43,300 mg/kg). Arsenic was reported at concentrations above its PSC in all 12 of the soil samples analyzed. Arsenic was also compared to background concentrations. Arsenic was reported at a concentration slightly above the background concentration (9.14 mg/kg) in one soil sample collected from the same boring (A23SB31) from 7 to 8 feet bgs (9.3 mg/kg).
- At EBS Parcel 125, iron was reported at concentrations above the PSC (23,000 mg/kg) in two soil samples from two locations: sample A23SB33 from 6 to 7.5 feet bgs (27,200 mg/kg) and sample A23SB35 from 4 to 8 feet bgs

(35,600 mg/kg). Arsenic was reported at concentrations above the PSC in all 15 soil samples analyzed. Arsenic was also compared to background concentrations at Alameda Point. Arsenic was reported at concentrations slightly above the background concentration (9.14 mg/kg) in one sample (A23SB35) from 4 to 8 feet bgs (9.6 mg/kg).

- At EBS Parcel 126, arsenic, iron, and thallium were the metals reported at concentrations above the PSC. Iron was reported at a concentration above the PSC in sample 126-0009 from 0 to 1 foot bgs (46,300 mg/kg). Arsenic was reported at concentrations above the PSC in 13 of 14 soil samples analyzed. Arsenic was also compared to background concentrations. Arsenic was reported at concentrations above the background concentration (9.14 mg/kg) in one sample (126-0009) from 0 to 1 foot bgs (13.2 mg/kg). In addition, thallium was reported above the PSC in sample 126-0005 from 0.5 to 1 foot bgs (6.4 J mg/kg).

  One sample in EBS Parcel 126 was identified as a possible outlier in the sitewide statistical evaluation (4.3.1.2): iron at 46,300 mg/kg in a sample collected at 126-0009 from 0 to 1 foot bgs.

4.2 GROUNDWATER SAMPLING RESULTS

Analytical groundwater sampling results are presented for each class of chemicals investigated at AOC 23 and are further described by EBS parcel.

4.2.1 Volatile Organic Compounds

Benzene (at EBS Parcel 71), vinyl chloride (at EBS Parcels 123, 124, and 125), and 1,2-DCA (EBS Parcel 126) were the only VOCs reported in groundwater samples collected within AOC 23 at concentrations above PSCs (MCLs of 1, 0.5, and 0.5 micrograms per liter [µg/L], respectively). Distribution of VOCs in groundwater shows that three of the vinyl chloride exceedances (up to 2.8 µg/L) were located around Building 13 in the center of EBS Parcel 124; the concentration of vinyl chloride in soil above the PSC was from a location southeast of Building 13. A fourth sample with a reported vinyl chloride concentration above the PSC was from a location in the southern portion of AOC 23, southwest of Building 66. The reported concentration (2.7 µg/L in boring S21-DGS-DP20) from southwest of Building 66 was also compared to surface water PSCs because the location is about 150 feet from Seaplane Lagoon. This concentration was slightly above the surface water PSC (NRWQC HHCO of 2.4 µg/L). It is unlikely that vinyl chloride would migrate approximately 150 feet in groundwater and result in a surface water concentration above the PSC. IR Site 21 is south of this location. It is not clear whether this concentration is associated with IR Site 21. The interpreted extent of VOCs associated with IR Site 21, as presented in recent Alameda Point basewide monitoring reports, does not extend north to AOC 23. The lateral extent of vinyl chloride is defined around Building 13 and north of the southern exceedance.

The two exceedances of 1,2-DCA were in the northeastern corner of EBS Parcel 126. These concentrations are likely associated with the VOCs reported in groundwater at

Building 398 (located in CAA-3A in IR Site 21). During the 2001 data gap investigation at CAAs (TtEMI 2001b), VOCs (1,1-DCA, 1,2-DCA, PCE, and TCE) were reported in groundwater at Building 398 (adjacent to AOC 23). All VOCs were reported at concentrations below their respective PSCs. During the data gap investigation, PCE and TCE were reported at concentrations below their PSCs in a groundwater sample collected from monitoring well 398-MW1, which is located on the west side of Building 398 and within AOC 23, EBS Parcel 126. The EBS documented storage of approximately 5,000 gallons of halogenated and nonhalogenated solvents in Building 398 (IT 2001a). The benzene exceedance at EBS Parcel 71 was reported in one grab groundwater sample at 1.1 µg/L, just above the PSC (MCL of 1 µg/L). The following are VOCs present at concentrations above PSCs, by EBS parcel.

- At EBS Parcel 71, benzene was reported at 1.1 µg/L from location A23SB03.
- At EBS Parcel 123, vinyl chloride was reported in two samples from two locations: A23SB18 and A23SB20 at 2.8 and 0.62 µg/L, respectively.
- At EBS Parcel 124, vinyl chloride was reported from location A23SB31 at 1.9 µg/L.
- At EBS Parcel 125, vinyl chloride was reported from location S21-DGS-DP20 at 2.7 µg/L. Because of its proximity to Seaplane Lagoon and the potential of groundwater to enter surface water, results from southern groundwater sampling locations at EBS Parcels 123, 124, and 125 were also screened against surface water quality criteria. The vinyl chloride concentration reported at S21-DGS-DP20 was also above the aquatic NRWQC HHCO criterion (2.4 µg/L) for surface water.
- At EBS Parcel 126, 1,2-DCA was reported in two groundwater samples: one from location A23SB37 and one from monitoring well 398-MW1 (A23398-MW-1) at 0.91 µg/L and 2.4 µg/L, respectively.

The baseline human-health risk assessment (HHRA) identified three VOCs with maximum concentrations below PSCs as major risk contributors (cancer risk of 10^{-6} or hazard quotient [HQ] equal to or greater than 0.8): TCE, PCE, and naphthalene. A PSC was not identified for naphthalene in groundwater. EBS parcels within AOC 23 that had groundwater samples with VOC concentrations below PSC or above method detection limits were as follows.

- At EBS Parcel 71, eight VOCs were reported at concentrations below PSCs (1,1-DCA, 1,2,4-trimethylbenzene, carbon disulfide, cis-1,2-DCE, ethylbenzene, naphthalene, toluene, and total xylenes). Naphthalene was reported in grab groundwater samples collected during the RI from five borings at concentrations from 0.11 to 4.2 µg/L.
- At EBS Parcel 72, no VOCs were reported at concentrations above PSCs in groundwater samples; however, carbon disulfide and toluene were present at concentrations above detection limits.

- At EBS Parcel 110, no VOCs were reported at concentrations above PSCs in groundwater samples. Five VOCs (1,1-DCA, carbon disulfide, cis-1,2-DCE, MTBE, and toluene) were reported at concentrations above detection limits.
- At EBS Parcel 121, no VOCs were reported at concentrations above PSCs in the groundwater sample; however, carbon disulfide was reported at a concentration above the detection limit.
- At EBS Parcel 123, eleven VOCs (1,2-DCA, 1,2,4-trimethylbenzene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, benzene, carbon disulfide, cis-1,2-DCE, toluene, total xylenes, trans-1,2-DCE, and TCE) were reported at concentrations below PSCs. TCE was reported in grab groundwater samples from three soil borings (SB17, SB18, and SB22) at concentrations from 0.3 J to 0.55 mg/L, below the PSC.
- At EBS Parcel 124, four VOCs (1,4-dioxane, benzene, cis-1,2-DCE, and trans-1,2-DCE) were reported at concentrations below PSCs.
- At EBS Parcel 125, seven VOCs (1,2,4-trimethylbenzene, 1,3-dichlorobenzene, benzene, carbon disulfide, naphthalene, toluene, and total xylenes) were reported at concentrations below PSCs.
- At EBS Parcel 126, seven VOCs (1,2,4-trichlorobenzene, benzene, carbon disulfide, cis-1,2-DCE, PCE, toluene, and TCE) were reported at concentrations below PSCs. TCE and PCE were reported in two groundwater samples from monitoring well 398-MW-1 at concentrations below PSCs in 2001 and also in RI samples collected in 2005. The concentrations of TCE were 0.5 J and 0.94 µg/L and the concentrations of PCE were 0.3 J and 0.47 J µg/L in samples from 2001 and 2005, respectively.

4.2.2 Semivolatile Organic Compounds

B(a)P was the only SVOC reported in a groundwater sample at AOC 23 at a concentration above the PSC (MCL, 0.2 µg/L). B(a)P was present at a concentration of 3 J µg/L in groundwater sample 071M-013 collected from a depth of 7.5 to 8.5 feet bgs from within EBS Parcel 71.

Additionally, the HHRA (Section 6) identified four PAHs (benz[a]anthracene, benzo[b]fluoranthene, chrysene, and indeno[1,2,3-cd]pyrene) in groundwater as risk contributors (cancer risk of 10^{-6} or HQ equal to or greater than 0.8). PSCs were not identified for these SVOCs. The PAH concentrations in groundwater are likely an artifact of sampling (associated with suspended material due to turbidity) rather than representing dissolved concentrations. Because of the low solubility and tendency to sorb to organic matter and clay-size particles in soil, these heavier-molecular-weight PAHs are typically not found dissolved in groundwater. EBS parcels within AOC 23 that had groundwater samples with SVOC concentrations below PSC or above method detection limits were as follows.

- At EBS Parcel 71, the SVOCs most frequently reported in groundwater samples were acenaphthene, fluoranthene, fluorene, phenanthrene, and pyrene. Benzo(b)fluoranthene, chrysene and indeno(1,2,3-cd)pyrene were reported in

only one grab groundwater sample from AOC 23 at EBS Parcel 71 collected at 071M-013. One of the two reported concentrations of benz(a)anthracene in groundwater at AOC 23 was from the same grab groundwater sample.

- At EBS Parcel 72, no groundwater samples were analyzed for SVOCs.
- At EBS Parcel 110, no SVOCs were reported at concentrations above PSCs. However, six SVOCs were reported in groundwater samples from EBS Parcel 110 (acenaphthene, anthracene, fluoranthene, fluorene, phenanthrene, and pyrene).
- At EBS Parcel 121, no SVOCs were reported above detection limits in the groundwater sample.
- At EBS Parcel 123, no SVOCs were reported above PSCs in groundwater samples. However, five SVOCs were reported above detection limits in groundwater samples from EBS Parcel 123 (acenaphthene, benz[a]anthracene [reported at 0.56 µg/L in a sample from A23SB25], fluorene, phenanthrene, and pyrene).
- At EBS Parcel 124, no SVOCs were reported at concentrations above PSCs in groundwater samples. However, five SVOCs were reported above detection limits in groundwater samples from EBS Parcel 124 (benzo[g,h,i]perylene, butyl benzyl phthalate, fluoranthene, phenanthrene, and pyrene).
- At EBS Parcel 125, no SVOCs were reported at concentrations above PSCs in groundwater samples. However, eight SVOCs were reported above detection limits in groundwater samples from EBS Parcel 125 (acenaphthene, acenaphthylene, anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene).
- At EBS Parcel 126, no SVOCs were reported at concentrations above PSCs in groundwater samples. However, two SVOCs were reported in groundwater samples from EBS Parcel 126 (butyl benzyl phthalate and pyrene).

4.2.3 Pesticides and Polychlorinated Biphenyls

Pesticides were not reported in any groundwater samples collected at AOC 23. PCBs were not reported in groundwater samples from AOC 23 at concentrations above PSCs. However, the HHRA (Section 6) identified Aroclors 1016 and 1260 in groundwater as primary risk contributors. Both of these PCBs were reported only once in AOC 23 in a grab groundwater sample collected in EBS Parcel 123. The sample was from soil boring A23SB18, and the concentrations of Aroclors 1016 and 1260 were 0.24 and 0.34 J µg/L, respectively, and are likely to be an artifact of sampling (associated with suspended material due to turbidity) rather than representing dissolved concentrations. These concentrations were reported in grab groundwater samples collected from soil borings. It is not uncommon for grab groundwater samples to have suspended material (turbidity) entrained and analyzed with the groundwater sample that could result in nondissolved concentrations being reported. Because of the low solubility and tendency to sorb to organic matter and clay-size particles in soil, these heavier-molecular-weight PCBs are typically not found dissolved in groundwater.

4.2.4 Total Petroleum Hydrocarbons

TPH compounds were reported in groundwater samples above PSCs across AOC 23 with no obvious pattern of distribution. Concentrations of TPH in groundwater above PSCs ranged from 110 J to 940 J µg/L diesel-range TPH and 200 to 930 J µg/L motor oil–range TPH. Gasoline-range TPH was not reported above the PSC. Some of these concentrations may represent positive interferences of nonpetroleum organic matter from incomplete sample preparation or sample preparation without silica gel cleanup. Diesel-range TPH was reported in the following soil samples at AOC 23 above the PSC (ESL of 100 µg/L) at all seven EBS parcels.

- At EBS Parcel 71, diesel-range TPH was reported in five groundwater samples: a sample from 7.5 to 8.5 feet bgs at 071M-017 (110 J µg/L), a sample from 6 to 11 feet bgs at A23SB02 (140 µg/L), a sample from 5 to 9 feet bgs at A23SB03 (250 µg/L), a sample from 6 to 11 feet bgs at A23SB04 (150 µg/L), and a sample from 6 to 11 feet bgs at A23SB06 (150 µg/L).
- At EBS Parcel 110, diesel-range TPH was reported in three groundwater samples: a sample from 6 to 11 feet bgs at A23SB09 (150 J µg/L), a sample from 5 to 10 feet bgs at A23SB10 (220 J µg/L), and a sample from 8 to 13 feet bgs at A23SB12 (180 J µg/L).
- At EBS Parcel 121, diesel-range TPH was reported in a groundwater sample from 2 to 7 feet bgs at A23SB14 (180 µg/L).
- At EBS Parcel 123, diesel-range TPH was reported in five groundwater samples: two samples near former UST(R)-11 from 4 to 8 feet bgs at 123-0041 and 123-0043 (200 and 240 µg/L, respectively); a sample from 7 to 12 feet bgs at A23SB17 (150 µg/L); a sample from 3 to 8 feet bgs at A23SB18 (150 J µg/L); and a sample from 5 to 10 feet bgs at A23SB29 (240 J µg/L).
- At EBS Parcel 124, diesel-range TPH was reported in two samples: a sample from 3 to 8 feet bgs at A23SB31 (220 J µg/L) and a sample from 4 to 9 feet bgs at A23SB32 (130 µg/L).
- At EBS Parcel 125, diesel-range TPH was reported in three samples: a sample from 6.5 to 11.5 feet bgs at A23SB33 (120 µg/L); a sample from 7 to 12 feet bgs at A23SB34 (120 µg/L); and a sample from 6 to 11 feet bgs at A23SB35 (160 µg/L).
- At EBS Parcel 126, diesel-range TPH was reported in sample 126-0017 (940 J µg/L). Because of this location's proximity to Seaplane Lagoon and potential of groundwater to enter surface water, the result from this location was also screened against surface water PSCs. The diesel-range TPH concentration reported in 126-0017 is above the aquatic criteria (ESL aquatic criterion of 640 µg/L) for diesel.

Motor oil–range TPH was reported above the PSC (100 µg/L) in the following groundwater samples at AOC 23.

- At EBS Parcel 71, motor oil–range TPH was reported in two groundwater samples: 071M-011 and 071M-013 both from 7.5 to 8.5 feet bgs (930 J and 330 J µg/L, respectively). These samples are located within CAA-B.

- At EBS Parcel 123, motor oil–range TPH was reported in three groundwater samples: 03GB036 from 10 to 12 feet bgs (610 J µg/L); 03GB240 from 5 to 6 feet bgs (860 J µg/L); and 123-0041 from 4 to 8 feet bgs (200 µg/L).
- At EBS Parcel 124, motor oil–range TPH was reported in a pair of regular/ duplicate samples: 071M-019/071M-021 from 7.5 to 8 feet bgs. The highest concentration in either sample was 680 J µg/L.

Groundwater samples collected at EBS Parcel 72 were not analyzed for TPH. Gasoline-range TPH was reported at concentrations below the PSC at EBS Parcels 71, 123, and 125 and was not reported above detection limits at EBS Parcels 110, 121, 124, or 125. Motor oil–range TPH was not reported above detection limits at EBS Parcels 110, 121, 125, and 126.

4.2.5 Metals

Arsenic concentrations were reported in groundwater above the groundwater PSC (MCL of 10 µg/L) at EBS Parcels 110, 123, 124, and 125; and additionally a surface water PSC at EBS Parcels 123 and 125 within AOC 23. In addition, thallium was present in groundwater at concentrations above the PSC (MCL of 2.4 µg/L) at EBS Parcels 110 and 123. There was no apparent pattern of distribution of the metals in groundwater. Only one reported concentration (22.6 µg/L) of arsenic was above both the PSC and slightly above the background concentration of 20.72 µg/L. As discussed in Section 6, statistical analyses used to support the baseline HHRA (Appendix H) show that arsenic in groundwater at AOC 23 is consistent with background concentrations. Thallium (up to 3.4 µg/L) was reported above the PSC (MCL of 2.4 µg/L) in three samples, but was below the background concentration of 16.15 µg/L). The following is more detailed information on the PSC exceedances, presented by EBS parcel.

- At EBS Parcel 110, arsenic was reported in a sample from boring A23SB13 at 6 to 11 feet bgs (22.6 µg/L) and boring A23B09 at 4 to 9 feet bgs (6.7 µg/L). Arsenic was also above the background concentration of 20.72 µg/L in one of these samples. Thallium was reported in samples from two borings: A23SB08 at 7 to 12 feet bgs and A23SB12 at 8 to 13 feet bgs (2.7 J µg/L and 3.2 µg/L, respectively). However, these thallium concentrations are both below the background concentration of 16.15 µg/L.
- At EBS Parcel 123, arsenic was reported in five groundwater samples, and thallium was present in one groundwater sample. Near former UST(R)-11, samples 123-0042 and 123-0043 were both from 4 to 8 feet bgs and had arsenic concentrations of 16 µg/L and 13.9 µg/L, respectively. Arsenic was also reported in samples from borings A23SB17 at 7 to 12 feet bgs, A23SB22 at 4 to 9 feet bgs, and A23SB25 at 5 to 10 feet bgs (10.5, 12.7, and 11.1 µg/L, respectively). However, these arsenic concentrations are below the background concentration (20.72 µg/L). Because of the proximity to Seaplane Lagoon, results from the southern portion of EBS Parcel 123 were also screened against surface water PSCs. The arsenic concentration reported in boring A23SB22 is above the aquatic criterion NRWQC HHCO (0.14 µg/L) for arsenic in surface water. Thallium was present in one groundwater sample (A23SB18) collected

within EBS Parcel 123 at 3 to 8 feet bgs (3.4 J µg/L) above the PSC (2.4 µg/L). However, this concentration is below the background concentration (16.15 µg/L).

- At EBS Parcel 124, arsenic was reported in two groundwater samples: one sample from 3 to 8 feet bgs at A23SB31 (11.9 µg/L), and one sample from 4 to 9 feet bgs at (19.3 µg/L). However, both of these concentrations are below the background concentration (20.72 µg/L).
- At EBS Parcel 125, arsenic was reported in a groundwater sample from location A23SB36 at 7 to 12 feet bgs (3.4 J µg/L). This concentration was below the PSC and below the background concentration (20.72 µg/L). Because of the proximity to Seaplane Lagoon results from the southern portion of EBS Parcel 125 were also screened against surface water PSCs. The reported arsenic concentration of 3.4 J µg/L was above the surface water PSC (NRWQC HHCO of 0.14 µg/L).

Seventeen metals were reported in groundwater at concentrations below PSCs in 46 samples. Additionally, four metals were identified as major risk contributors in groundwater (Section 6): cadmium, iron, manganese, and vanadium. The following is more detailed information on these metals, presented by EBS parcel.

- At EBS Parcel 71, manganese, iron, and vanadium were reported at concentrations above the background concentration of 1,741 µg/L in one groundwater sample (A23SB04). Manganese was reported at 2,550 µg/L, above the background concentration of 1,741 µg/L. Iron was reported at 6,900 µg/L, above the background concentration of 6,586 µg/L. Vanadium was reported at 31.4 J µg/L, above the background concentration of 26.27 µg/L. This sample was the only groundwater sample collected from AOC 23 with these metals at concentrations above background.
- At EBS Parcel 123, cadmium was reported in grab groundwater samples from three locations (123-0040, 123-0041, and 123-0043) near former UST(R)-11. These were the only groundwater samples with reported cadmium concentrations at AOC 23. The RI samples collected nearby did not have reported concentrations of cadmium.

Arsenic, iron, manganese, and vanadium in groundwater above background are believed to result from dissolution of naturally occurring metals in soil due to reducing conditions as described in Section 4.3.2 of the main RI/FS Report. The cause of the reducing conditions in groundwater is not known; however, it could be related to the low concentrations of TPH as diesel and BTEX reported in the groundwater at this location. It is also possible that reducing conditions are related to the presence of BSU sediment in the interval from which groundwater was collected. As discussed in Section 4.3.2.2 of the main RI/FS Report, the color of the BSU was logged as dark gray, suggesting a reduced form of iron.

Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for AOC 23. It discusses the conceptual model, the physical and chemical changes that might occur to contaminants present at AOC 23, and the mechanisms that could potentially transfer the contaminants from the study area. The conceptual site model facilitates understanding of the present conditions by integrating study area-specific physical characteristics with the nature and extent of contaminants in the physical systems. Section 5.2 includes an evaluation of the mobility and persistence of compounds above PSCs not attributable to background and of risk drivers at AOC 23. Section 5.3 discusses potential migration pathways.

5.1 CONCEPTUAL SITE MODEL

AOC 23 is located in the south-central portion of Transfer Parcel EDC-5, east of Saratoga Street. Topography is flat and the study area is mostly paved or covered by buildings. The northern portion of AOC 23 is over 1,000 feet from Seaplane Lagoon, and the southern portion is approximately 100 feet from Seaplane Lagoon.

Based on a review of boring logs for AOC 23, subsurface lithology consists of generally homogeneous coarse-grained material (poorly graded sand and some silty sand) in the upper 4 to 11 feet bgs. This is underlain by silty clay of the Young Bay Mud. Shallow groundwater of the first water-bearing zone beneath this study area occurs in the fill material; the underlying Young Bay Mud would be expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. The Marsh Crust was not encountered in the RI borings, although it may be present beneath the AOC. Groundwater flow direction is to the northeast in the northern portion of AOC 23 and to the southwest in the southern portion of the AOC. The average depth to water is approximately 6 feet bgs. Tidal influence is expected to be negligible beneath most of AOC 23, based on tidal studies performed at other Alameda Point sites. However, it is not known to what degree, if any, groundwater in the southern portion of AOC 23 near Seaplane Lagoon is influenced by tides.

Although it is unlikely that groundwater in the central region of Alameda Point would be used as drinking water, groundwater east of Saratoga Street is considered a potential drinking water source. However, TDS concentrations measured at AOC 23 during the RI and observations of low yield suggest that groundwater in this area may meet state exemption criteria for the municipal and domestic water supply designation.

VOCs (benzene and vinyl chloride), TPH (gasoline-, diesel-, and motor oil–ranges), B(a)P equivalent concentrations, a PCB (Aroclor 1260), and metals (arsenic, iron, thallium, and vanadium) were reported in soil at concentrations above PSCs at AOC 23. Benzene was also reported in a soil sample collected during a previous investigation, but the concentration was not verified during the RI, and the affected soil is believed to have been excavated during fuel pipeline removal activities performed for corrective action area CAA-B. Vinyl chloride in soil was reported in one sample and its extent appears limited. Motor oil–range TPH in soil was notably high in a near surface sample beneath Building 399, which borders corrective action area CAA-3A. Diesel-range and

gasoline-range TPH in soil was also reported above PSCs at a number of locations in AOC 23 without an apparent pattern, but at much lower concentrations than the motor oil–range TPH exceedance beneath Building 399. The extent of Aroclor 1260 above the PSC in one soil sample was defined.

VOCs (primarily vinyl chloride, but also benzene and 1,2-DCA), TPH (diesel- and motor oil–range), a PAH (B[a]P, considered an artifact of sampling due to likely turbidity), and metals (arsenic and thallium) were reported in groundwater at concentrations above PSCs at AOC 23. Vinyl chloride concentrations slightly above the PSC were reported in three samples around Building 13 and at an isolated location in the southern portion of the AOC. The vinyl chloride concentration in the southern portion of AOC 23 was also slightly above a surface water PSC (2.7 µg/L compared to the surface water PSC of 2.4 µg/L); however, it is unlikely that vinyl chloride would migrate 150 feet to Seaplane Lagoon and remain at concentrations above the surface water PSC given the inherent natural attenuation and volatilization factors. The extent of vinyl chloride in groundwater at AOC 23 is defined. TPH concentrations in groundwater were reported across the AOC without an apparent pattern to the distribution, and a PAH (B[a]P) was reported above the detection limit in one sample.

Additionally, the baseline HHRA (Section 6) identified several risk contributors (contributing more than 10^{-6} to cancer risk and 0.8 or more to noncancer hazard index [HI]) in soil and groundwater. The primary risk contributors in groundwater with concentrations below PSCs were TCE, PCE, naphthalene, benz(a)anthracene, benzo(b)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene, Aroclor 1016, cadmium, and manganese. The primary risk contributor in soil with concentrations below PSCs is Aroclor 1254. PAHs in soil were also identified as primary risk contributors; however, B(a)P equivalent concentrations above the PSC are addressed as part of the PAH Areas (Attachment W). Metals concentrations reported above PSCs in soil and groundwater at AOC 23 are considered naturally occurring. Metals identified as primary risk contributors in soil and groundwater at AOC 23 are also considered to be naturally occurring.

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in the environment tends to remain in place. The tendency toward immobility and persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Section 5 of the main RI/FS Report discusses the physical and chemical properties of contaminants, and their chemical class (e.g., VOCs), that affect their transport and persistence in the environment. Also discussed in Section 5 of the main RI/FS Report are mobility and persistence of naturally occurring metals. This section discusses the mobility and persistence of the compounds of concern reported at AOC 23: VOCs, PCBs, and TPH.

5.2.1 Volatile Organic Compounds

Both chlorinated and nonchlorinated VOCs were reported in soil and groundwater at AOC 23. Table 5-1 provides estimates of mobility and persistence for the different VOCs either reported above PSCs or identified as major risk contributors at AOC 23 (benzene, 1,2-DCA, naphthalene, TCE, PCE and vinyl chloride).

Chlorinated VOCs identified as contaminants at AOC 23 (vinyl chloride, PCE, and TCE) have low-to-moderate solubilities, high volatilities, low-to-moderate partition coefficients, high mobilities, and, except for vinyl chloride, product densities greater than water.

In general, chlorinated VOCs tend to adsorb weakly to clay-size particles and organics in soil, and under suitable conditions, they are relatively easily leached from soil into groundwater. In the subsurface, depending on conditions (the presence of nutrients, microorganisms, a reducing environment, etc.), chlorinated VOCs typically undergo reductive dechlorination (except vinyl chloride), a biological process that breaks down chlorinated ethenes under reducing conditions. Vinyl chloride is biodegraded in soil and groundwater under aerobic conditions. Some biodegradation of PCE and TCE may be taking place at AOC 23, as indicated by degradation products such as cis-1,2-DCE and vinyl chloride.

Benzene and naphthalene are volatile compounds that are typically present in fuels. The structure of naphthalene is like that of a PAH, but naphthalene behaves more like a VOC in the environment. Benzene is biodegraded under certain environmental conditions. Benzene degradation can occur both in the presence of oxygen (aerobic) and absence of oxygen (anaerobic). Under aerobic conditions, benzene has been shown to degrade at a relatively fast rate, while under anaerobic conditions the degradation occurs at a very slow rate (Alvarez et al. 1998). Similar to other VOCs, benzene tends to adsorb weakly to clay-size particles and organics in soil, and under suitable conditions, it can leach from soil into groundwater.

Naphthalene can be transported in air because of its lower molecular weight and high vapor pressure. The Henry's law constant for naphthalene indicates that it will partition primarily in the vapor phase and is capable of movement in the vadose zone by molecular diffusion. Naphthalene can also adsorb to soil. This process is controlled by organic carbon partition coefficient (K_{oc}) and fraction organic carbon. In soil and groundwater, microorganisms have the ability to break down naphthalene (ATSDR 1995), and biodegradation is the dominant fate process for naphthalene in aquatic systems. Half-lives reported for naphthalene range from 3 to 260 days in various water systems, with the fastest rates of biodegradation occurring in oil-polluted water and the slower rates in unpolluted waters. In general, biodegradation rates increase with naphthalene concentration (ATSDR 1995).

5.2.2 Polychlorinated Biphenyls

The most important property of PCBs in relation to mobility and persistence is their general inertness, as they resist both acids and alkalis and have thermal stability. PCBs have large molecular structures and typically bind to soil based on their size and physical

characteristics. PCBs have high K_{oc} values, causing them to be relatively immobile and resistant to transformation processes that can degrade some chemicals, thereby resulting in their persistence in soil. Table 5-1 provides estimates of mobility and persistence for Aroclors 1016, 1254, and 1260 reported at AOC 23. Only Aroclor 1260 was above the PSC in one soil sample at AOC 23. The low solubility and mobility exhibited by these compounds retard their migration to groundwater as indicated by the estimate that the Aroclors will remain sorbed to soil. Because of their low solubility and tendency to sorb to organic matter and clay-size particles in soil, PCBs are typically not found dissolved in groundwater.

Two mechanisms allow PCBs to change in the environment: degradation and weathering. Under normal conditions, PCBs degrade slowly in soil, with degradation occurring more rapidly in anaerobic systems than in aerobic systems. Aroclors are mixtures of PCB congeners whose names typically reflect the percent chlorine by weight of the mixture. Aroclor 1260 is 60 percent chlorine by weight, Aroclor 1254 is 54 percent chlorine by weight, and Aroclor 1016 (an exception to the naming convention) is 41.5 percent chlorine by weight. The more chlorinated mixtures are the most persistent and toxic. Individual congeners present in the Aroclor mixtures are subject to different rates of microbial degradation. Microbial degradation depends on the position of the chlorine atom on the biphenyl molecule and the degree of chlorination. Higher chlorinated congeners (those with five or more chlorine atoms) are more persistent in the environment and are not readily transformed by bacteria. Approximately 5 percent (by weight) for Aroclor 1016 to 99 percent (by weight) for Aroclor 1260 consists of congeners with five or more chlorine atoms (ATSDR 2000).

5.2.3 Total Petroleum Hydrocarbons

TPH is generally composed of a spectrum of hydrocarbon molecule sizes, from the short-chain volatiles (e.g., BTEX and naphthalene) to longer-chain hydrocarbons. TPH is subject to biodegradation in the subsurface, with constituents that comprise the lighter end of fuels (BTEX) being more readily biodegradable under aerobic conditions. These constituents also tend to be more volatile, more soluble, more mobile, and generally more toxic than the longer-chain hydrocarbons. Heavier fuels (motor oil, heavier end of diesel spectrum) do not typically have appreciable amounts of soluble constituents and tend to adsorb to soil particles or organic matter in the subsurface, thus being less mobile. Aging or weathering of TPH will remove the light-end hydrocarbons, including volatiles, first, similar to biodegradation.

In general, the impact of fuel to soil and groundwater is measured by the presence of the volatile components, such as BTEX, which have relatively low PSCs. The lack of appreciable fuel-related volatile constituents (e.g., BTEX) reported in soil and groundwater at AOC 23 (except for benzene concentrations above PSC in one soil and one groundwater sample) indicates that the TPH present in the subsurface at AOC 23 may have been subject to weathering and is not a significant source of soluble or volatile constituents to groundwater or air.

5.3 CONTAMINANT MIGRATION PATHWAYS

The migration pathways evaluated for relevance to AOC 23 include atmospheric transport (i.e., vapors and airborne fugitive dust), transport via surface water infiltration and runoff, and groundwater transport. Particulate transport by wind or surface water runoff is not a significant pathway, because most of the study area is paved or covered with buildings and landscaping. However, if the surface cover at the study area is disturbed or removed during and after redevelopment, particulate dispersion from soil is a possible transport pathway for nonvolatile compounds in surface soil.

The most likely migration pathways for contaminants in soil and groundwater at AOC 23 are the following.

- Vapor migration of volatile compounds from soil or groundwater is a potential transport mechanism at AOC 23.
- Transport due to groundwater flow is a potential mechanism. The more soluble compounds (e.g., VOCs) can migrate relatively close to the rate of groundwater flow in the subsurface. Diesel- and motor oil–range TPH and PCBs in groundwater would migrate very slowly; their rate of migration is slower than the flow of groundwater as both TPH and PCBs are more likely to be adsorbed to organic matter and soil particles than dissolved in groundwater. TPH has been reported in some soil and some groundwater samples above PSCs, but there is no apparent pattern to their occurrence and no obvious correlation between the reported concentrations in soil and groundwater. The same applies to PCBs, except PCBs were not reported in groundwater above PSCs.

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Section 6
HUMAN-HEALTH RISK ASSESSMENT

This section summarizes the baseline HHRA results for AOC 23. In the baseline HHRA, risk for a residential exposure scenario is assessed with the assumption that no remedial action would take place at the study area. Baseline risks were evaluated for reasonable maximum exposure (RME). This section also presents a qualitative uncertainty evaluation that identifies and characterizes the effects of uncertainties on the risk results.

The HHRA calculates total cumulative risk values and was conducted in accordance with guidelines published by the U.S. EPA in the Risk Assessment Guidance for Superfund Part A (U.S. EPA 1989), Part B (U.S. EPA 1991), and Part E (U.S. EPA 2004a) and supporting documents and guidelines published by Cal/EPA (1993, 1994, 1999, 2005). The approach used to calculate risk is described in Section 6 of the main RI/FS Report. HHRA information is provided in Appendix J.

Cancer risk and noncancer values for AOC 23 are shown in Table 6-1. Risk drivers for cancer and noncancer risk are presented in Table 6-2.

6.1 COPC IDENTIFICATION

The data selection and identification of COPCs are based on a compilation of all usable data for soil and groundwater. All chemicals reported in at least one sample collected during the RI and/or included in the historic data were included as HHRA COPCs. The HHRA included PAHs and metals in soil, except calcium, magnesium, potassium, and sodium, which are known to be required human trace nutrients. All metals were included in the list of HHRA COPCs regardless of whether the concentrations were above or below background.

The identification of HHRA COPCs in soil was based on the results from analyses of samples collected from 0 to 10 feet bgs or to groundwater if depth to groundwater is less than 10 feet.

There are 73 COPCs in soil at AOC 23: 32 VOCs based on 90 to 149 samples, 14 SVOCs based on 84 to 126 samples, 8 PCBs/pesticides based on 84 to 106 samples, and 19 metals based on 104 to 149 samples.

There are 57 COPCs in groundwater: 28 VOCs based on 36 to 60 samples except total xylenes based on 15 samples, 8 SVOCs based on 41 samples except 1,4-dioxane based on one sample, 2 PCBs based on 34 samples, and 19 metals based on 38 to 42 samples except molybdenum based on 4 samples.

Antimony, cadmium, selenium, and silver have concentrations in soil below background. Additional statistical tests found aluminum, arsenic, cadmium, chromium, manganese, and vanadium in soil to be below background (Appendix H). These metals each had maximum concentrations that were close to the 95th percentile and below the maximum in background. In groundwater, concentrations of aluminum, barium, copper, lead, and thallium are below background. Additional statistical analysis showed that concentrations of arsenic, chromium, manganese, and vanadium in soil and arsenic in groundwater are below background (Appendix H).

6.2 RISK CHARACTERIZATION

This section presents the results of the U.S. EPA and Cal/EPA cancer risk calculations, noncancer hazard values and the evaluation of lead. For cancer risk, specific exposure pathways are discussed in the following sections. Results are presented in terms of three exposure groups:

- **Exposure Group 1**. All soil and groundwater exposure pathways (includes residential use of groundwater)
- **Exposure Group 2**. Exposure pathways for soil and vapors from VOCs in groundwater (does not include residential use of groundwater)
- **Exposure Group 3**. Exposure pathways for residential use of groundwater

Two results are presented for each exposure group, the total risk and a second value that does not include risk associated with metals concentrations that are below Alameda Point background. For cancer risk, specific exposure pathways are also discussed.

6.2.1 Cancer Risk

The total U.S. EPA and Cal/EPA RME cancer risks (including background) at AOC 23 are 2×10^{-2} and 3×10^{-2}, respectively. The total RME cancer risks rank-ordered by exposure pathway for U.S. EPA and Cal/EPA, respectively, are as follows:

- residential use of groundwater (2×10^{-2} and 3×10^{-2})
- direct contact with soil (1×10^{-5} and 8×10^{-5})
- ingestion of homegrown produce (2×10^{-5} and 7×10^{-5})
- inhalation of vapors in indoor air (4×10^{-6} and 1×10^{-5})
- inhalation of particulates and vapors in outdoor air (4×10^{-7} and 9×10^{-7})

For residential use of groundwater, the cancer risks are above the risk management range. In descending order, the risk drivers in groundwater are as follows:

- PAHs based on one or two reported values in 41 samples. The PAHs belong to a higher-molecular-weight group; these chemicals are rarely found in groundwater because they are immobilized in soil. This suggests that these reported values are anomalous, likely due to suspended soil in the sample.
- PCBs (Aroclor 1260 and Aroclor 1016) each reported once in 34 samples. PCBs are also rarely found in groundwater because these chemicals are immobilized in soil. This suggests that these reported values are anomalous, likely due to suspended soil in the sample.
- VOCs reported with varying frequency in the groundwater samples.

For current and reasonable future use exposure pathways via soil and vapors from groundwater to indoor air and without metals below background, the cancer risk drivers, in descending order, are as follows.

- PCBs in soil (Aroclor 1254 and Aroclor 1260) were reported in 2 and 8 of 106 samples, respectively, and the cancer risk above 10^{-6} is associated with ingestion of homegrown produce.
- Carbazole, an SVOC, was only reported in 1 of 84 soil samples.
- PAHs in soil have a risk of less than 1×10^{-5}, which is within the risk management range set for PAHs at Alameda Point.
- VOCs, including TCE and vinyl chloride, were reported in groundwater.

Without PAHs or metals below background, the U.S. EPA and Cal/EPA cancer risks are 1×10^{-5} and 3×10^{-5}, largely associated with homegrown produce.

6.2.2 Noncancer Hazard

For residential use of groundwater, the noncancer HI value at AOC 23 is 405, due to PCBs in one sample. The HI is 3 for current and reasonable future use pathways. Without iron and the metals below background (arsenic and cadmium), the cumulative HI is 1.

The maximum concentration of lead in soil of 135 mg/kg is below the generic lead PRG of 150 mg/kg as well as the site-specific PRGs of 184 mg/kg including ingestion of homegrown produce and 322 mg/kg without ingestion of homegrown produce. The maximum concentration of lead in groundwater of 1.2 µg/L is below the background concentration of 11.45 µg/L.

6.3 UNCERTAINTY ANALYSIS

The data are considered adequate for this approximately 15.2-acre site, with 84 to 149 soil samples and 34 to 60 groundwater samples for most COPCs.

6.4 CONCLUSIONS

For AOC 23, the U.S. EPA and Cal/EPA total cancer risks including metals below background are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 2×10^{-2} and 3×10^{-2}, respectively

  Without metals below background: 2×10^{-2} and 3×10^{-2}, respectively

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 3×10^{-5} and 2×10^{-4}, respectively

  Without metals below background: 2×10^{-5} and 5×10^{-5}, respectively

  Without metals below background and PAHs in soil: 1×10^{-5} and 3×10^{-5}, respectively

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 2×10^{-2} and 3×10^{-2}, respectively

  Without metals below background: 2×10^{-2} and 3×10^{-2}, respectively

The noncancer hazard values including metals below background are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 408

  Without metals below background: 401

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 3

  Without metals below background: 2

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 405

  Without metals below background: 399

The risk drivers are PCBs and PAHs in one sample of groundwater. The hazard values without metals below background are due to PCBs in one groundwater sample.

For current and reasonable future use (Exposure Group 2), the noncancer hazard value without iron is 1.

The maximum concentration of lead in soil of 135 mg/kg is below the site-specific PRGs of 184 and 322 mg/kg with and without homegrown produce, respectively.

Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at AOC 23. Included are summaries of the nature and extent of contamination and results of the baseline HHRA. Results form the basis of responses to the data quality objective (DQO) decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendation presented below.

7.1 SUMMARY

AOC 23 was established to address soil and groundwater contaminants in areas previously used for chemical storage or handling at eight EBS parcels (EBS Parcels 71, 72, 110, 121, 123, 124, 125, and 126). Additionally, the regulatory agencies requested further evaluation of NAS GAPs 15 and 29 and NADEP GAP 43, OWS 067, UST(R)-11, and SWMU AOC 098.

Previous investigations did not assess (or completely assess) whether possible releases from historical activities had impacted soil or groundwater at the following:

- EBS Parcel 71 (specifically, historical activities in the washdown area; in addition this parcel needed delineation of iron and PAH contamination in soil in the central portion and delineation of VOC contamination in groundwater in the southern portion)
- EBS Parcel 72 (specifically, whether groundwater contaminated with VOCs at adjacent IR Site 6 had impacted AOC 23 groundwater)
- EBS Parcel 110 (specifically, possible releases from Building 271, the former industrial waste pump station, and the storage yard areas in the southwestern portion)
- EBS Parcel 121
- EBS Parcel 123 (specifically, historical activities at Building 98, Building 263, OWS 067, NAS GAP 15, NAS GAP 29, SWMU AOC 98, UST(R)-11, and stained areas between Buildings 67 and 393)
- EBS Parcel 124
- EBS Parcel 125 (specifically, Building 66 and NADEP GAP 43)
- EBS Parcel 126

Benzene, 1,2-DCA, and vinyl chloride were the only VOCs reported in soil or groundwater above PSCs. Vinyl chloride was the most frequently reported VOC. Vinyl chloride was reported above the PSC in one soil sample in EBS Parcel 123, located southeast of Building 13 and southwest of Building 98. Vinyl chloride was either not reported or was below the PSC in shallower soil samples from the same boring. The lateral extent of vinyl chloride in soil appears to be limited, since it was not reported above detection limits in other soil samples analyzed for VOCs beneath and around adjacent Buildings 13 and 98. Except for one sample, vinyl chloride concentrations in groundwater reported above the PSC (MCL of 0.5 µg/L) were in the same area (around Building 13) and are laterally defined. The highest reported groundwater concentration

of vinyl chloride at AOC 23 was 2.8 µg/L from a grab sample. One location with vinyl chloride above the PSC was in the southern portion of AOC 23, southwest of Building 66. IR Site 21 is south of this location, and it is not clear whether this concentration is associated with IR Site 21. The interpreted extent of VOCs in groundwater associated with IR Site 21, as presented in recent Alameda Point basewide groundwater monitoring reports, does not extend north to AOC 23. The concentration of vinyl chloride in the southern area was slightly above a surface water PSC, but it is considered unlikely that migration of this concentration approximately 150 feet would result in an exceedance in Seaplane Lagoon.

Benzene was reported in one grab groundwater sample at 1.1 µg/L, slightly above the PSC (MCL of 1 µg/L). Two concentrations of 1,2,-DCA in groundwater were reported in the southeastern portion of AOC 23, and are likely associated with the adjacent CAA-3A.

RI sampling did not confirm a previous concentration of benzene (27,000 µg/kg) reported in an EBS sample from 7.5 to 8.5 feet bgs in EBS Parcel 71. This concentration was above the residential soil PRG of 640 µg/kg. Benzene was reported below laboratory detection limits in all soil and groundwater samples from the RI borings. It appears that the previously reported benzene in soil at this location is no longer present. This sampling location is within CAA-B, and soil associated with this sample was probably removed as part of subsequent pipeline removal activities. This is supported by observations of gravelly fill soil in this boring. In addition, field observations did not indicate hydrocarbon impact of the pipeline backfill during RI drilling.

Diesel-, motor oil–, and some gasoline-range TPH was reported in soil and groundwater samples across AOC 23 at concentrations above PSCs (TPH ESLs). There was no apparent pattern to the distribution of TPH. Most notably, motor oil–range TPH was reported in a soil sample at 27,000 µg/kg, in the upper 0.5 foot bgs beneath Building 399 in EBS Parcel 126. Diesel-range TPH was also reported in this sample at 1,900 µg/kg. Building 399 borders CAA-3A, located immediately east of AOC 23. Reported concentrations of TPH in groundwater above PSCs ranged from 110 J to 940 J µg/L (diesel-range TPH).

Pesticides were not reported in soil above PSCs and were not reported in groundwater above laboratory detection limits.

Aroclor 1260 was the only PCB reported above the PSC in 1 of 134 samples. Aroclor 1260 was reported at 500 J µg/kg in soil sample 123-0022 collected at 0 to 0.5 foot bgs. This is above the residential PRG of 220 µg/kg. However, Aroclor 1260 was reported at 5 µg/kg in duplicate sample 123-044. Samples from previous investigations and the RI defined this possible exceedance both laterally and vertically. PCBs (Aroclors 1016 and 1260) were reported in one groundwater sample below PSCs (MCLs), but the HHRA identified these detections as primary risk drivers. These concentrations are likely an artifact of sampling (associated with suspended material due to turbidity) rather than representing dissolved concentrations. Because of the low solubility and tendency to sorb to organic matter and clay-size particles in soil, these PCBs are typically not found dissolved in groundwater.

B(a)P was reported in one of 45 groundwater samples above the PSC (MCL of 0.2 µg/L), and is likely an artifact of sampling (associated with suspended material due to turbidity) rather than representing dissolved concentrations. Because of low solubility and tendency to sorb to organic matter in soil, B(a)P would not be expected to be dissolved in groundwater. The B(a)P equivalent concentrations in soil above the PSC were incorporated into the PAH Areas (Attachment W).

Concentrations of arsenic, iron, thallium, and vanadium were present at concentrations above PSCs in soil; however, only the iron and thallium concentrations were also above background. Iron is not believed to be associated with Navy activities, based on the evaluation in Section 4.3 of the main RI/FS Report. Only one thallium concentration (6.4 mg/kg) reported in soil was slightly above the PSC (PRG of 5.2 mg/kg).

Four possible outliers at AOC 23 identified in Section 4.3.1.2 of the main RI/FS Report are as follows: aluminum at 29,500 mg/kg in a sample collected at A23SB19, arsenic at 12.2 mg/kg in a sample collected at A23SB15, iron at 46,300 mg/kg from sample 126-0009, and arsenic at 14.2 mg/kg from sample 123-0022.

Thallium and arsenic in groundwater were above PSCs but below background except for one arsenic sample slightly above background. Iron, manganese, and vanadium were also present in groundwater and are risk drivers. The concentrations of arsenic, iron, manganese, and vanadium in groundwater are believed to result from dissolution of metals into groundwater due to reducing conditions. No site-related source of organic material that could have caused the reducing conditions was identified in soil or groundwater. One potential non-site-related source might be the presence of BSU sediment in the interval from which groundwater was collected, as discussed in Section 4.3.2.2 of the main RI/FS Report.

TDS measurement from 38 groundwater samples collected during the RI at AOC 23 ranged from 371 to 21,900 mg/L, and the average TDS concentration was 3,638 mg/L. Yield at six borings was low, based on observations of very slow groundwater recharge during sampling. Groundwater yield was not quantified during sampling; however, yield was low enough that it was difficult to collect enough water for sample analysis. Some samples were collected on a second day due to low yield. However, samples for VOC analysis were taken on the first day.

Results of the baseline HHRA show U.S. EPA and Cal/EPA cancer risks for Exposure Group 1 without metals below background were 2×10^{-2} and 3×10^{-2}, respectively, with an HI of 401. The cancer risk above 10^{-4} is due to PAHs in 2 of 45 samples and PCBs in 1 of 37 samples. The HI is largely due to a single detection of Aroclor 1260 in groundwater at a concentration below the MCL; Aroclor 1016 also contributed to the HI (4), but to a much lesser extent. These PCBs are likely an artifact of sampling (associated with suspended material due to turbidity) rather than representing dissolved concentrations. Because of their low solubility and tendency to sorb to organic matter in soil, PCBs not typically found dissolved in groundwater.

Without metals below background, PAHs in soil and groundwater, and PCBs in groundwater, the U.S. EPA and Cal/EPA risks are 1×10^{-5} and 3×10^{-5}, respectively, with an HI of 2. The HI above 1 is mostly due to iron in soil (0.8) and PCBs.

7.2 AOC 23 CONCLUSIONS AND RECOMMENDATIONS

The RI was conducted using the seven-step DQO process (U.S. EPA 2000); DQOs were developed for AOC 23 in the Work Plan (BEI 2006). The RI has addressed these DQOs, as summarized in Table 7-1.

The data collected during previous investigations and the RI adequately defined the nature and extent of contamination, and were sufficient to perform a baseline HHRA and to support decisions on the necessity for remedial action at AOC 23.

The recommendations for AOC 23 are as follows.

- An FS is recommended for vinyl chloride in groundwater at AOC 23. While contribution to cancer risk is within the risk management range of 10^{-6} to 10^{-4}, reported concentrations from grab groundwater samples were above the MCL around Building 13 and at one location south of Building 66. AOC 23 is located east of Saratoga Street, and groundwater beneath this area is considered a potential drinking water source. The reported concentration of vinyl chloride south of Building 66 is also above the surface water PSC; however, it is unlikely that vinyl chloride (reported at 2.7 µg/L) would migrate approximately 150 feet in groundwater and result in a surface water concentration above the PSC of 2.4 µg/L.

  The FS alternatives would also address the exceedance of vinyl chloride in soil reported just above the water table at one location in the same area (southeast of Building 13). Initial studies are also recommended for inclusion in the FS alternatives to verify that vinyl chloride concentrations are above MCLs (because concentrations in a well sample are often lower than in a grab sample).

- It is recommended that TPH results at AOC 23 be reviewed under the TPH Program to determine whether the San Francisco Bay Regional Water Quality Control Board's criteria for closure of low-risk fuel sites are met, or whether areas at AOC 23 should be incorporated into corrective action areas. TPH concentrations were reported in soil and groundwater at AOC 23, most notably in the upper foot of soil at one location beneath Building 399. This building is adjacent to CAA-3A.

- No further action is recommended for benzene and 1,2-DCA reported in groundwater above PSCs (MCLs). Benzene was reported in one grab groundwater sample at 1.1 µg/L, slightly above the PSC (MCL of 1 µg/L). Two concentrations of 1,2,-DCA in groundwater were reported in the eastern portion of AOC 23, and are likely associated with the adjacent IR Site 3 and CAA-3A.

- No further action is recommended for PCBs and PAHs in groundwater. PCBs and PAHs reported in three groundwater samples are the primary risk drivers at AOC 23, and are likely an artifact of sampling (associated with suspended material due to turbidity) rather than representing dissolved concentrations. Because of low solubility and tendency to sorb to organic matter and clay-size

particles in soil, PCBs and the heavier-molecular-weight PAHs are rarely found dissolved in groundwater.

Reported concentrations of PAHs and PCBs in groundwater were limited in extent. Aroclors 1260 and 1016 were reported only once in the same grab groundwater sample at concentrations below PSCs (MCLs). The PAHs benz(a)-anthracene, benzo(b)fluoranthene, B(a)P, chrysene, and indeno(1,2,3-cd)pyrene were reported in the same grab groundwater sample located within the fuel line removal area for CAA-B; fuel line removal activities were performed subsequent to the sampling. Benz(a)anthracene was also reported in another grab groundwater sample. Of these PAHs, only B(a)P has an MCL; the reported concentration of 3 J µg/L was above the MCL of 0.2 µg/L.

- No further action is recommended for benzene in soil. This sampling location is within CAA-B, and soil associated with this sample likely was removed as part of subsequent pipeline removal activities.
- No further action is recommended for PCBs in soil. The risk contributed by PCBs in soil is within the risk management range of 10^{-6} to 10^{-4}, and contribution to the HI is less than 1.
- No further action is recommended for metals in soil or groundwater. Metals concentrations above background that contribute to HI values above 1 are largely due to iron in soil and iron, manganese, and vanadium in groundwater. These metals have an HQ of 1 or less, and their health effects are not considered additive with other chemicals. In groundwater, these metals are believed to result from dissolution of the metals in soil due to reducing conditions.
- PAHs in soil are addressed as part of the PAH Areas (Attachment W).

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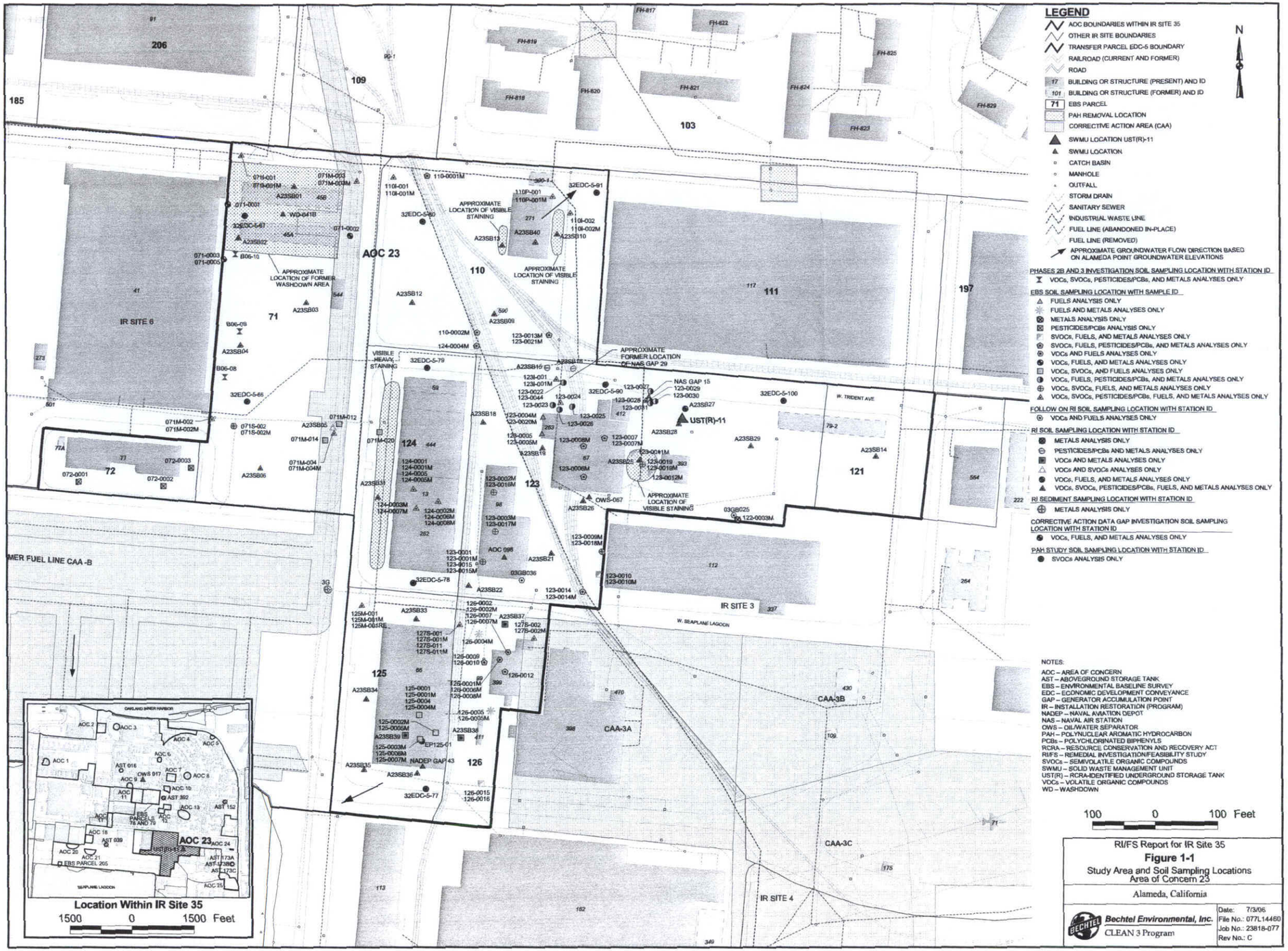
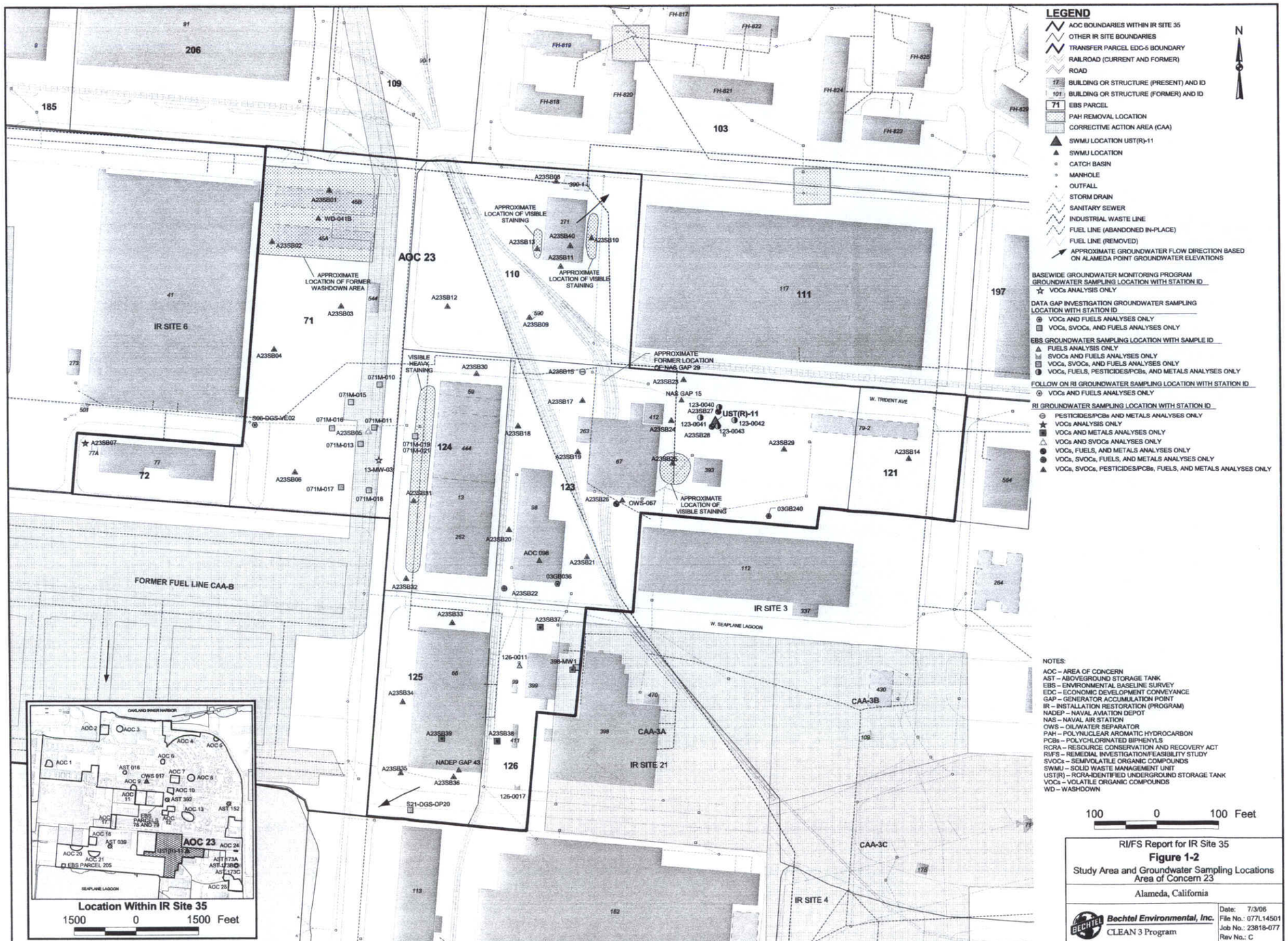
FIGURES


AOC 23
IR SITE 6
IR SITE 3
IR SITE 4
UST(R)-11
APPROXIMATE LOCATION OF VISIBLE STAINING
APPROXIMATE LOCATION OF FORMER WASHDOWN AREA
APPROXIMATE FORMER LOCATION OF NAS GAP 29
APPROXIMATE LOCATION OF VISIBLE STAINING
VISIBLE HEAVY STAINING
APPROXIMATE LOCATION OF VISIBLE STAINING
NAS GAP 15
NADEP GAP 43
EP125-01
OWS-067
AOC 098
CAA-3A
CAA-3B
CAA-3C
W. TRIDENT AVE
W. SEAPLANE LAGOON
MER FUEL LINE CAA -B
OAKLAND INNER HARBOR
SEAPLANE LAGOON
EBS PARCEL 205
EBS PARCELS 78 AND 79
Location Within IR Site 35
1500 0 1500 Feet
LEGEND
AOC BOUNDARIES WITHIN IR SITE 35
OTHER IR SITE BOUNDARIES
TRANSFER PARCEL EDC-5 BOUNDARY
RAILROAD (CURRENT AND FORMER)
ROAD
BUILDING OR STRUCTURE (PRESENT) AND ID
BUILDING OR STRUCTURE (FORMER) AND ID
EBS PARCEL
PAH REMOVAL LOCATION
CORRECTIVE ACTION AREA (CAA)
SWMU LOCATION UST(R)-11
SWMU LOCATION
CATCH BASIN
MANHOLE
OUTFALL
STORM DRAIN
SANITARY SEWER
INDUSTRIAL WASTE LINE
FUEL LINE (ABANDONED IN-PLACE)
FUEL LINE (REMOVED)
APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
PHASES 2B AND 3 INVESTIGATION SOIL SAMPLING LOCATION WITH STATION ID
VOCs, SVOCs, PESTICIDES/PCBs, AND METALS ANALYSES ONLY
EBS SOIL SAMPLING LOCATION WITH SAMPLE ID
FUELS ANALYSIS ONLY
FUELS AND METALS ANALYSES ONLY
METALS ANALYSIS ONLY
PESTICIDES/PCBs ANALYSIS ONLY
SVOCs, FUELS, AND METALS ANALYSES ONLY
SVOCs, FUELS, PESTICIDES/PCBs, AND METALS ANALYSES ONLY
VOCs AND FUELS ANALYSES ONLY
VOCs, FUELS, AND METALS ANALYSES ONLY
VOCs, SVOCs, AND FUELS ANALYSES ONLY
VOCs, FUELS, PESTICIDES/PCBs, AND METALS ANALYSES ONLY
VOCs, SVOCs, FUELS, AND METALS ANALYSES ONLY
VOCs, SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY
FOLLOW ON RI SOIL SAMPLING LOCATION WITH STATION ID
VOCs AND FUELS ANALYSES ONLY
RI SOIL SAMPLING LOCATION WITH STATION ID
METALS ANALYSIS ONLY
PESTICIDES/PCBs AND METALS ANALYSES ONLY
VOCs AND METALS ANALYSES ONLY
VOCs AND SVOCs ANALYSES ONLY
VOCs, FUELS, AND METALS ANALYSES ONLY
VOCs, SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY
RI SEDIMENT SAMPLING LOCATION WITH STATION ID
METALS ANALYSIS ONLY
CORRECTIVE ACTION DATA GAP INVESTIGATION SOIL SAMPLING LOCATION WITH STATION ID
VOCs, FUELS, AND METALS ANALYSES ONLY
PAH STUDY SOIL SAMPLING LOCATION WITH STATION ID
SVOCs ANALYSIS ONLY
N
NOTES:
AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
NADEP – NAVAL AVIATION DEPOT
NAS – NAVAL AIR STATION
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOCs – VOLATILE ORGANIC COMPOUNDS
WD – WASHDOWN
100 0 100 Feet
RI/FS Report for IR Site 35
Figure 1-1
Study Area and Soil Sampling Locations
Area of Concern 23
Alameda, California
Bechtel Environmental, Inc.
CLEAN 3 Program
Date: 7/3/06
File No.: 077L14460
Job No.: 23818-077
Rev No.: C



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- CORRECTIVE ACTION AREA (CAA)
- SWMU LOCATION UST(R)-11
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- OUTFALL
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- FUEL LINE (ABANDONED IN-PLACE)
- FUEL LINE (REMOVED)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

N

BASEWIDE GROUNDWATER MONITORING PROGRAM GROUNDWATER SAMPLING LOCATION WITH STATION ID
- ☆ VOCs ANALYSIS ONLY

DATA GAP INVESTIGATION GROUNDWATER SAMPLING LOCATION WITH STATION ID
- ⊙ VOCs AND FUELS ANALYSES ONLY
- ▨ VOCs, SVOCs, AND FUELS ANALYSES ONLY

EBS GROUNDWATER SAMPLING LOCATION WITH SAMPLE ID
- △ FUELS ANALYSIS ONLY
- ▤ SVOCs AND FUELS ANALYSES ONLY
- ▨ VOCs, SVOCs, AND FUELS ANALYSES ONLY
- ◑ VOCs, FUELS, PESTICIDES/PCBs, AND METALS ANALYSES ONLY

FOLLOW ON RI GROUNDWATER SAMPLING LOCATION WITH STATION ID
- ⊙ VOCs AND FUELS ANALYSES ONLY

RI GROUNDWATER SAMPLING LOCATION WITH STATION ID
- ⊖ PESTICIDES/PCBs AND METALS ANALYSES ONLY
- ★ VOCs ANALYSIS ONLY
- ▩ VOCs AND METALS ANALYSES ONLY
- △ VOCs AND SVOCs ANALYSES ONLY
- ● VOCs, FUELS, AND METALS ANALYSES ONLY
- ◉ VOCs, SVOCs, FUELS, AND METALS ANALYSES ONLY
- ▲ VOCs, SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY

NOTES:
AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
NADEP – NAVAL AVIATION DEPOT
NAS – NAVAL AIR STATION
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOCs – VOLATILE ORGANIC COMPOUNDS
WD – WASHDOWN

100 0 100 Feet

RI/FS Report for IR Site 35

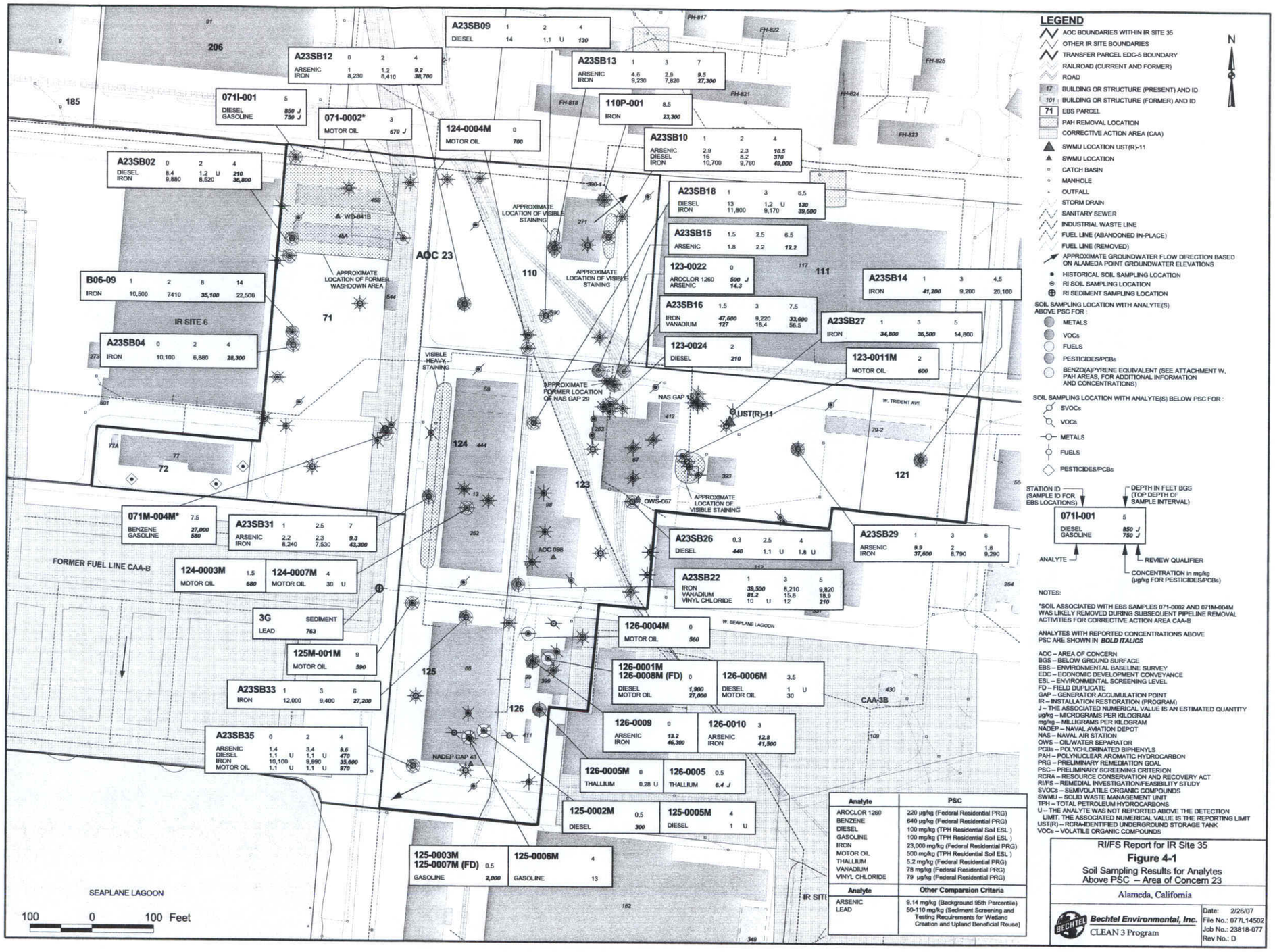
Figure 1-2

Study Area and Groundwater Sampling Locations
Area of Concern 23

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 7/3/06
File No.: 077L14501
Job No.: 23818-077
Rev No.: C



NOTES:

*SOIL ASSOCIATED WITH EBS SAMPLES 071-0002 AND 071M-004M WAS LIKELY REMOVED DURING SUBSEQUENT PIPELINE REMOVAL ACTIVITIES FOR CORRECTIVE ACTION AREA CAA-B

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
ESL – ENVIRONMENTAL SCREENING LEVEL
FD – FIELD DUPLICATE
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
µg/kg – MICROGRAMS PER KILOGRAM
mg/kg – MILLIGRAMS PER KILOGRAM
NADEP – NAVAL AVIATION DEPOT
NAS – NAVAL AIR STATION
OWS – OILWATER SEPARATOR
PCBs – POLYCHLORINATED BIPHENYLS
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PRG – PRELIMINARY REMEDIATION GOAL
PSC – PRELIMINARY SCREENING CRITERION
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
SWMU – SOLID WASTE MANAGEMENT UNIT
TPH – TOTAL PETROLEUM HYDROCARBONS
U – THE ANALYTE WAS NOT REPORTED ABOVE THE DETECTION LIMIT. THE ASSOCIATED NUMERICAL VALUE IS THE REPORTING LIMIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOCs – VOLATILE ORGANIC COMPOUNDS

RI/FS Report for IR Site 35

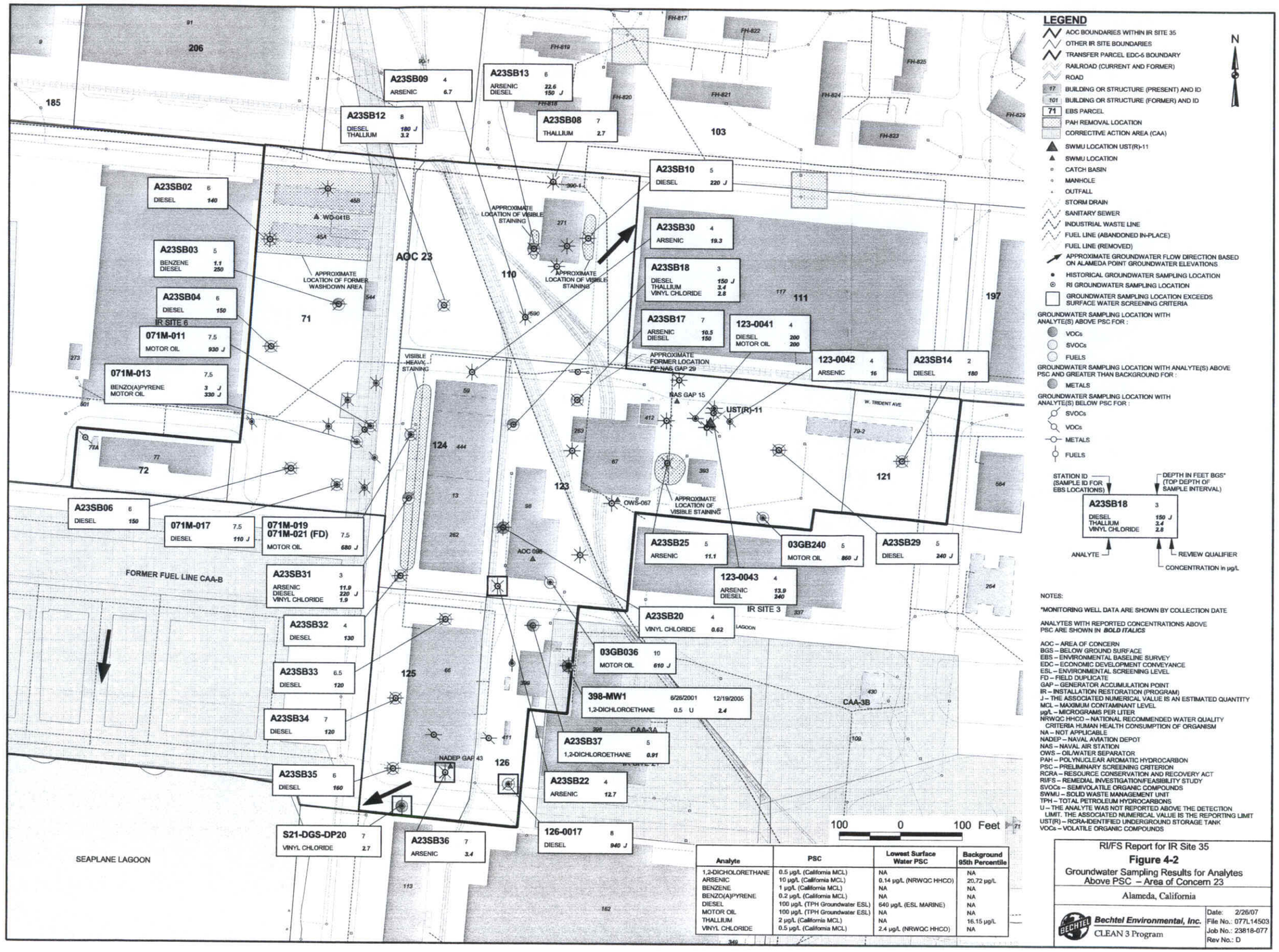
Figure 4-1

Soil Sampling Results for Analytes Above PSC – Area of Concern 23

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/26/07
File No.: 077L14502
Job No.: 23818-077
Rev No.: D



Analyte	PSC	Lowest Surface Water PSC	Background 95th Percentile
1,2-DICHLORETHANE	0.5 µg/L (California MCL)	NA	NA
ARSENIC	10 µg/L (California MCL)	0.14 µg/L (NRWQC HHCO)	20.72 µg/L
BENZENE	1 µg/L (California MCL)	NA	NA
BENZO(A)PYRENE	0.2 µg/L (California MCL)	NA	NA
DIESEL	100 µg/L (TPH Groundwater ESL)	640 µg/L (ESL MARINE)	NA
MOTOR OIL	100 µg/L (TPH Groundwater ESL)	NA	NA
THALLIUM	2 µg/L (California MCL)	NA	16.15 µg/L
VINYL CHLORIDE	0.5 µg/L (California MCL)	2.4 µg/L (NRWQC HHCO)	NA

NOTES:

*MONITORING WELL DATA ARE SHOWN BY COLLECTION DATE

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
ESL – ENVIRONMENTAL SCREENING LEVEL
FD – FIELD DUPLICATE
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
MCL – MAXIMUM CONTAMINANT LEVEL
µg/L – MICROGRAMS PER LITER
NRWQC HHCO – NATIONAL RECOMMENDED WATER QUALITY CRITERIA HUMAN HEALTH CONSUMPTION OF ORGANISM
NA – NOT APPLICABLE
NADEP – NAVAL AVIATION DEPOT
NAS – NAVAL AIR STATION
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PSC – PRELIMINARY SCREENING CRITERION
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
SWMU – SOLID WASTE MANAGEMENT UNIT
TPH – TOTAL PETROLEUM HYDROCARBONS
U – THE ANALYTE WAS NOT REPORTED ABOVE THE DETECTION LIMIT. THE ASSOCIATED NUMERICAL VALUE IS THE REPORTING LIMIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOCs – VOLATILE ORGANIC COMPOUNDS

RI/FS Report for IR Site 35

Figure 4-2

Groundwater Sampling Results for Analytes Above PSC – Area of Concern 23

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/26/07
File No.: 077L14503
Job No.: 23818-077
Rev No.: D

TABLES

Table 3-1
Sample Analysis Summary, AOC 23

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE							
				VOCs	SVOCs	TPH	Pest/PCBs	Herbicides	Metals	Organotins	TDS
Soil											
32EDC-5-100	C032CB94	PAH Study	0–0.5		X						
32EDC-5-100	C032CB95	PAH Study	0.5–2		X						
32EDC-5-100	C032CB96	PAH Study	2–4		X						
32EDC-5-100	C032CB97	PAH Study	4–8		X						
32EDC-5-100	C032CB98 (FD)	PAH Study	4–8		X						
32EDC-5-66	C032CA45	PAH Study	0–0.5		X						
32EDC-5-66	C032CA46	PAH Study	0.5–2		X						
32EDC-5-66	C032CA47	PAH Study	2–4		X						
32EDC-5-66	C032CA48	PAH Study	4–8		X						
32EDC-5-67	C032CA49	PAH Study	0–0.5		X						
32EDC-5-67	C032CA50	PAH Study	0.5–2		X						
32EDC-5-67	C032CA51	PAH Study	2–4		X						
32EDC-5-67	C032CA52	PAH Study	4–8		X						
32EDC-5-77	C032CA93	PAH Study	0–0.5		X						
32EDC-5-77	C032CA94	PAH Study	0.5–2		X						
32EDC-5-77	C032CA95	PAH Study	2–4		X						
32EDC-5-77	C032CA96	PAH Study	4–8		X						
32EDC-5-78	C032CA97	PAH Study	0–0.5		X						
32EDC-5-78	C032CA98	PAH Study	0.5–2		X						
32EDC-5-78	C032CA99 (FD)	PAH Study	0.5–2		X						
32EDC-5-78	C032CA00	PAH Study	2–4		X						
32EDC-5-78	C032CB01	PAH Study	4–8		X						
32EDC-5-79	C032CB02	PAH Study	0–0.5		X						
32EDC-5-79	C032CB03	PAH Study	0.5–2		X						
32EDC-5-79	C032CB04	PAH Study	2–4		X						
32EDC-5-79	C032CB05	PAH Study	4–8		X						
32EDC-5-80	C032CB06	PAH Study	0–0.5		X						
32EDC-5-80	C032CB07	PAH Study	0.5–2		X						
32EDC-5-80	C032CB08	PAH Study	2–4		X						
32EDC-5-80	C032CB09	PAH Study	4–8		X						

Table 3-1
Sample Analysis Summary, AOC 23

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE							
				VOCs	SVOCs	TPH	Pest/PCBs	Herbicides	Metals	Organotins	TDS
32EDC-5-80	C032CB10 (FD)	PAH Study	4–8		X						
32EDC-5-90	C032CB50	PAH Study	0–0.5		X						
32EDC-5-90	C032CB51	PAH Study	0.5–2		X						
32EDC-5-90	C032CB52	PAH Study	2–4		X						
32EDC-5-90	C032CB53	PAH Study	4–8		X						
32EDC-5-90	C032CB54 (FD)	PAH Study	4–8		X						
32EDC-5-91	C032CB55	PAH Study	0–0.5		X						
32EDC-5-91	C032CB56	PAH Study	0.5–2		X						
32EDC-5-91	C032CB57	PAH Study	2–4		X						
32EDC-5-91	C032CB58	PAH Study	4–8		X						
071-001-001	071-0001	EBS	3–3.5	X		X[a]			X		
071-001-002	071-0002	EBS	3–3.5	X		X[a]			X		
071-001-003	071-0003	EBS	3–3.5	X		X[a]			X		
071-001-003	071-0005 (FD)	EBS	3–3.5	X		X[a]			X		
071-IW-001	071I-001[b]	EBS	5–9	X	X	X[a]	X	X	X	X	
071-IW-001	071I-001M[b]	EBS	8.5–9	X					X		
071-SN-002	071S-002[b]	EBS	4–4.5	X	X						
071-SN-002	071S-002M[b]	EBS	4–4.5	X		X[b]			X		
071-SS-002	071M-002[b]	EBS	6.5–7	X	X		X			X	
071-SS-002	071M-002M[b]	EBS	6.5–7	X		X[b]			X		
071-SS-003	071M-003[b]	EBS	7.5–8	X	X		X			X	
071-SS-003	071M-003M[b]	EBS	7.5–8	X		X[b]			X		
071-SS-004	071M-004[b]	EBS	7.5–8.5	X	X		X			X	
071-SS-004	071M-004M[b]	EBS	7.5–8.5	X		X[b]			X		
071-SS-008	071M-012	EBS	3.5–4.5	X	X	X[a]					
071-SS-009	071M-014	EBS	3–4	X	X	X[a]					
071-SS-014	071M-020	EBS	4.5–5.5	X	X	X[a]					
072-001-001	072-0001	EBS	0.5–1				X				
072-001-002	072-0002	EBS	0.5–1				X				
072-001-003	072-0003	EBS	3–3.5				X				
110-IW-001	110I-001[b]	EBS	8.5–9	X	X	X[a]	X	X	X	X	

Table 3-1
Sample Analysis Summary, AOC 23

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE							
				VOCs	SVOCs	TPH	Pest/PCBs	Herbicides	Metals	Organotins	TDS
110-IW-001	110I-001M[b]	EBS	8.5–9	X					X		
110-IW-002	110I-002[b]	EBS	5–5.5	X	X	X[a]	X	X	X	X	
110-IW-002	110I-002M[b]	EBS	5–5.5	X					X		
110-IWPS5-001	110P-001[b]	EBS	8.5–9	X	X	X[a]	X	X	X	X	
110-IWPS5-001	110P-001M[b]	EBS	8.5–9	X					X		
110-Z17-001	110-0001M	EBS	1–1.5		X	X[a]	X		X		
110-Z17-002	110-0002M	EBS	2–2.5		X	X[a]	X		X		
122-002-003	122-0003M	EBS	1–1.5						X		
123-001-001	123-0001[b]	EBS	1–1.5	X	X	X[a]			X		
123-001-001	123-0001M[b]	EBS	1–1.5		X	X[a]			X		
123-001-001	123-0015[b]	EBS	4–4.5	X	X	X[a]			X		
123-001-001	123-0015M[b]	EBS	4–4.5	X	X	X[a]			X		
123-001-002	123-0002M	EBS	1–1.5		X	X[a]			X		
123-001-002	123-0016M	EBS	3.5–4	X	X	X[a]			X		
123-001-003	123-0003M	EBS	1–1.5		X	X[a]			X		
123-001-003	123-0017M	EBS	4–4.5	X	X	X[a]			X		
123-002-004	123-0004M	EBS	1–1.5			X[a]					
123-002-004	123-0020M	EBS	1–1.5			X[a]					
123-002-005	123-0005[b]	EBS	1–1.5			X[a]					
123-002-005	123-0005M[b]	EBS	1–1.5			X[a]					
123-0022	123-0022	EBS	0–0.5	X		X[a]	X		X		
123-0023	123-0023	EBS	2–2.5	X		X[a]	X		X		
123-0024	123-0024	EBS	2–2.5	X	X	X[a]	X		X		
123-0025	123-0025	EBS	0–1	X		X[a]	X		X		
123-0026	123-0026	EBS	0–1	X		X[a]	X		X		
123-0027	123-0027	EBS	0–1	X		X[a]	X		X		
123-0028	123-0028	EBS	0–1	X	X	X[a]	X		X		
123-0029	123-0029	EBS	0–1	X		X[a]	X		X		
123-0030	123-0030	EBS	0–1	X		X[a]	X		X		
123-003-006	123-0006M	EBS	1.5–2		X	X[a]	X		X		
123-003-007	123-0007[b]	EBS	1–1.5	X	X	X[a]	X		X		

Table 3-1
Sample Analysis Summary, AOC 23

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE							
				VOCs	SVOCs	TPH	Pest/PCBs	Herbicides	Metals	Organotins	TDS
123-003-007	123-0007M[b]	EBS	1–1.5		X	X[a]	X		X		
123-003-008	123-0008M	EBS	1.5–2		X	X[a]	X		X		
123-0031	123-0031	EBS	0–1	X		X[a]	X		X		
123-004-009	123-0009M	EBS	2–2.5		X	X[a]			X		
123-004-009	123-0018M	EBS	4–4.5	X	X	X[a]			X		
123-004-010	123-0010	EBS	2–2.5	X	X	X[a]			X		
123-004-010	123-0010M	EBS	2–2.5		X	X[a]			X		
123-004-010	123-0019	EBS	4–4.5	X	X	X[a]			X		
123-004-010	123-0019M	EBS	4–4.5	X	X	X[a]			X		
123-0044	123-0044	EBS	0.5–1	X		X[a]	X		X		
123-005-011	123-0011M	EBS	2–2.5		X	X[a]			X		
123-005-012	123-0012M	EBS	2–2.5		X	X[a]			X		
123-IW-001	123I-001[b]	EBS	6.5–7	X	X	X[a]	X	X	X	X	
123-IW-001	123I-001M[b]	EBS	6.5–7	X					X		
123-Z17-013	123-0013M	EBS	2–2.5		X	X[a]	X		X		
123-Z17-013	123-0021M	EBS	2–2.5		X	X[a]	X		X		
123-Z17-014	123-0014[b]	EBS	1.5–2	X	X	X[a]	X		X		
123-Z17-014	123-0014M[b]	EBS	1.5–2		X	X[a]	X		X		
124-001-001	124-0001[b]	EBS	1.5–2	X	X	X[a]	X		X		
124-001-001	124-0001M[b]	EBS	1.5–2		X	X[a]	X		X		
124-001-001	124-0005[b]	EBS	4–4.5	X	X	X[a]	X		X		
124-001-001	124-0005M[b]	EBS	4–4.5	X	X	X[a]	X		X		
124-001-002	124-0002M	EBS	1–1.5		X	X[a]	X		X		
124-001-002	124-0006M	EBS	4–4.5	X	X	X[a]	X		X		
124-001-002	124-0008M	EBS	4–4.5	X	X	X[a]	X		X		
124-001-003	124-0003M	EBS	1.5–2		X	X[a]	X		X		
124-001-003	124-0007M	EBS	4–4.5	X	X	X[a]	X		X		
124-Z17-004	124-0004M	EBS	0–0.5		X	X[a]	X		X		
125-001-001	125-0001[b]	EBS	0.5–1	X	X	X[a]					
125-001-001	125-0001M[b]	EBS	0.5–1		X	X[a]					
125-001-001	125-0004[b]	EBS	4–5	X	X	X[a]					

Table 3-1
Sample Analysis Summary, AOC 23

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE							
				VOCs	SVOCs	TPH	Pest/PCBs	Herbicides	Metals	Organotins	TDS
125-001-001	125-0004M[b]	EBS	4–5	X	X	X[a]					
125-001-002	125-0002M	EBS	0.5–1		X	X[a]					
125-001-002	125-0005M	EBS	4–4.5	X	X	X[a]					
125-001-003	125-0003M	EBS	0.5–1		X	X[a]					
125-001-003	125-0007M	EBS	0.5–1		X	X[a]					
125-001-003	125-0006M	EBS	4–4.5	X	X	X[a]					
125-SS-001	125M-001[b]	EBS	9–10	X	X		X			X	
125-SS-001	125M-001M[b]	EBS	9–10	X		X[a]			X		
126-001-001	126-0001M	EBS	0–0.5			X[a]					
126-001-001	126-0008M	EBS	0–0.5			X[a]					
126-001-001	126-0006M	EBS	3.5–4	X		X[a]					
126-001-002	126-0002M[b]	EBS	0–0.5			X[a]					
126-001-002	126-0002[b]	EBS	0.5–1			X[a]					
126-001-002	126-0007	EBS	4–4.5	X		X[a]					
126-001-002	126-0007M	EBS	4–4.5	X		X[a]					
126-002-004	126-0004M	EBS	0–0.5			X[a]			X		
126-002-005	126-0005M	EBS	0–0.5			X[a]			X		
126-002-005	126-0005	EBS	0.5–1			X[a]			X		
126-003-006	126-0009	EBS	0–1		X	X[a]	X		X		
126-003-006	126-0010	EBS	3–4		X	X[a]	X		X		
126-003-007	126-0012	EBS	7.5–8.5		X	X[a]	X		X		
126-003-008	126-0015	EBS	0.5–1.5		X	X[a]			X		
126-003-008	126-0016	EBS	3–4		X	X[a]			X		
127-SN-001	127S-001[b]	EBS	3–3.5	X	X		X				
127-SN-001	127S-001M[b]	EBS	3–3.5	X		X[c]			X		
127-SN-001	127S-011[b]	EBS	3–3.5	X	X		X				
127-SN-001	127S-011M[b]	EBS	3–3.5	X		X[c]			X		
127-SN-002	127S-002[b]	EBS	6–6.5	X	X		X				
127-SN-002	127S-002M[b]	EBS	6–6.5	X		X[c]			X		
03GB025	GPS03-025-1.0	Follow-on RI	0.5–1	X		X[d]					
03GB025	GPS03-025-3.0	Follow-on RI	2.5–3	X		X[d]					

Table 3-1
Sample Analysis Summary, AOC 23

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE							
				VOCs	SVOCs	TPH	Pest/PCBs	Herbicides	Metals	Organotins	TDS
03GB025	GPS03-025-6.0	Follow-on RI	5–6	X		X[d]					
03GB036	03GPS036-1.5	Follow-on RI	1–1.3	X		X[d]					
03GB036	03GPS036-3.0	Follow-on RI	2.5–3	X		X[d]					
B06-08	B06-08-000	Phases 2B and 3 Inv.	1–1.5	X	X				X		
B06-08	B06-08-002	Phases 2B and 3 Inv.	2–3	X	X		X		X		
B06-08	B06-08-007	Phases 2B and 3 Inv.	6.5–7.5	X	X		X		X		
B06-08	B06-08-014	Phases 2B and 3 Inv.	14–15.5	X	X		X		X		
B06-09	B06-09-000	Phases 2B and 3 Inv.	1–1.5	X	X				X		
B06-09	B06-09-002	Phases 2B and 3 Inv.	2–3.5	X	X		X		X		
B06-09	B06-09-008	Phases 2B and 3 Inv.	8–9.5	X	X		X		X		
B06-09	B06-09-014	Phases 2B and 3 Inv.	14–15.5	X	X		X		X		
B06-10	B06-10-000	Phases 2B and 3 Inv.	1–1.5	X	X				X		
B06-10	B06-10-002	Phases 2B and 3 Inv.	2–3.5	X	X		X		X		
B06-10	B06-10-008	Phases 2B and 3 Inv.	8–9.5	X	X		X		X		
B06-10	B06-10-008-DUP (FD)	Phases 2B and 3 Inv.	8–9.5				X				
B06-10	B06-10-014	Phases 2B and 3 Inv.	14–15.5	X	X		X		X		
EP125-01	030-CAP-235	Corr. Action Data Gap Inv.	0.5–1.5	X		X[d]			X		
EP125-01	030-CAP-236	Corr. Action Data Gap Inv.	3–4	X		X[d]			X		
A23SB01	C077S361	Site 35 RI	0–2	X	X	X[d]	X		X		
A23SB01	C077S362	Site 35 RI	2–4	X	X	X[d]	X		X		
A23SB01	C077S363	Site 35 RI	4–8	X	X	X[d]	X		X		
A23SB02	C077S364	Site 35 RI	0–2	X	X	X[d]	X		X		
A23SB02	C077S365	Site 35 RI	2–4	X	X	X[d]	X		X		
A23SB02	C077S366	Site 35 RI	4–8	X	X	X[d]	X		X		
A23SB03	C077S367	Site 35 RI	0–2	X	X	X[d]	X		X		
A23SB03	C077S368	Site 35 RI	2–4	X	X	X[d]	X		X		
A23SB03	C077S369	Site 35 RI	4–8	X	X	X[d]	X		X		
A23SB04	C077S370	Site 35 RI	0–2	X	X	X[d]	X		X		
A23SB04	C077S371	Site 35 RI	2–4	X	X	X[d]	X		X		
A23SB04	C077S372	Site 35 RI	4–8	X	X	X[d]	X		X		
A23SB05	C077S373	Site 35 RI	0–2	X	X						

Table 3-1
Sample Analysis Summary, AOC 23

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE							
				VOCs	SVOCs	TPH	Pest/PCBs	Herbicides	Metals	Organotins	TDS
A23SB05	C077S375	Site 35 RI	4–8	X	X						
A23SB06	C077S376	Site 35 RI	0–2	X	X	X[d]	X		X		
A23SB06	C077S377	Site 35 RI	2–4	X	X	X[d]	X		X		
A23SB06	C077S378	Site 35 RI	4–8	X	X	X[d]	X		X		
A23SB09	C077S379	Site 35 RI	1–2	X	X	X[d]	X		X		
A23SB09	C077S380	Site 35 RI	3–4	X	X	X[d]	X		X		
A23SB09	C077S381	Site 35 RI	7–8	X	X	X[d]	X		X		
A23SB10	C077S382	Site 35 RI	1–2	X	X	X[d]	X		X		
A23SB10	C077S383	Site 35 RI	2–3	X	X	X[d]	X		X		
A23SB10	C077S384	Site 35 RI	4–5.5	X	X	X[d]	X		X		
A23SB12	C077S385	Site 35 RI	0–2	X	X	X[d]	X		X		
A23SB12	C077S386	Site 35 RI	2–4	X	X	X[d]	X		X		
A23SB12	C077S387	Site 35 RI	4–8	X	X	X[d]	X		X		
A23SB13	C077S388	Site 35 RI	1–2	X	X	X[d]	X		X		
A23SB13	C077S389	Site 35 RI	2–3	X	X	X[d]	X		X		
A23SB13	C077S390	Site 35 RI	4–5	X	X	X[d]	X		X		
A23SB14	C077S391	Site 35 RI	1–2	X	X	X[d]	X		X		
A23SB14	C077S392	Site 35 RI	3–4	X	X	X[d]	X		X		
A23SB14	C077S393	Site 35 RI	4.5–6	X	X	X[d]	X		X		
A23SB15	C077S394	Site 35 RI	1.5–2.5				X		X		
A23SB15	C077S395	Site 35 RI	2.5–3.5				X		X		
A23SB15	C077S396	Site 35 RI	6.5–7.5				X		X		
A23SB16	C077S397	Site 35 RI	1.5–2				X		X		
A23SB16	C077S398	Site 35 RI	3–4				X		X		
A23SB16	C077S399	Site 35 RI	7.5–8				X		X		
A23SB18	C077S400	Site 35 RI	1–2	X	X	X[d]	X		X		
A23SB18	C077S401	Site 35 RI	3–4	X	X	X[d]	X		X		
A23SB18	C077S402	Site 35 RI	6.5–8	X	X	X[d]	X		X		
A23SB19	C077S403	Site 35 RI	0.25–1.25	X	X	X[d]	X		X		
A23SB19	C077S404	Site 35 RI	2–3	X	X	X[d]	X		X		
A23SB19	C077S405	Site 35 RI	4–5	X	X	X[d]	X		X		

Table 3-1
Sample Analysis Summary, AOC 23

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE							
				VOCs	SVOCs	TPH	Pest/PCBs	Herbicides	Metals	Organotins	TDS
A23SB21	C077S406	Site 35 RI	1–2	X	X	X[d]	X		X		
A23SB21	C077S407	Site 35 RI	2.5–4	X	X	X[d]	X		X		
A23SB21	C077S408	Site 35 RI	4–5	X	X	X[d]	X		X		
A23SB22	C077S409	Site 35 RI	1–2	X	X	X[d]	X		X		
A23SB22	C077S410	Site 35 RI	3–4	X	X	X[d]	X		X		
A23SB22	C077S411	Site 35 RI	5–6	X	X	X[d]	X		X		
A23SB25	C077S412	Site 35 RI	1–2	X	X	X[d]	X		X		
A23SB25	C077S413	Site 35 RI	2.5–4	X	X	X[d]	X		X		
A23SB25	C077S414	Site 35 RI	5–6	X	X	X[d]	X		X		
A23SB26	C077S415	Site 35 RI	0.3–1.3	X	X	X[d]	X		X		
A23SB26	C077S416	Site 35 RI	2.5–4	X	X	X[d]	X		X		
A23SB26	C077S417	Site 35 RI	4–5	X	X	X[d]	X		X		
A23SB27	C077S418	Site 35 RI	1–2	X		X[e]			X		
A23SB27	C077S419	Site 35 RI	3–4	X		X[e]			X		
A23SB27	C077S420	Site 35 RI	5–6	X		X[e]			X		
A23SB28	C077S421	Site 35 RI	1–2	X	X	X[e]	X		X		
A23SB28	C077S422	Site 35 RI	3–4	X		X[e]			X		
A23SB28	C077S423	Site 35 RI	5–6.5	X		X[e]			X		
A23SB29	C077S424	Site 35 RI	1–2	X	X	X[d]	X		X		
A23SB29	C077S425	Site 35 RI	3–4	X	X	X[d]	X		X		
A23SB29	C077S426	Site 35 RI	6–7	X	X	X[d]	X		X		
A23SB31	C077S427	Site 35 RI	1–2	X	X	X[d]	X		X		
A23SB31	C077S428	Site 35 RI	2.5–3.5	X	X	X[d]	X		X		
A23SB31	C077S429	Site 35 RI	7–8	X	X	X[d]	X		X		
A23SB33	C077S430	Site 35 RI	1–2	X	X	X[d]	X		X		
A23SB33	C077S431	Site 35 RI	3–4	X	X	X[d]	X		X		
A23SB33	C077S432	Site 35 RI	6–7.5	X	X	X[d]	X		X		
A23SB34	C077S433	Site 35 RI	1–2	X	X	X[d]	X		X		
A23SB34	C077S434	Site 35 RI	2–3	X	X	X[d]	X		X		
A23SB34	C077S435	Site 35 RI	5–6	X	X	X[d]	X		X		
A23SB35	C077S436	Site 35 RI	0–2	X	X	X[d]	X		X		

Table 3-1
Sample Analysis Summary, AOC 23

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE							
				VOCs	SVOCs	TPH	Pest/PCBs	Herbicides	Metals	Organotins	TDS
A23SB35	C077S437	Site 35 RI	2–4	X	X	X[d]	X		X		
A23SB35	C077S438	Site 35 RI	4–8	X	X	X[d]	X		X		
A23SB36	C077S439	Site 35 RI	1–2	X	X	X[d]	X		X		
A23SB36	C077S440	Site 35 RI	2–3	X		X[e]					
A23SB36	C077S441	Site 35 RI	4.5–6	X	X	X[d]	X		X		
A23SB37	C077S442	Site 35 RI	1–2	X					X		
A23SB37	C077S443	Site 35 RI	2–3.5	X					X		
A23SB37	C077S444	Site 35 RI	5–6.5	X					X		
A23SB38	C077S445	Site 35 RI	0–2	X					X		
A23SB38	C077S446	Site 35 RI	2–4	X					X		
A23SB38	C077S447	Site 35 RI	4–8	X					X		
A23SB39	C077S448	Site 35 RI	0–2	X					X		
A23SB39	C077S449	Site 35 RI	2–4	X					X		
A23SB39	C077S450	Site 35 RI	4–8	X					X		
A23SB40	C077S451	Site 35 RI	1–2	X	X	X[d]	X		X		
A23SB40	C077S452	Site 35 RI	2–3	X	X	X[d]	X		X		
A23SB40	C077S453	Site 35 RI	7–8	X	X	X[d]	X		X		
Groundwater											
13-MW-03	13-MW-03-B2675	BGMP2004_IRSite6	3–18	X							
13-MW-03	13-MW-03-B2835	BGMP2004_IRSite6	3–18	X							
13-MW-03	13-MW-03-C3093	BGMP2004_IRSite6	3–18	X							
13-MW-03	13-MW-03-C4142	BGMP2004Fall_Winter	3–18	X							
071-SS-007	071M-010	EBS	7.5–8.5	X	X	X[a]					
071-SS-008	071M-011	EBS	7.5–8.5	X	X	X[a]					
071-SS-009	071M-013	EBS	7.5–8.5	X	X	X[a]					
071-SS-010	071M-015	EBS	7.5–8.5	X	X	X[a]					
071-SS-011	071M-016	EBS	7.5–8.5	X	X	X[a]					
071-SS-012	071M-017	EBS	7.5–8.5	X	X	X[a]					
071-SS-013	071M-018	EBS	7.5–8.5	X	X	X[a]					
071-SS-014	071M-019	EBS	7.5–8.5	X	X	X[a]					
071-SS-014	071M-021	EBS	7.5–8.5	X	X	X[a]					

Table 3-1
Sample Analysis Summary, AOC 23

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE							
				VOCs	SVOCs	TPH	Pest/PCBs	Herbicides	Metals	Organotins	TDS
123-0040	123-0040	EBS	6–10	X		X[a]	X		X		
123-0041	123-0041	EBS	4–8	X		X[a]	X		X		
123-0042	123-0042	EBS	4–8	X		X[a]	X		X		
123-0043	123-0043	EBS	4–8	X		X[a]	X		X		
126-003-006	126-0011	EBS	11–12			X[e]					
126-003-008	126-0017	EBS	8–9	X	X	X[a]					
03GB036	03GPW036	Follow-on RI	10–12	X		X[d]					
03GB240	GPW03-240	Follow-on RI	5–6	X		X[d]					
398-MW1	385-S21-024	QS_2003	2.4–12.4	X	X	X[d]					
S06-DGS-VE02	385-S06-028	OUs 1 & 2 Data Gap Inv.	5.4–6.9	X	X	X[a]					
S21-DGS-DP20	385-S21-080	OUs 1 & 2 Data Gap Inv.	7–9	X	X	X[e]					
A23398-MW1	C077G153	Site 35 RI	7–12	X					X	X	X
A23SB01	C077G101	Site 35 RI	7–12	X	X	X[d]	X		X	X	X
A23SB01	C077G102	Site 35 RI	7–12	X			X				
A23SB02	C077G103	Site 35 RI	6–11	X	X	X[d]	X				
A23SB02	C077G103A	Site 35 RI	6–11						X	X	X
A23SB02	C077G104	Site 35 RI	6–11		X						
A23SB02	C077G104A	Site 35 RI	6–11							X	X
A23SB03	C077G105	Site 35 RI	5–9	X	X	X[d]					
A23SB03	C077G105A	Site 35 RI	5–9				X		X	X	X
A23SB04	C077G106	Site 35 RI	6–11	X	X	X[d]	X		X	X	X
A23SB05	C077G107	Site 35 RI	8–12	X	X					X	X
A23SB05	C077G108	Site 35 RI	8–12	X	X					X	
A23SB06	C077G109	Site 35 RI	6–11	X	X	X[d]					
A23SB06	C077G109A	Site 35 RI	6–11		X		X		X	X	X
A23SB07	C077G110	Site 35 RI	6–11	X						X	X
A23SB08	C077G111	Site 35 RI	7–12	X	X	X[d]	X		X	X	X
A23SB09	C077G112	Site 35 RI	4–9	X	X	X[d]	X		X	X	X
A23SB10	C077G113	Site 35 RI	5–10	X	X	X[d]	X		X	X	X
A23SB11	C077G114	Site 35 RI	5–10	X	X	X[d]	X		X	X	X
A23SB12	C077G115	Site 35 RI	8–13	X	X	X[d]	X		X	X	X

Table 3-1
Sample Analysis Summary, AOC 23

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE							
				VOCs	SVOCs	TPH	Pest/PCBs	Herbicides	Metals	Organotins	TDS
A23SB13	C077G116	Site 35 RI	6–11	X	X	X[d]	X		X	X	
A23SB13	C077G117	Site 35 RI	6–11			X[f]					
A23SB14	C077G118	Site 35 RI	2–7	X	X	X[d]	X		X	X	X
A23SB14	C077G119	Site 35 RI	2–7		X	X[e]					
A23SB15	C077G120	Site 35 RI	7–12				X		X	X	X
A23SB17	C077G121	Site 35 RI	7–12	X	X	X[d]	X		X	X	X
A23SB18	C077G122	Site 35 RI	3–8	X	X	X[d]	X		X	X	X
A23SB19	C077G123	Site 35 RI	4–9	X	X	X[d]	X		X	X	X
A23SB20	C077G124	Site 35 RI	4–9	X	X	X[d]	X		X	X	X
A23SB20	C077G125	Site 35 RI	4–9		X				X		
A23SB21	C077G126	Site 35 RI	5–10	X	X	X[d]	X		X	X	X
A23SB22	C077G127	Site 35 RI	4–9	X	X	X[d]			X		
A23SB23	C077G128	Site 35 RI	5–10	X	X	X[d]	X		X	X	X
A23SB23	C077G129	Site 35 RI	5–10	X		X[d]					
A23SB24	C077G130	Site 35 RI	5–10	X	X	X[d]	X		X	X	X
A23SB24	C077G131	Site 35 RI	5–10				X				
A23SB25	C077G132	Site 35 RI	5–10	X	X	X[d]	X		X	X	X
A23SB26	C077G133	Site 35 RI	5–10	X		X[d]			X	X	X
A23SB26	C077G134	Site 35 RI	5–10						X	X	
A23SB27	C077G135	Site 35 RI	5–10	X		X[f]			X	X	X
A23SB28	C077G136	Site 35 RI	5–10	X		X[f]			X	X	X
A23SB29	C077G137	Site 35 RI	5–10	X	X	X[d]	X		X	X	X
A23SB29	C077G138	Site 35 RI	5–10						X		
A23SB30	C077G139	Site 35 RI	4–9	X	X	X[d]	X		X	X	X
A23SB30	C077G140	Site 35 RI	4–9		X						
A23SB31	C077G141	Site 35 RI	3–8	X	X	X[d]	X		X	X	X
A23SB32	C077G142	Site 35 RI	4–9	X	X	X[d]	X		X	X	X
A23SB33	C077G143	Site 35 RI	6.5–11.5	X	X	X[d]	X		X	X	X
A23SB33	C077G144	Site 35 RI	6.5–11.5				X				
A23SB34	C077G145	Site 35 RI	7–12	X	X	X[d]	X		X	X	X
A23SB34	C077G146	Site 35 RI	7–12		X					X	

Table 3-1
Sample Analysis Summary, AOC 23

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE							
				VOCs	SVOCs	TPH	Pest/PCBs	Herbicides	Metals	Organotins	TDS
A23SB35	C077G147	Site 35 RI	6–11	X	X	X[d]	X		X	X	X
A23SB36	C077G148	Site 35 RI	7–12	X	X	X[d]	X		X	X	X
A23SB36	C077G149	Site 35 RI	7–12			X[d]					
A23SB37	C077G150	Site 35 RI	5–10	X					X	X	X
A23SB38	C077G151	Site 35 RI	7–12	X					X	X	X
A23SB38	C077G152	Site 35 RI	7–12	X					X		
A23SB39	C077G154	Site 35 RI	7–12	X					X		
A23SB40	C077G155	Site 35 RI	6–11	X	X	X[d]	X		X		

References:
Corr. Action Data Gap Inv. (TtEMI 2001a)
EBS (IT 2001a)
Follow-on RI (PRC Environmental and Montgomery 1996)
OUs 1 & 2 Data Gap Inv. (TtEMI 2002c)
PAH Study (BEI 2005a)
Phases 2B and 3 Inv. (PRC Environmental and Montgomery 1992)
QS_2003 – historical quarterly sampling results now available in ArcView Database
BGMP2004_IRSite6 – historical quarterly sampling results now available in ArcView Database
BGMP2004Fall_Winter – historical quarterly sampling results now available in ArcView Database

Notes:
[a] analyzed for gasoline-, diesel-, and motor oil–range TPH
[b] sample pairs in the form XXX-000X and XXX-000XM were collected from the same locations; sample XXX-000X was analyzed by a fixed-base laboratory, while sample XXX-000XM was analyzed by a mobile or screening laboratory
[c] analyzed for gasoline- and diesel-range TPH
[d] analyzed for gasoline-, diesel-, JP-5–, and motor oil–range TPH
[e] analyzed for gasoline-range TPH
[f] analyzed for diesel-, JP-5–, and motor oil–range TPH

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
Corr. – corrective
EBS – environmental baseline survey
FD – field duplicate
Inv. – investigation
JP-5 – jet propellant grade 5
OU – operable unit
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
Pest – pesticides
RI – remedial investigation
SVOC – semivolatile organic compound
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 23

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background[a]	Minimum[b]	Average[b]	Maximum[b]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
Volatile Organic Compounds (µg/kg)										
acetone	132	51	39	0	3.3	73	330	14,000,000	—[c]	—
benzene	157	6	3.8	1	1.7	4,500	27,000	640	—	—
bromoform	145	1	0.69	0	1.2	1.2	1.2	62,000	—	—
2-butanone	144	24	17	0	0.99	5.6	27	22,000,000	—	—
sec-butylbenzene	97	1	1	0	2	2	2	220,000	—	—
carbon disulfide	132	23	17	0	1.2	5	19	360,000	—	—
chlorobenzene	145	1	0.69	0	21	21	21	150,000	—	—
chloroform	145	2	1.4	0	3	3.4	3.7	220	—	—
1,2-dichlorobenzene	97	1	1	0	2.4	2.4	2.4	600,000	—	—
1,1-dichloroethene	157	1	0.64	0	4.8	4.8	4.8	120,000	—	—
cis-1,2-dichloroethene	148	27	18	0	0.29	11	190	43,000	—	—
trans-1,2-dichloroethene	135	2	1.5	0	1.1	8.6	16	69,000	—	—
ethylbenzene	157	1	0.64	0	2,900	2,900	2,900	400,000	—	—
isopropylbenzene	97	1	1	0	2.6	2.6	2.6	570,000	—	—
p-isopropyltoluene	97	1	1	No PSC	3	3	3	—	—	—
methyl tert-butyl ether	99	17	17	0	1.1	1.6	3.7	17,000	—	—
methylene chloride	157	27	17	0	2	16	90	9,100	—	—
naphthalene	86	2	2.3	0	7.1	7.3	7.4	1,700[d]	—	—
n-propylbenzene	97	2	2.1	0	1.5	2.6	3.7	240,000	—	—
tetrachloroethene	157	20	13	0	1	4.4	23	480	—	—
toluene	157	16	10	0	0.84	38	570	520,000	—	—
trichloroethene	157	4	2.5	0	1.8	9.2	15	53	—	—
1,3,5-trimethylbenzene	99	1	1	0	2.5	2.5	2.5	21,000	—	—
vinyl chloride	157	2	1.3	1	12	110	210	79	—	—
xylenes, total	157	5	3.2	0	6.62	6.9	7.2	270,000	—	—
Fuels (µg/kg)										
diesel	176	67	38	11	1,000	110,000	1,900,000	—	100,000	—
gasoline	171	17	9.9	4	360	300,000	2,000,000	—	100,000	—
JP-5	81	1	1.2	0	3,800	3,800	3,800	—	100,000	—
motor oil	169	81	48	9	6,000	680,000	27,000,000	—	500,000	—
Semivolatile Organic Compounds (µg/kg)										
acenaphthene	123	18	15	0	1.4	190	2,100	3,700,000	—	—
acenaphthylene	123	29	24	No PSC	1.1	28	240	—	—	—
anthracene	123	34	28	0	0.62	100	1,100	22,000,000	—	—
benz(a)anthracene	123	58	47	0	0.83	190	4,900	620	—	—
benzo(b)fluoranthene	123	77	63	0	1.1	250	7,000	620	—	—
benzo(k)fluoranthene	123	66	54	0	1.1	200	6,700	380[d]	—	—
benzo(g,h,i)perylene	123	87	71	No PSC	1.6	150	3,300	—	—	—
benzo(a)pyrene	123	87	71	0	1.7	200	4,200	62	—	—
bis(2-ethylhexyl)phthalate	149	13	8.7	0	24	1,300	8,100	35,000	—	—
carbazole	100	2	2	0	62	220	380	24,000	—	—
chrysene	123	62	50	0	0.96	160	3,900	3,800[d]	—	—
dibenz(a,h)anthracene	123	37	30	0	0.29	37	680	62	—	—
di-n-butyl phthalate	149	35	23	0	37	180	1,100	6,100,000	—	—
dibenzofuran	149	3	2	0	150	470	1,100	150,000	—	—
diethyl phthalate	149	2	1.3	0	21	28	34	49,000,000	—	—
fluoranthene	123	83	67	0	1.3	270	7,900	2,300,000	—	—
fluorene	123	15	12	0	1.5	100	610	2,700,000	—	—

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 23

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background[a]	Minimum[b]	Average[b]	Maximum[b]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
indeno(1,2,3-cd)pyrene	123	80	65	0	1.3	130	3,100	620	—	—
2-methylnaphthalene	123	33	27	No PSC	0.4	30	550	—	—	—
naphthalene	123	35	28	0	0.39	79	1,500	1,700[d]	—	—
pentachlorophenol	148	1	0.68	0	20	20	20	3,000	—	—
phenanthrene	123	68	55	No PSC	0.42	240	6,200	—	—	—
phenol	149	1	0.67	0	390	390	390	18,000,000	—	—
pyrene	123	91	74	0	1.9	400	8,000	2,300,000	—	—
Pesticides and Polychlorinated Biphenyls (µg/kg)										—
Aroclor 1254	134	2	1.5	0	15	33	50	220	—	—
Aroclor 1260	134	9	6.7	1	5	84	500	220	—	—
alpha-BHC	107	1	0.93	0	0.2	0.2	0.2	90	—	—
alpha-chlordane	108	1	0.93	0	2.1	2.1	2.1	1,600	—	—
4,4'-DDE	107	2	1.9	0	0.2	1.1	2	1,700	—	—
4,4'-DDT	107	4	3.7	0	0.3	2.8	5.8	1,700	—	—
endosulfan II	107	1	0.93	0	3	3	3	370,000	—	—
heptachlor epoxide	107	1	0.93	0	0.5	0.5	0.5	53	—	—
Metals (mg/kg)										
aluminum	123	123	100	0	3,300	8,000	30,300	76,000	—	13,960
antimony	161	14	8.7	0	0.69	4.4	9.9	31	—	9.50
arsenic	160	153	96	10	0.76	3.3	14.3	0.062[d]	—	9.14
barium	160	159	99	0	15.8	58	474	5,400	—	93.68
beryllium	172	136	79	0	0.051	0.34	3.4	150	—	1.27
cadmium	172	75	44	0	0.018	0.25	1.1	37	—	1.72
calcium	123	123	100	No PSC	587	3,300	24,900	—	—	16,800
chromium	172	159	92	0	3	34	107	210	—	54.84
cobalt	160	160	100	0	2.8	7	46.8	900	—	14.30
copper	172	164	95	0	3.9	17	185	3,100	—	39.14
iron	123	123	100	19	6,380	15,000	49,000	23,000	—	22,280
lead	181	168	93	0	1.2	9.3	135	150[d]	—	37.66
magnesium	123	123	100	No PSC	1,580	4,300	19,500	—	—	7,304
manganese	123	123	100	0	60.9	220	1,460	1,800	—	383.0
mercury	172	50	29	0	0.022	0.56	2.6	23	—	0.52
nickel	172	171	99	0	1.7	35	119	1,600	—	55.72
potassium	123	122	99	No PSC	244	1,100	4,600	—	—	1,232
selenium	160	13	8.1	0	0.32	0.59	1.3	390	—	1.78
silver	172	61	35	0	0.046	0.31	1.39	390	—	2.22
sodium	123	74	60	No PSC	61.6	1,200	7,900	—	—	1,230
thallium	160	16	10	1	0.71	2.4	6.4	5.2	—	0.50
vanadium	160	160	100	2	11.6	28	127	78	—	47.34
zinc	172	170	99	0	10.1	39	343	23,000	—	67.48

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

Acronyms/Abbreviations:

AOC – area of concern
BHC – benzene hexachloride
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
JP-5 – jet propellant grade 5
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
TPH – total petroleum hydrocarbons

Table 4-2a
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, AOC 23

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background	Minimum [a]	Average [a]	Maximum [a]	California MCL	TPH ESL	Background (95th Percentile)
Volatile Organic Compounds (µg/L)										
benzene	65	10	15	1	0.16	0.38	1.1	1	—[b]	—
carbon disulfide	60	27	45	No PSC	0.29	2	11	—	—	—
1,2-dichlorobenzene	54	1	1.9	0	4.4	4.4	4.4	600	—	—
1,3-dichlorobenzene	54	3	5.6	No PSC	0.12	0.22	0.36	—	—	—
1,1-dichloroethane	65	4	6.2	0	0.33	1.1	2.8	5	—	—
1,2-dichloroethane	65	2	3.1	2	0.91	1.7	2.4	0.5	—	—
cis-1,2-dichloroethene	65	12	18	0	0.16	0.68	1.4	6	—	—
trans-1,2-dichloroethene	53	2	3.8	0	0.37	0.61	0.85	10	—	—
1,4-dioxane	1	1	100	No PSC	0.18	0.18	0.18	—	—	—
ethylbenzene	65	2	3.1	0	0.53	0.56	0.59	300	—	—
methyl tert-butyl ether	54	3	5.6	0	0.28	0.29	0.31	13	—	—
naphthalene	54	4	7.4	No PSC	0.43	1.4	4.2	—	—	—
tetrachloroethene	65	2	3.1	0	0.3	0.39	0.47	5	—	—
toluene	65	18	28	0	0.18	0.44	1.1	150	—	—
1,2,4-trichlorobenzene	53	1	1.9	0	0.29	0.29	0.29	5	—	—
trichloroethene	65	5	7.7	0	0.3	0.56	0.94	5	—	—
1,2,4-trimethylbenzene	52	5	9.6	No PSC	0.24	0.67	2	—	—	—
vinyl chloride	65	4	6.2	4	0.62	2	2.8	0.5	—	—
xylenes, total	65	9	14	0	0.69	1	2	1,800	—	—
Fuels (µg/L)										
diesel	54	22	41	20	70	200	940	—	100	—
gasoline	54	4	7.4	0	9.7	17	30	—	100	—
motor oil	54	10	19	7	70	450	930	—	100	—
Semivolatile Organic Compounds (µg/L)										
acenaphthene	45	16	36	No PSC	0.066	0.86	2.1	—	—	—
acenaphthylene	45	8	18	No PSC	0.11	0.26	0.58	—	—	—
anthracene	45	8	18	No PSC	0.13	0.3	0.5	—	—	—
benz(a)anthracene	45	2	4.4	No PSC	0.56	1.3	2	—	—	—
benzo(b)fluoranthene	45	1	2.2	No PSC	3	3	3	—	—	—
benzo(g,h,i)perylene	45	2	4.4	No PSC	0.12	1.1	2	—	—	—
benzo(a)pyrene	45	1	2.2	1	3	3	3	0.2	—	—
butyl benzyl phthalate	44	3	6.8	No PSC	1	1.7	2	—	—	—
chrysene	45	1	2.2	No PSC	2	2	2	—	—	—
fluoranthene	45	12	27	No PSC	0.093	0.99	5	—	—	—
fluorene	45	12	27	No PSC	0.1	0.4	1.2	—	—	—
indeno(1,2,3-cd)pyrene	45	1	2.2	No PSC	2	2	2	—	—	—
2-methylnaphthalene	39	1	2.6	No PSC	0.24	0.24	0.24	—	—	—
naphthalene	44	6	14	No PSC	0.11	0.77	3.5	—	—	—
phenanthrene	45	19	42	No PSC	0.081	0.98	3	—	—	—
pyrene	45	25	56	No PSC	0.11	1.2	9	—	—	—
Pesticides and PCBs (µg/L)										
Aroclor 1016	37	1	2.7	0	0.24	0.24	0.24	0.5	—	—
Aroclor 1260	37	1	2.7	0	0.34	0.34	0.34	0.5	—	—

Table 4-2a
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, AOC 23

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background	Minimum [a]	Average [a]	Maximum [a]	California MCL	TPH ESL	Background (95th Percentile)
Metals (µg/L)										
aluminum	42	1	2.4	0	36.4	36	36.4	1,000	—	1,070
arsenic	46	25	54	1	3.4	9.3	22.6	10 [c]	—	20.72
barium	46	46	100	0	11.7	150	533	1,000	—	569.5
beryllium	46	15	33	0	0.24	0.46	3.1	4	—	2.50
cadmium	46	3	6.5	0	0.15	0.18	0.23	5	—	—
calcium	42	42	100	No PSC	7,400	43,000	284,000	—	—	—
chromium	46	34	74	0	0.53	5.6	42.2	50	—	12.45
cobalt	46	4	8.7	No PSC	0.81	1.9	3.7	—	—	—
copper	46	4	8.7	No PSC	1.7	2.7	4.7	—	—	24.03
iron	42	40	95	No PSC	29.9	1,700	6,900	—	—	6,586
lead	46	1	2.2	0	1.2	1.2	1.2	15 [c]	—	11.45
magnesium	42	42	100	No PSC	5,770	85,000	903,000	—	—	—
manganese	42	41	98	No PSC	80	410	2,550	—	—	1,741
mercury	46	14	30	0	0.00078	0.01	0.12	2	—	—
molybdenum	4	4	100	No PSC	6.7	8.7	10.5	—	—	—
nickel	46	5	11	0	2.8	4.4	7.2	100	—	—
potassium	42	42	100	No PSC	876	50,000	276,000	—	—	—
selenium	46	9	20	0	3.2	4.8	8.8	50	—	8.58
silver	46	1	2.2	No PSC	0.61	0.61	0.61	—	—	—
sodium	42	42	100	No PSC	88,900	1,300,000	8,910,000	—	—	—
thallium	46	3	6.5	3	2.7	3.1	3.4	2	—	16.15
vanadium	46	45	98	No PSC	0.7	5.1	31.4	—	—	26.27
zinc	46	4	8.7	No PSC	3.2	20	54.2	—	—	36.39
General Chemistry (µg/L)										
solids, total dissolved	41	41	100	No PSC	371,000	3,600,000	21,900,000	—	—	—

Notes:
[a] data review qualifiers are not included in this table
[b] dash indicates not applicable or not established
[c] Federal MCL

Acronyms/Abbreviations:
AOC – area of concern
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/L – micrograms per liter
MCL – maximum contaminant level
PCB – polychlorinated biphenyl
PSC – preliminary screening criteria (MCL and ESL)
TPH – total petroleum hydrocarbons

Table 4-2b
Concentration Ranges for Organic and Inorganic Analytes Compared to Surface Water Preliminary Screening Criteria, AOC 23

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background	Minimum[a]	Average[a]	Maximum[a]	Surface Water Aquatic TPH ESL	Surface Water CTR CCC	Surface Water CTR HHCO	Surface Water NRWQC CCC	Surface Water NRWQC HHCO	Background (95th Percentile)
Volatile Organic Compounds (µg/L)													
benzene	15	4	27	0	0.16	0.26	0.38	—[b]	—	71	—	51	—
carbon disulfide	15	10	67	No PSC	0.32	2.2	11	—	—	—	—	—	—
1,3-dichlorobenzene	13	2	15	0	0.12	0.15	0.18	—	—	2,600	—	960	—
1,1-dichloroethane	15	1	6.7	No PSC	2.8	2.8	2.8	—	—	—	—	—	—
1,2-dichloroethane	15	2	13	0	0.91	1.7	2.4	—	—	99	—	37	—
cis-1,2-dichloroethene	15	3	20	No PSC	0.26	0.82	1.2	—	—	—	—	—	—
trans-1,2-dichloroethene	12	1	8.3	0	0.37	0.37	0.37	—	—	140,000	—	10,000	—
naphthalene	13	1	7.7	No PSC	0.46	0.46	0.46	—	—	—	—	—	—
tetrachloroethene	15	2	13	0	0.3	0.39	0.47	—	—	8.9	—	3.3	—
toluene	15	6	40	0	0.18	0.32	0.69	—	—	200,000	—	15,000	—
1,2,4-trichlorobenzene	13	1	7.7	0	0.29	0.29	0.29	—	—	—	—	70	—
trichloroethene	15	3	20	0	0.5	0.65	0.94	—	—	81	—	30	—
1,2,4-trimethylbenzene	12	1	8.3	No PSC	0.26	0.26	0.26	—	—	—	—	—	—
vinyl chloride	15	1	6.7	1	2.7	2.7	2.7	—	—	530	—	2	—
xylenes, total	15	2	13	No PSC	0.83	0.93	1.03	—	—	—	—	—	—
Fuels (µg/L)													
diesel	11	6	55	1	110	260	940	640	—	—	—	—	—
gasoline	13	1	7.7	0	9.7	9.7	9.7	3,700	—	—	—	—	—
Semivolatile Organic Compounds (µg/L)													
acenaphthene	11	5	45	0	0.44	0.87	1.4	—	—	2,700	—	990	—
acenaphthylene	11	5	45	No PSC	0.14	0.25	0.37	—	—	—	—	—	—
anthracene	11	5	45	0	0.16	0.31	0.45	—	—	110,000	—	40,000	—
benzo(g,h,i)perylene	11	1	9.1	No PSC	0.12	0.12	0.12	—	—	—	—	—	—
butyl benzyl phthalate	10	1	10	0	1	1	1	—	—	5,200	—	1,900	—
fluoranthene	11	6	55	0	0.26	0.65	0.95	—	—	370	—	140	—
fluorene	11	5	45	0	0.21	0.38	0.51	—	—	14,000	—	5,300	—
naphthalene	10	2	20	No PSC	0.19	0.33	0.47	—	—	—	—	—	—
phenanthrene	11	6	55	No PSC	0.27	1.6	2.4	—	—	—	—	—	—
pyrene	11	7	64	0	0.48	1.5	2.4	—	—	11,000	—	4,000	—
Metals (µg/L)													
arsenic	11	2	18	0	3.4	8.1	12.7	—	36	—	36	0.14	20.72
barium	11	11	100	No PSC	11.7	130	369	—	—	—	—	—	569.5
beryllium	11	5	45	No PSC	0.24	0.26	0.29	—	—	—	—	—	2.50
calcium	11	11	100	No PSC	8,770	35,000	109,000	—	—	—	—	—	—
chromium	11	8	73	No PSC	3.1	7.5	21.2	—	—	—	—	—	12.45
iron	11	10	91	No PSC	30	800	2,290	—	—	—	—	—	6,586
magnesium	11	11	100	No PSC	12,600	52,000	176,000	—	—	—	—	—	—
manganese	11	10	91	No PSC	84.9	340	691	—	—	—	—	—	1,741
mercury	11	11	100	0	0.00082	0.0016	0.0024	—	0.025	0.051	0.94	—	—
potassium	11	11	100	No PSC	876	40,000	106,000	—	—	—	—	—	—
selenium	11	2	18	0	4	5	6	—	71	—	71	4,200	8.58
sodium	11	11	100	No PSC	88,900	1,100,000	2,950,000	—	—	—	—	—	—
vanadium	11	11	100	No PSC	3.3	7.4	17	—	—	—	—	—	26.27
General Chemistry (µg/L)													
solids, total dissolved	9	9	100	No PSC	371,000	3,100,000	7,680,000	—	—	—	—	—	—

Notes:
[a] data review qualifiers are not included in this table
[b] dash indicates not applicable or not established

Acronyms/Abbreviations:
AOC – area of concern
CCC – criterion continuous concentration
CTR – California Toxics Rule
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
HHCO – human-health consumption of organisms only
µg/L – micrograms per liter
NRWQC – National Recommended Water Quality Criteria
PSC – preliminary screening criteria (ESL, CTR, and NRWQC)
TPH – total petroleum hydrocarbons

Table 4-3a
Soil Sampling Results, AOC 23 EBS Parcel 71

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	071-001-001 071-0001 3 - 3.5 30-Mar-95	071-001-002 071-0002 3 - 3.5 30-Mar-95	071-001-003 071-0003 3 - 3.5 30-Mar-95	071-001-003 071-0005 (FD) 3 - 3.5 30-Mar-95	071-IW-001 071I-001 5 - 9 13-Dec-94	071-IW-001 071I-001M 8.5 - 9 13-Dec-94	071-SN-002 071S-002 4 - 4.6 23-Jan-95	071-SN-002 071S-002M 4 - 4.6 23-Jan-95	071-SS-002 071M-002 6.5 - 7 06-Feb-95	071-SS-002 071M-002M 6.5 - 7 06-Feb-95	071-SS-003 071M-003 7.5 - 8 03-Feb-95	071-SS-003 071M-003M 7.5 - 8 03-Feb-95	071-SS-004 071M-004 7.5 - 8.5 08-Feb-95
VOCs																		
acetone	14,000,000	—[b]	—	—	µg/kg	9 J	8 J	24	24	9 J	NA	NA	NA	NA	NA	NA	NA	NA
benzene	640	—	—	—	µg/kg	12 U	12 U	11 U	11 U	11 U	10 U	NA	10 U	NA	10 U	NA	10 U	NA
2-butanone	22,000,000	—	—	—	µg/kg	12 U	12 U	11 U	11 U	4 J	10 U	NA	10 U	NA	10 U	NA	10 U	NA
carbon disulfide	360,000	—	—	—	µg/kg	12 U	12 U	11 U	11 U	11 U	NA	NA	NA	NA	NA	NA	NA	NA
chlorobenzene	150,000	—	—	—	µg/kg	12 U	12 U	11 U	11 U	11 U	NA	NA	NA	NA	NA	NA	NA	NA
chloroform	220	940	—	—	µg/kg	3 J	12 U	11 U	11 U	11 U	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	10 U	NA	10 U	NA	10 U	NA	10 U	NA
ethylbenzene	400,000	—	—	—	µg/kg	12 U	12 U	11 U	11 U	11 U	10 U	NA	10 U	NA	10 U	NA	10 U	NA
methyl tert-butyl ether	17,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	µg/kg	12 U	12 U	11 U	11 U	11 U	10 U	NA	10 U	NA	10 U	NA	10 U	NA
tetrachloroethene	480	—	—	—	µg/kg	12 U	12 U	11 U	11 U	11 U	10 U	NA	10 U	NA	10 U	NA	10 U	NA
toluene	520,000	—	—	—	µg/kg	12 U	12 U	11 U	11 U	11 U	10 U	NA	10 U	NA	10 U	NA	10 U	NA
trichloroethene	53	2,900	—	—	µg/kg	12 U	12 U	11 U	11 U	11 U	10 U	NA	10 U	NA	10 U	NA	10 U	NA
m-, p-xylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	20 U	NA	20 U	NA	20 U	NA	20 U	NA
Petroleum Hydrocarbons																		
diesel	—	—	100,000	—	µg/kg	12000 U	12000 U	11000 U	11000 U	**850000 J**[c]	NA	NA	50000 U	NA	50000 U	NA	50000 U	NA
gasoline	—	—	100,000	—	µg/kg	600 U	600 U	600 U	600 U	**750000 J**	NA	NA	50000 U	NA	50000 U	NA	50000 U	NA
motor oil	—	—	500,000	—	µg/kg	24000 U	**670000 J**	71000 J	36000 J	22000 U	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																		
acenaphthene	3,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[d]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[d]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[d]	380[d]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[d]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	NA	NA	NA	NA	370 U	NA	24 J	NA	420 U	NA	470 U	NA	28 J
carbazole	24,000	—	—	—	µg/kg	NA	NA	NA	NA	370 U	NA	370 U	NA	420 U	NA	470 U	NA	62 J
chrysene	62,000[d]	3,800[d]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[d]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	NA	NA	NA	370 U	NA	370 U	NA	65 J	NA	470 U	NA	400 U
dibenzofuran	150,000	—	—	—	µg/kg	NA	NA	NA	NA	1100	NA	370 U	NA	420 U	NA	470 U	NA	170 J
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[d]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[d]	1,700[d]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenol	18,000,000	—	—	—	µg/kg	NA	NA	NA	NA	370 U	NA	370 U	NA	420 U	NA	470 U	NA	400 U
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs																		
4,4'-DDT	1,700	—	—	—	µg/kg	NA	NA	NA	NA	3.7 U	NA	NA	NA	4.2 U	NA	4.7 U	NA	4 U
Herbicides						NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3a
Soil Sampling Results, AOC 23 EBS Parcel 71

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: / Sample: / [a] Depth Interval: / Collection Date:												
						071-001-001 / 071-0001 / 3 - 3.5 / 30-Mar-95	071-001-002 / 071-0002 / 3 - 3.5 / 30-Mar-95	071-001-003 / 071-0003 / 3 - 3.5 / 30-Mar-95	071-001-003 / 071-0005 (FD) / 3 - 3.5 / 30-Mar-95	071-IW-001 / 071I-001 / 5 - 9 / 13-Dec-94	071-IW-001 / 071I-001M / 8.5 - 9 / 13-Dec-94	071-SN-002 / 071S-002 / 4 - 4.6 / 23-Jan-95	071-SN-002 / 071S-002M / 4 - 4.6 / 23-Jan-95	071-SS-002 / 071M-002 / 6.5 - 7 / 06-Feb-95	071-SS-002 / 071M-002M / 6.5 - 7 / 06-Feb-95	071-SS-003 / 071M-003 / 7.5 - 8 / 03-Feb-95	071-SS-003 / 071M-003M / 7.5 - 8 / 03-Feb-95	071-SS-004 / 071M-004 / 7.5 - 8.5 / 08-Feb-95
Metals																		
aluminum	76,000	—	—	13,960	mg/kg	3650	4080	5600	3760	6740 J	NA	NA	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	mg/kg	1.5 UJ	1.5 UJ	1.4 UJ	1.4 UJ	0.71 UJ	*25 U* [e,f]	NA	*25 U* [f]	NA	*25 U* [f]	NA	*25 U* [f]	NA
arsenic	0.39	0.062	—	9.14	mg/kg	**1.6**	**1.2 U** [f]	**1.1 U** [f]	**1.2**	**1**	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	26.9	35.8	34	22.5	57.2 J	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	0.19 U	0.19	0.19	0.2	*1.9*	*25 U* [f]	NA	*25 U* [f]	NA	*25 U* [f]	NA	*25 U* [f]	NA
cadmium	37	—	—	1.72	mg/kg	0.09 UJ	0.09 UJ	0.09 UJ	0.09 UJ	0.25 U	*25 U* [f]	NA	*25 U* [f]	NA	*25 U* [f]	NA	*25 U* [f]	NA
calcium	—	—	—	16,800	mg/kg	1620	1640	3470 J	1660 J	2640	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	23.4 J	28 J	35.6 J	26.3 J	31.4 J	25 U	NA	25 U	NA	25 U	NA	25 U	NA
cobalt	900	—	—	14.30	mg/kg	2.8	3.3	4.6	3.9	6.6	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	5.7	7.4	7.5	8.1	21.9 J	25 U	NA	25 U	NA	25 U	NA	25 U	NA
iron	23,000	—	—	22,280	mg/kg	6820	7570	8280	6920	11400	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	3	3.5	3.4	3.7	4.4	25 U	NA	25 U	NA	25 U	NA	25 U	NA
magnesium	—	—	—	7,304	mg/kg	1860	2240	2330	2070	4620	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	78.1 J	72.4 J	119 J	85.5 J	189 J	NA	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	mg/kg	0.18 U	0.18 U	0.17 U	0.17 U	0.17 U	***25 U*** [f]	NA	***25 U*** [f]	NA	***25 U*** [f]	NA	***25 U*** [f]	NA
nickel	1,600	—	—	55.72	mg/kg	24	23.7	26.3	22.6	42.6	*59*	NA	41	NA	32	NA	50	NA
potassium	—	—	—	1,232	mg/kg	621	693	770	*586*	848	NA	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	mg/kg	0.47 U	0.47 U	0.44 U	0.44 U	0.3 U	*25 U* [f]	NA	*25 U* [f]	NA	*25 U* [f]	NA	*25 U* [f]	NA
sodium	—	—	—	1,230	mg/kg	64.2	78.6	121	101	244	NA	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	mg/kg	*1.8*	*1.4*	*1.9*	*1.3*	0.49 U	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	15	16.8	19	16.2	23.8	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	16.7	19.5	*19.6*	19.5	36.3	29	NA	29	NA	31	NA	27	NA
Organotins						NA	NA	NA	NA	ND	NA	NA	NA	ND	NA	ND	NA	ND

Table 4-3a
Soil Sampling Results, AOC 23 EBS Parcel 71

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	071-SS-004 071M-004M 7.5 - 8.5 08-Feb-95	071-SS-008 071M-012 3.5 - 4.5 04-Oct-95	071-SS-009 071M-014 3 - 4 04-Oct-95	32EDC-5-66 C032CA45 0 - 0.5 22-May-02	32EDC-5-66 C032CA46 0.5 - 2 22-May-02	32EDC-5-66 C032CA47 2 - 4 22-May-02	32EDC-5-66 C032CA48 4 - 8 22-May-02	32EDC-5-67 C032CA49 0 - 0.5 16-May-02	32EDC-5-67 C032CA50 0.5 - 2 16-May-02	32EDC-5-67 C032CA51 2 - 4 16-May-02	32EDC-5-67 C032CA52 4 - 8 16-May-02	A23SB01 C077S361 0 - 2 29-Nov-05	A23SB01 C077S362 2 - 4 29-Nov-05	A23SB01 C077S363 4 - 8 29-Nov-05
VOCs																			
acetone	14,000,000	—[b]	—	—	µg/kg	NA	24 J	12 U	NA	NA	NA	NA	NA	NA	NA	NA	100 U	110 UJ	100 UJ
benzene	640	—	—	—	µg/kg	**27000**	10 J	12 U	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ	6 U	6 UJ
2-butanone	22,000,000	—	—	—	µg/kg	500 U	58 U	12 U	NA	NA	NA	NA	NA	NA	NA	NA	100 U	100 UJ	100 UJ
carbon disulfide	360,000	—	—	—	µg/kg	NA	58 U	12 U	NA	NA	NA	NA	NA	NA	NA	NA	100 U	100 U	100 UJ
chlorobenzene	150,000	—	—	—	µg/kg	NA	21 J	12 U	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ	6 U	6 UJ
chloroform	220	940	—	—	µg/kg	NA	58 U	12 U	NA	NA	NA	NA	NA	NA	NA	NA	6 U	6 UJ	6 UJ
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	10 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6 U	2 J	6 UJ
ethylbenzene	400,000	—	—	—	µg/kg	2900	58 U	12 U	NA	NA	NA	NA	NA	NA	NA	NA	20 UJ	20 U	30 UJ
methyl tert-butyl ether	17,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	50 U	2.5 J	1.2 UJ
methylene chloride	9,100	—	—	—	µg/kg	10 U	6 J	12 U	NA	NA	NA	NA	NA	NA	NA	NA	60 U	60 UJ	60 UJ
tetrachloroethene	480	—	—	—	µg/kg	10 U	58 U	12 U	NA	NA	NA	NA	NA	NA	NA	NA	4.1 J	6.6 J	3.8 J
toluene	520,000	—	—	—	µg/kg	570	9 J	12 U	NA	NA	NA	NA	NA	NA	NA	NA	0.84 J	1.2 J	0.84 J
trichloroethene	53	2,900	—	—	µg/kg	10 U	6 J	12 U	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ	6 U	6 UJ
m-, p-xylene	—	—	—	—	µg/kg	2100 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6 UJ	0.73 J	6 UJ
Petroleum Hydrocarbons																			
diesel	—	—	100,000	—	µg/kg	50000 U	12000 U	12000 U	NA	NA	NA	NA	NA	NA	NA	NA	11000	1200 U	1200 U
gasoline	—	—	100,000	—	µg/kg	**580000**	24000 J	600 U	NA	NA	NA	NA	NA	NA	NA	NA	1000 U	1000 U	1000 U
motor oil	—	—	500,000	—	µg/kg	NA	35000 J	23000 U	NA	NA	NA	NA	NA	NA	NA	NA	15000	12000 U	12000 U
SVOCs																			
acenaphthene	3,700,000	—	—	—	µg/kg	NA	NA	NA	5.5 U	5.4 U	5.4 U	6.2 U	5.6 U	5.7 U	6.1 U	6.1 U	4 J	6 U	6 U
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	1.8 J	5.4 U	5.4 U	6.2 U	5.6 U	5.7 U	6.1 U	6.1 U	4 J	6 U	6 U
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	1.1 J	5.4 U	2.1 J	6.2 U	5.6 U	5.7 U	6.1 U	6.1 U	7	6 U	6 U
benz(a)anthracene	620[d]	—	—	—	µg/kg	NA	NA	NA	13	0.94 J	9.9	1.7 J	8.6 J	7.8 J	2.7 J	6.1 UJ	25	6 U	6 U
benzo(b)fluoranthene	620[d]	—	—	—	µg/kg	NA	NA	NA	18	1.6 J	7.4	3.1 J	18 J	13 J	6 J	1.5 J	41	6 U	4.3 J
benzo(k)fluoranthene	6,200[d]	380[d]	—	—	µg/kg	NA	NA	NA	25	5.4 U	7.2 U	6.2 U	4.9 J	4.1 J	6.1 UJ	6.1 UJ	17 J	6 U	4.2 J
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	34	5.4 U	4 J	4.2 J	20	13	6.4	1.9 J	35	6 U	6 U
benzo(a)pyrene	62[d]	—	—	—	µg/kg	NA	NA	NA	33	3.7 J	8.9	6 J	17	13	5.7 J	6.1 U	39	6 U	3.3 J
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	NA	370 U	380 U	NA	NA	NA	NA	NA	NA	NA	NA	300 U	300 U	400 U
carbazole	24,000	—	—	—	µg/kg	NA	370 U	380 U	NA	NA	NA	NA	NA	NA	NA	NA	700 U	700 U	700 U
chrysene	62,000[d]	3,800[d]	—	—	µg/kg	NA	NA	NA	20	1.3 J	13	2 J	10	8.5	3.1 J	6.1 U	24	6 U	2.3 J
dibenz(a,h)anthracene	62[d]	—	—	—	µg/kg	NA	NA	NA	4.8 J	5.4 U	5.4 U	6.2 U	1.8 J	5.7 U	6.1 U	6.1 U	6 U	6 U	6 U
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	370 U	380 U	NA	NA	NA	NA	NA	NA	NA	NA	300 U	300 U	400 U
dibenzofuran	150,000	—	—	—	µg/kg	NA	370 U	380 U	NA	NA	NA	NA	NA	NA	NA	NA	300 U	300 U	400 U
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	29	1.9 J	18	4.2 J	17	14	3.8 J	6.1 U	64	6 U	4.2 J
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	5.5 U	5.4 U	5.4 U	6.2 U	5.6 U	5.7 U	6.1 U	6.1 U	2.6 J	6 U	6 U
indeno(1,2,3-cd)pyrene	620[d]	—	—	—	µg/kg	NA	NA	NA	32	5.4 U	5.2 J	6.2 U	19	12	5.9 J	1.5 J	22	6 U	6 U
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	5.5 U	5.4 U	5.4 U	6.2 U	5.6 U	5.7 U	6.1 U	6.1 U	1.7 J	6 U	6 U
naphthalene	56,000[d]	1,700[d]	—	—	µg/kg	NA	NA	NA	1.3 J	5.4 U	5.4 U	0.39 J	5.6 U	5.7 U	6.1 U	6.1 U	3.4 J	6 U	6 U
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	4.2 J	0.44 J	9.6 J	1.1 J	5.2 J	5.3 J	6.1 U	6.1 U	43	6 U	6 U
phenol	18,000,000	—	—	—	µg/kg	NA	370 U	390 J	NA	NA	NA	NA	NA	NA	NA	NA	300 U	300 U	400 U
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	48	2.8 J	20	9.5	24	21	7.3	4 J	74 J	6 U	9 J
Pesticides/PCBs																			
4,4'-DDT	1,700	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6 U	6 U	6 U
Herbicides						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3a
Soil Sampling Results, AOC 23 EBS Parcel 71

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	071-SS-004 071M-004M 7.5 - 8.5 08-Feb-95	071-SS-008 071M-012 3.5 - 4.5 04-Oct-95	071-SS-009 071M-014 3 - 4 04-Oct-95	32EDC-5-66 C032CA45 0 - 0.5 22-May-02	32EDC-5-66 C032CA46 0.5 - 2 22-May-02	32EDC-5-66 C032CA47 2 - 4 22-May-02	32EDC-5-66 C032CA48 4 - 8 22-May-02	32EDC-5-67 C032CA49 0 - 0.5 16-May-02	32EDC-5-67 C032CA50 0.5 - 2 16-May-02	32EDC-5-67 C032CA51 2 - 4 16-May-02	32EDC-5-67 C032CA52 4 - 8 16-May-02	A23SB01 C077S361 0 - 2 29-Nov-05	A23SB01 C077S362 2 - 4 29-Nov-05	A23SB01 C077S363 4 - 8 29-Nov-05
Metals																			
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6100	11000	5680
antimony	31	—	—	9.50	mg/kg	*25 U* [f]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.6 U	0.6 U	0.65 U
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.7**	**2.7**	**1.9**
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	45.8	*132*	44.7
beryllium	150	—	—	1.27	mg/kg	*25 U* [f]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.13 J	0.26	0.14 J
cadmium	37	—	—	1.72	mg/kg	*25 U* [f]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.16 J	0.11 J	0.048 J
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2980	2620	2120
chromium	210	—	—	54.84	mg/kg	25 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	27.7	53.9	34.4
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.8	8.1	4.9
copper	3,100	—	—	39.14	mg/kg	37	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10.2	10	6.8
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	14000	15500	10600
lead	400	150	—	37.66	mg/kg	30	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.7	3.6	3
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2990	3070	2830
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	145	95.6	89
mercury	23	—	—	0.52	mg/kg	*25 U* [f]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.07 U	0.056 U	0.048 U
nickel	1,600	—	—	55.72	mg/kg	*56*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	23.8	45.6	32
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	814	1140	1000
silver	390	—	—	2.22	mg/kg	*25 U* [f]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.25	0.15	0.22
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	199	112 U	247
thallium	5.2	—	—	0.50	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*2 U* [f]	*2 U* [f]	*3 U* [f]
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	28.8	29.8	22.5
zinc	23,000	—	—	67.48	mg/kg	*89*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	28.8	23.6	21.6
Organotins						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3a
Soil Sampling Results, AOC 23 EBS Parcel 71

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	A23SB02 C077S364 0 - 2 29-Nov-05	A23SB02 C077S365 2 - 4 29-Nov-05	A23SB02 C077S366 4 - 8 29-Nov-05	A23SB03 C077S367 0 - 2 29-Nov-05	A23SB03 C077S368 2 - 4 29-Nov-05	A23SB03 C077S369 4 - 8 29-Nov-05	A23SB04 C077S370 0 - 2 29-Nov-05	A23SB04 C077S371 2 - 4 29-Nov-05	A23SB04 C077S372 4 - 8 29-Nov-05	A23SB05 C077S373 0 - 2 30-Nov-05	A23SB05 C077S375 4 - 8 30-Nov-05	A23SB06 C077S376 0 - 2 30-Nov-05	A23SB06 C077S377 2 - 4 30-Nov-05	A23SB06 C077S378 4 - 8 30-Nov-05	B06-08 B06-08-000 1 - 1.5 08-Jul-91
VOCs																				
acetone	14,000,000	—[b]	—	—	µg/kg	200 UJ	41 J	200 UJ	100 U	100 UJ	200 UJ	100 U	100 U	63 J	100 U	240 J	100 U	72 J	150 J	NA
benzene	640	—	—	—	µg/kg	10 UJ	6 UJ	9 UJ	6 UJ	6 UJ	8 UJ	5 U	6 U	9 U	5 U	20 U	6 U	6 U	6 UJ	NA
2-butanone	22,000,000	—	—	—	µg/kg	200 UJ	100 UJ	200 UJ	100 U	100 UJ	200 U	100 U	100 U	200 U	100 U	10 J	100 U	1.9 J	100 UJ	NA
carbon disulfide	360,000	—	—	—	µg/kg	200 UJ	100 UJ	3 J	100 U	100 UJ	200 U	100 U	100 U	200 U	100 U	6.6 J	100 U	100 U	100 UJ	NA
chlorobenzene	150,000	—	—	—	µg/kg	10 UJ	6 UJ	9 UJ	6 UJ	6 UJ	8 UJ	5 U	6 U	9 U	5 U	20 U	6 U	6 U	6 UJ	NA
chloroform	220	940	—	—	µg/kg	10 UJ	6 UJ	9 UJ	6 U	6 UJ	8 UJ	5 U	6 U	9 U	5 U	20 U	6 U	3.7 J	6 UJ	NA
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	10 UJ	6 UJ	9 UJ	6 U	6 UJ	8 UJ	25	3.2 J	2.4 J	0.68 J	20 U	0.29 J	1.6 J	6 UJ	NA
ethylbenzene	400,000	—	—	—	µg/kg	50 UJ	20 UJ	30 UJ	20 UJ	20 UJ	30 UJ	20 U	20 U	40 U	20 U	70 U	20 U	30 U	30 UJ	NA
methyl tert-butyl ether	17,000	—	—	—	µg/kg	90 UJ	50 UJ	70 UJ	50 U	1.3 J	70 U	40 U	50 U	70 U	40 U	140 U	50 U	1.2 J	50 UJ	NA
methylene chloride	9,100	—	—	—	µg/kg	100 UJ	26 J	90 UJ	60 U	60 UJ	80 UJ	60 U	60 U	90 U	50 U	200 U	60 U	20 J	19 J	NA
tetrachloroethene	480	—	—	—	µg/kg	10 UJ	3.1 J	9 UJ	3 J	3.6 J	4.4 J	4.7 J	4.5 J	5.1 J	5 U	6.5 J	6 U	3 J	1 J	NA
toluene	520,000	—	—	—	µg/kg	10 UJ	6 UJ	9 UJ	0.84 J	6 UJ	1.1 J	5 U	6 U	9 U	5 U	20 U	6 U	0.89 J	8.8 J	NA
trichloroethene	53	2,900	—	—	µg/kg	10 UJ	6 UJ	9 UJ	6 UJ	6 UJ	8 UJ	14	6 U	9 U	5 U	20 U	6 U	6 U	6 UJ	NA
m-, p-xylene	—	—	—	—	µg/kg	10 UJ	6 UJ	9 UJ	6 UJ	6 UJ	8 UJ	5 U	6 U	9 U	5 U	20 U	6 U	6 U	0.71 J	NA
Petroleum Hydrocarbons																				
diesel	—	—	100,000	—	µg/kg	8400	1200 U	**210000**	1200 U	1200 U	54000	19000	1200 U	56000	NA	NA	1200 U	1200 U	40000	NA
gasoline	—	—	100,000	—	µg/kg	1000 U	1000 U	2000 U	1000 U	1000 U	2000 U	1000 U	1000 U	2000 U	NA	NA	510 J	1000 U	1000 U	NA
motor oil	—	—	500,000	—	µg/kg	8500 J	12000 U	340000	12000 U	12000 U	83000	22000	12000 U	140000	NA	NA	12000 U	12000 U	77000	NA
SVOCs																				
acenaphthene	3,700,000	—	—	—	µg/kg	6 U	6 U	74	1.4 J	6 U	12	7.7	6 U	680	5 U	4.7 J	6 U	6 U	62	87 U
acenaphthylene	—	—	—	—	µg/kg	6 U	6 U	61	2.5 J	6 U	3.2 J	44	6 U	210	5 U	6.8 J	6 U	6 U	22	87 U
anthracene	22,000,000	—	—	—	µg/kg	6 U	6 U	360	3.6 J	6 U	9.6	110	6 U	1100	5 U	9.1	6 U	6 U	39	87 U
benz(a)anthracene	620[d]	—	—	—	µg/kg	6 U	6 U	330	14	2.4 J	18	450	6 U	**4900**	5.1	45	6 U	6 U	170	110 U
benzo(b)fluoranthene	620[d]	—	—	—	µg/kg	3.1 J	3.1 J	610 J	42 J	6 J	92 J	**680 J**	5.7 J	**7000 J**	7.9	170 J	2.2 J	6 U	350 J	110 U
benzo(k)fluoranthene	6,200[d]	380[d]	—	—	µg/kg	3 J	3.1 J	**590 J**	41 J	5.8 J	88 J	**650 J**	5.5 J	**6700 J**	4.2 J	170 J	3.9 J	6 U	340 J	110 U
benzo(g,h,i)perylene	—	—	—	—	µg/kg	6 U	2.2 J	330	33	6 U	63	350	5.5 J	2000	7.5	130	7.3	6 U	220	170 U
benzo(a)pyrene	62[d]	—	—	—	µg/kg	2.3 J	2.5 J	**490**	28	3.8 J	**67**	**490**	4 J	**4200**	7.5	**150**	2.3 J	6 U	**290**	**150 U**[f]
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	300 U	400 U	500 U	300 U	400 U	500 U	300 U	400 U	600 U	NA	NA	300 U	400 U	400 U	110 U
carbazole	24,000	—	—	—	µg/kg	700 U	700 U	1000 U	700 U	700 U	1000 U	700 U	700 U	380 J	NA	NA	700 U	700 U	800 U	NA
chrysene	62,000[d]	3,800[d]	—	—	µg/kg	6 U	6 U	330	16	6 U	24	400	6 U	**3900**	9.2	45	6 U	6 U	140	110 U
dibenz(a,h)anthracene	62[d]	—	—	—	µg/kg	6 U	6 U	47	5.5 J	6 U	7.5 J	**63**	2.9 J	**680**	2.7 J	12	6.1	6 U	30	**170 U**[f]
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	300 U	400 U	500 U	300 U	400 U	500 U	300 U	400 U	600 U	NA	NA	300 U	400 U	400 U	87 U
dibenzofuran	150,000	—	—	—	µg/kg	300 U	400 U	500 U	300 U	400 U	500 U	300 U	400 U	150 J	NA	NA	300 U	400 U	400 U	130 U
fluoranthene	2,300,000	—	—	—	µg/kg	6 U	6 U	1200	34	2.5 J	59	1100	6 U	7900	5.6	94	6 U	6 U	440	87 U
fluorene	2,700,000	—	—	—	µg/kg	6 U	6 U	90 J	6 U	6 U	11 J	23 J	6 U	610 J	5 U	4.1 J	6 U	6 U	38	87 U
indeno(1,2,3-cd)pyrene	620[d]	—	—	—	µg/kg	6 U	6 U	240	18	6 U	36	270	3.2 J	**1900**	4.3 J	80	5.1 J	6 U	160	170 U
2-methylnaphthalene	—	—	—	—	µg/kg	6 U	6 U	26 J	6 U	6 U	3.5 J	7.2 J	6 U	550 J	5 U	5.2 J	6 U	6 U	13 J	110 U
naphthalene	56,000[d]	1,700[d]	—	—	µg/kg	6 U	6 U	79 J	3.4 J	6 U	11 J	35 J	6 U	590 J	5 U	34	6 U	6 U	32	87 U
phenanthrene	—	—	—	—	µg/kg	6 U	6 U	980	17	6 U	26	590	6 U	4700	7.1	24	6 U	6 U	200 J	87 U
phenol	18,000,000	—	—	—	µg/kg	300 U	400 U	500 U	300 U	400 U	500 U	300 U	400 U	600 U	NA	NA	300 U	400 U	400 U	150 U
pyrene	2,300,000	—	—	—	µg/kg	2.8 J	3.8 J	1500 J	42 J	7.2 J	140 J	1300 J	2.9 J	7800 J	7.2	360	6 U	6 U	560	87 U
Pesticides/PCBs																				
4,4'-DDT	1,700	—	—	—	µg/kg	6 U	6 U	2.1 J	6 U	6 U	8 U	5 U	6 U	9 U	NA	NA	6 UJ	6 UJ	6 UJ	NA
Herbicides						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3a
Soil Sampling Results, AOC 23 EBS Parcel 71

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	A23SB02 C077S364 0 - 2 29-Nov-05	A23SB02 C077S365 2 - 4 29-Nov-05	A23SB02 C077S366 4 - 8 29-Nov-05	A23SB03 C077S367 0 - 2 29-Nov-05	A23SB03 C077S368 2 - 4 29-Nov-05	A23SB03 C077S369 4 - 8 29-Nov-05	A23SB04 C077S370 0 - 2 29-Nov-05	A23SB04 C077S371 2 - 4 29-Nov-05	A23SB04 C077S372 4 - 8 29-Nov-05	A23SB05 C077S373 0 - 2 30-Nov-05	A23SB05 C077S375 4 - 8 30-Nov-05	A23SB06 C077S376 0 - 2 30-Nov-05	A23SB06 C077S377 2 - 4 30-Nov-05	A23SB06 C077S378 4 - 8 30-Nov-05	B06-08 B06-08-000 1 - 1.5 08-Jul-91
Metals																				
aluminum	76,000	—	—	13,960	mg/kg	4870	4240	*22900*	5920	4510	10500	4950	3300	*15600*	NA	NA	3750	3780	3850	6440
antimony	31	—	—	9.50	mg/kg	0.65 U	0.6 U	0.91 U	0.6 U	0.6 U	0.59 U	0.6 U	0.6 U	1.5 U	NA	NA	0.6 U	0.6 U	0.6 U	3.6
arsenic	0.39	0.062	—	9.14	mg/kg	**1.7**	**2**	**8.6**	**2.2**	**1.8**	**5**	**1.9**	**1.7 U** [f]	**7**	NA	NA	**1.4**	**1.2**	**4.9**	**1.65 J**
barium	5,400	—	—	93.68	mg/kg	34.8	42.7	*284*	46.4	34.7	*202*	31.2	42.2	86.5	NA	NA	40.8	41.5	22.3	28
beryllium	150	—	—	1.27	mg/kg	0.13 J	0.12 J	0.46	0.15 J	0.11 J	0.29 J	0.11 J	0.062 J	0.26 J	NA	NA	0.062 U	0.077 U	0.11 U	0.316
cadmium	37	—	—	1.72	mg/kg	0.087 J	0.054 J	0.62 J	0.079 J	0.11 J	0.28 J	0.1 J	0.035 J	0.15 J	NA	NA	0.6 U	0.6 U	0.6 U	0.325 U
calcium	—	—	—	16,800	mg/kg	2370	2080	3510	2520	2150	4030	2340	1720	4740	NA	NA	2010	2000	2810	3890
chromium	210	—	—	54.84	mg/kg	31.8	32.1	*91.6*	35.9	31.9	*57.9*	34.9	29.6	*66.1*	NA	NA	30.4	25.2	23.8	23.7
cobalt	900	—	—	14.30	mg/kg	4.6	4.1	*16.2*	5.4	4.3	12	4.4	3	10.9	NA	NA	3.3	3.6	5.2	6.5
copper	3,100	—	—	39.14	mg/kg	7.5	5.5	*40.9*	7.5	5.9	22.4	5.1	4.2	24.3	NA	NA	4.7	4.7	5.2	11.4
iron	23,000	—	—	22,280	mg/kg	9880	8520	***36800***	11300	9340	20000	10100	6880	***28300***	NA	NA	7960	7460	9600	10500
lead	400	150	—	37.66	mg/kg	3.6	2.9	31.8	3.1	2.6	*58.5*	1.8	2.4	17.8	NA	NA	1.8	1.8	24.2	2.56
magnesium	—	—	—	7,304	mg/kg	2330	1990	*9730*	2580	2030	6650	2060	1580	*7440*	NA	NA	1920	1890	2500	3080
manganese	1,800	—	—	383.0	mg/kg	104	101	380	115	73.7	*424*	97.3	68.9	302	NA	NA	79.9	75.5	190	183
mercury	23	—	—	0.52	mg/kg	*1.1*	0.058 U	*2.1*	0.068 U	0.049 U	*0.94*	0.097 U	0.034 U	0.1 U	NA	NA	0.032 U	0.036 U	0.13	0.142 J
nickel	1,600	—	—	55.72	mg/kg	27.5	24.4	*105*	32.5	25.2	*73*	30	18	*62.8*	NA	NA	21.9	22.2	25	23.7
potassium	—	—	—	1,232	mg/kg	735	632	*3590*	795	704	*1760*	551	536	*2570*	NA	NA	498	534	744	614
silver	390	—	—	2.22	mg/kg	0.12	0.16	0.4	0.31	0.23	0.23	0.21	0.11 U	0.44	NA	NA	0.12 U	0.15 U	0.047 U	0.68
sodium	—	—	—	1,230	mg/kg	75.4 U	66.9 U	*2490*	74.6 U	125 U	*1430*	85.2 U	120 U	*3130*	NA	NA	90.2 J	121 J	711	317
thallium	5.2	—	—	0.50	mg/kg	*2 U* [f]	*2 U* [f]	*3 U* [f]	*2 U* [f]	*2 U* [f]	*3 U* [f]	*2 U* [f]	*2 U* [f]	*4 U* [f]	NA	NA	*2 U* [f]	*3 U* [f]	*3 U* [f]	0.267 UJ
vanadium	78	—	—	47.34	mg/kg	21	19.3	*64.9*	23.2	21.4	37.2	24	14	47.2	NA	NA	18.1	16.1	18.5	25.3 J
zinc	23,000	—	—	67.48	mg/kg	21.3	16.5	*136*	21.1	16.4	*99.3*	20.6	15.3	59.6	NA	NA	10.1	11.2	26	21.7
Organotins						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3a
Soil Sampling Results, AOC 23 EBS Parcel 71

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	B06-08 B06-08-002 2 - 3 08-Jul-91	B06-08 B06-08-007 6.5 - 7.5 08-Jul-91	B06-08 B06-08-014 14 - 15.5 08-Jul-91	B06-09 B06-09-000 1 - 1.5 08-Jul-91	B06-09 B06-09-002 2 - 3.5 08-Jul-91	B06-09 B06-09-008 8 - 9.5 08-Jul-91	B06-09 B06-09-014 14 - 15.5 08-Jul-91	B06-10 B06-10-000 1 - 1.5 08-Jul-91	B06-10 B06-10-002 2 - 3.5 08-Jul-91	B06-10 B06-10-008 8 - 9.5 08-Jul-91	B06-10 B06-10-008-DUP 8 - 9.5 08-Jul-91	B06-10 B06-10-014 14 - 15.5 08-Jul-91
VOCs																	
acetone	14,000,000	—[b]	—	—	µg/kg	11 U	13 U	14 U	NA	11 U	180	25 UJ	NA	15 UJ	25 UJ	NA	18 UJ
benzene	640	—	—	—	µg/kg	5.5 U	6.3 U	7.1 U	NA	5.4 U	9 U	8.1 U	NA	6.2 U	7.4 U	NA	6.7 U
2-butanone	22,000,000	—	—	—	µg/kg	11 U	13 U	14 U	NA	11 U	18 U	16 U	NA	12 U	15 U	NA	13 U
carbon disulfide	360,000	—	—	—	µg/kg	5.5 U	6.3 U	7.1 U	NA	5.4 U	25 UJ	11 UJ	NA	6.2 U	7.4 U	NA	6.7 U
chlorobenzene	150,000	—	—	—	µg/kg	5.5 U	6.3 U	7.1 U	NA	5.4 U	9 U	8.1 U	NA	6.2 U	7.4 U	NA	6.7 U
chloroform	220	940	—	—	µg/kg	5.5 U	6.3 U	7.1 U	NA	5.4 U	9 U	8.1 U	NA	6.2 U	7.4 U	NA	6.7 U
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ethylbenzene	400,000	—	—	—	µg/kg	5.5 U	6.3 U	7.1 U	NA	5.4 U	9 U	8.1 U	NA	6.2 U	7.4 U	NA	6.7 U
methyl tert-butyl ether	17,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	µg/kg	5.5 U	6.3 U	7.3 UJ	NA	5.4 U	12 UJ	8.1 U	NA	6.2 U	7.4 U	NA	6.7 U
tetrachloroethene	480	—	—	—	µg/kg	5.5 U	6.3 U	7.1 U	NA	5.4 U	9 U	8.1 U	NA	6.2 U	7.4 U	NA	6.7 U
toluene	520,000	—	—	—	µg/kg	5.5 U	6.3 U	7.1 U	NA	5.4 U	9 U	8.1 U	NA	6.2 U	7.4 U	NA	6.7 U
trichloroethene	53	2,900	—	—	µg/kg	5.5 U	6.3 U	7.1 U	NA	5.4 U	9 U	8.1 U	NA	6.2 U	7.4 U	NA	6.7 U
m-, p-xylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons																	
diesel	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gasoline	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																	
acenaphthene	3,700,000	—	—	—	µg/kg	87 U	100 U	110 U	89 U	86 U	140 U	2100 J	85 U	99 U	120 U	NA	110 U
acenaphthylene	—	—	—	—	µg/kg	87 U	100 U	110 U	89 U	86 U	140 U	240 J	85 U	99 U	120 U	NA	110 U
anthracene	22,000,000	—	—	—	µg/kg	87 U	100 U	110 U	89 U	86 U	150 J	1100 J	85 U	99 U	120 U	NA	110 U
benz(a)anthracene	620[d]	—	—	—	µg/kg	110 U	130 U	140 U	110 U	110 U	**1100 J**	**1300 J**	110 U	120 U	150 U	NA	130 U
benzo(b)fluoranthene	620[d]	—	—	—	µg/kg	110 U	130 U	140 U	110 U	110 U	**3100 J**	**1300 J**	110 U	120 U	420 J	NA	130 U
benzo(k)fluoranthene	6,200[d]	380[d]	—	—	µg/kg	110 U	130 U	140 U	110 U	110 U	**540 J**	**420 J**	110 U	120 U	150 U	NA	130 U
benzo(g,h,i)perylene	—	—	—	—	µg/kg	170 U	200 U	230 U	180 U	170 U	3300 J	1000 J	170 U	200 U	500 J	NA	210 U
benzo(a)pyrene	62[d]	—	—	—	µg/kg	**150 U**[f]	**180 U**[f]	**200 U**[f]	**160 U**[f]	**150 U**[f]	**4100 J**	**1800 J**	**150 U**[f]	**170 U**[f]	**570 J**	NA	**190 U**[f]
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	110 U	130 U	140 U	110 U	110 U	180 U	160 U	110 U	120 U	150 U	NA	130 U
carbazole	24,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[d]	3,800[d]	—	—	µg/kg	110 U	130 U	140 U	110 U	110 U	1200 J	1400 J	110 U	120 U	180 J	NA	130 U
dibenz(a,h)anthracene	62[d]	—	—	—	µg/kg	**170 U**[f]	**200 U**[f]	**230 U**[f]	**180 U**[f]	**170 U**[f]	**290 U**[f]	**260 U**[f]	**170 U**[f]	**200 U**[f]	**240 U**[f]	NA	**210 U**[f]
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	87 U	100 U	110 U	89 U	86 U	140 U	130 U	85 U	99 U	120 U	NA	110 U
dibenzofuran	150,000	—	—	—	µg/kg	130 U	150 U	170 U	130 U	130 U	220 U	190 U	130 U	150 U	180 U	NA	160 U
fluoranthene	2,300,000	—	—	—	µg/kg	87 U	100 U	160 J	91 J	86 U	1500 J	4200 J	85 U	99 U	350 J	NA	110 U
fluorene	2,700,000	—	—	—	µg/kg	87 U	100 U	110 U	89 U	86 U	140 U	590 J	85 U	99 U	120 U	NA	110 U
indeno(1,2,3-cd)pyrene	620[d]	—	—	—	µg/kg	170 U	200 U	230 U	180 U	170 U	**3100 J**	**1100 J**	170 U	200 U	410 J	NA	210 U
2-methylnaphthalene	—	—	—	—	µg/kg	110 U	130 U	140 U	110 U	110 U	180 U	160 U	110 U	120 U	150 U	NA	130 U
naphthalene	56,000[d]	1,700[d]	—	—	µg/kg	87 U	100 U	110 U	89 U	86 U	140 U	1500 J	85 U	99 U	120 U	NA	110 U
phenanthrene	—	—	—	—	µg/kg	87 U	100 U	110 U	89 U	86 U	450 J	6200 J	85 U	99 U	120 U	NA	110 U
phenol	18,000,000	—	—	—	µg/kg	150 U	180 U	200 U	160 U	150 U	250 U	230 U	150 U	170 U	210 U	NA	190 U
pyrene	2,300,000	—	—	—	µg/kg	87 U	100 U	380 J	130 J	86 U	8000 J	4800 J	85 U	100 J	1200 J	NA	110 U
Pesticides/PCBs																	
4,4'-DDT	1,700	—	—	—	µg/kg	7.28 U	8.39 U	9.46 U	NA	7.15 U	12 U	10.8 U	NA	8.28 U	9.88 U	NA	8.92 U
Herbicides						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3a
Soil Sampling Results, AOC 23 EBS Parcel 71

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	B06-08 B06-08-002 2 - 3 08-Jul-91	B06-08 B06-08-007 6.5 - 7.5 08-Jul-91	B06-08 B06-08-014 14 - 15.5 08-Jul-91	B06-09 B06-09-000 1 - 1.5 08-Jul-91	B06-09 B06-09-002 2 - 3.5 08-Jul-91	B06-09 B06-09-008 8 - 9.5 08-Jul-91	B06-09 B06-09-014 14 - 15.5 08-Jul-91	B06-10 B06-10-000 1 - 1.5 08-Jul-91	B06-10 B06-10-002 2 - 3.5 08-Jul-91	B06-10 B06-10-008 8 - 9.5 08-Jul-91	B06-10 B06-10-008-DUP 8 - 9.5 08-Jul-91	B06-10 B06-10-014 14 - 15.5 08-Jul-91
Metals																	
aluminum	76,000	—	—	13,960	mg/kg	3940	6830	9110	5600	3960	*22200*	*14100*	4260	4880	7110	NA	11000
antimony	31	—	—	9.50	mg/kg	3.6	4.3	4.2	3.3	3.1	*9.9*	5.8	2.7 U	4.3	6	NA	5.3
arsenic	0.39	0.062	—	9.14	mg/kg	**1.68 J**	**1.62 J**	**4.35 J**	**1.85 J**	**1.23 J**	**5.84 J**	**3.54 J**	**1.48 J**	**2.76 J**	**3.21 J**	NA	**4.21 J**
barium	5,400	—	—	93.68	mg/kg	30.9	*98.4*	16.7	50.8	25.8	92.2	31.1	31.6	31.8	76.3	NA	24.1
beryllium	150	—	—	1.27	mg/kg	0.603	0.779	0.807	0.666	0.695	*1.82*	1.07	0.566	0.685	0.608	NA	1.27
cadmium	37	—	—	1.72	mg/kg	0.29 U	0.35 U	0.359 U	0.31 U	0.288 U	0.517 U	0.423 U	0.319 U	0.346 U	0.376 U	NA	0.379 U
calcium	—	—	—	16,800	mg/kg	1820	2050	1950	4730	1920	4840	5510	2510	2050	2470	NA	2170
chromium	210	—	—	54.84	mg/kg	24.3	36.5	36.7	29.7	25.5	*82.9*	*55.9*	28	30	40.2	NA	44.9
cobalt	900	—	—	14.30	mg/kg	5.27	7.87	7.04	6.5	4.4	*16.9*	10.7	5.05	5.55	9.56	NA	9.59
copper	3,100	—	—	39.14	mg/kg	6.9	8.08	11.1	9.77	5	*48.1*	16.9	4.36	7.1	17.3	NA	14.2
iron	23,000	—	—	22,280	mg/kg	7910	13000	13900	10500	7410	***35100***	*22500*	8030	9600	15000	NA	19400
lead	400	150	—	37.66	mg/kg	5	2.77	3.83	8.24	2.86	*45.1*	4.55	2.75	9.86	*53.4*	NA	4.12
magnesium	—	—	—	7,304	mg/kg	2310	3950	5910	3080	2150	*12500*	*8400*	1940	2600	4480	NA	7050
manganese	1,800	—	—	383.0	mg/kg	98.6	130	143	129	84.8	*440*	259	102	121	327	NA	192
mercury	23	—	—	0.52	mg/kg	0.098 UJ	0.116 UJ	0.141 UJ	0.109 UJ	0.095 UJ	*0.72 J*	0.128 UJ	0.093 UJ	0.121 UJ	0.451 J	NA	0.107 UJ
nickel	1,600	—	—	55.72	mg/kg	26.8	44.3	36.1	29.3	24.4	*97.9*	50.5	29.8	28.6	53.2	NA	44.1
potassium	—	—	—	1,232	mg/kg	713	1150	*2410*	925	690	*4400*	*2880*	615	883	*1440*	NA	*2490*
silver	390	—	—	2.22	mg/kg	0.691	0.572 U	0.587 U	0.776	0.681	1.39	0.866	0.686	0.839	0.98	NA	0.821
sodium	—	—	—	1,230	mg/kg	239	*1580*	*7020*	313	225	*7900*	*7360*	210	240	*2200*	NA	*6050*
thallium	5.2	—	—	0.50	mg/kg	0.283 UJ	0.294 UJ	0.348 UJ	0.279 UJ	0.262 UJ	0.472 UJ	0.368 UJ	0.274 UJ	0.323 UJ	0.349 UJ	NA	0.325 UJ
vanadium	78	—	—	47.34	mg/kg	18.3 J	27.4 J	39.5 J	25.9 J	18.7 J	*72.6 J*	47.3 J	20.7 J	22.7 J	29.8 J	NA	38.9 J
zinc	23,000	—	—	67.48	mg/kg	20.6	28.4	34.9	28.9	17	*117*	48.8	17.5	25.1	*69.8*	NA	43.8
Organotins						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL
[d] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[e] italicized font indicates result above background
[f] detection limit is above criteria

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
Cal – California
DDT – dichlorodiphenyltrichloroethane
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
ND – not detected
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-3b
Groundwater Sampling Results, AOC 23 EBS Parcel 71

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	071-SS-007 071M-010 7.5 - 8.5 04-Oct-95	071-SS-008 071M-011 7.5 - 8.5 04-Oct-95	071-SS-009 071M-013 7.5 - 8.5 04-Oct-95	071-SS-010 071M-015 7.5 - 8.5 04-Oct-95	071-SS-011 071M-016 7.5 - 8.5 04-Oct-95	071-SS-012 071M-017 7.5 - 8.5 04-Oct-95	071-SS-013 071M-018 7.5 - 8.5 06-Oct-95	A23SB01 C077G101 7 - 12 29-Nov-05	A23SB01 C077G102 (FD) 7 - 12 29-Nov-05	A23SB02 C077G103 6 - 11 29-Nov-05	A23SB02 C077G103A 6 - 11 30-Nov-05	A23SB02 C077G104 6 - 11 29-Nov-05	A23SB02 C077G104A 6 - 11 30-Nov-05	A23SB03 C077G105 5 - 9 30-Nov-05
VOCs																			
benzene	5	1	—[b]	—	µg/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.18 J	0.22 J	0.5 U	NA	NA	NA	**1.1**[c]
carbon disulfide	—	—	—	—	µg/L	1 U	1 U	1 U	1 U	1 U	2	1 UJ	1.7 U	2.1 U	1.8 U	NA	NA	NA	2.7
1,1-dichloroethane	—	5	—	—	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 UJ	0.5 U	0.5 U	0.5 U	NA	NA	NA	0.5 U
cis-1,2-dichloroethene	70	6	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	0.21 J	0.16 J	0.5 U	NA	NA	NA	0.3 J
ethylbenzene	700	300	—	—	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 UJ	0.5 U	0.5 U	0.5 U	NA	NA	NA	0.59
naphthalene	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	NA	NA	NA	4.2
toluene	1,000	150	—	—	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	1 UJ	0.76	0.79	0.5 U	NA	NA	NA	1.1
1,2,4-trimethylbenzene	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	NA	NA	NA	0.27 J
m-, p-xylene	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	0.39 J	0.36 J	0.2 J	NA	NA	NA	0.75
o-xylene	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	NA	NA	NA	0.27 J
Petroleum Hydrocarbons																			
diesel	—	—	100	—	µg/L	100 U	**300 U**[d]	100 U	100 U	100 U	**110 J**	100 U	50 U	NA	**140**	NA	NA	NA	**250**
gasoline	—	—	100	—	µg/L	50 U	50 U	50 U	50 U	50 U	50 U	50 UJ	100 U	NA	100 U	NA	NA	NA	10 J
motor oil	—	—	100	—	µg/L	**200 U**[d]	**930 J**	**330 J**	**200 U**[d]	**200 U**[d]	**200 U**[d]	**200 U**[d]	**500 U**[d]	NA	**500 U**[d]	NA	NA	NA	**500 U**[d]
SVOCs																			
acenaphthene	—	—	—	—	µg/L	10 U	10 U	10 U	1 J	10 U	10 U	10 U	0.24	NA	0.54	NA	NA	NA	2.1
acenaphthylene	—	—	—	—	µg/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.2 U	NA	0.11 J	NA	NA	NA	0.58
anthracene	—	—	—	—	µg/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.2 U	NA	0.2 U	NA	NA	NA	0.24
benz(a)anthracene	—	—	—	—	µg/L	10 U	10 U	2 J	10 U	10 U	10 U	10 U	0.2 U	NA	0.2 U	NA	NA	NA	0.2 U
benzo(b)fluoranthene	—	—	—	—	µg/L	10 U	10 U	3 J	10 U	10 U	10 U	10 U	0.2 U	NA	0.2 U	NA	NA	NA	0.2 U
benzo(g,h,i)perylene	—	—	—	—	µg/L	10 U	10 U	2 J	10 U	10 U	10 U	10 U	0.2 U	NA	0.2 U	NA	NA	NA	0.2 U
benzo(a)pyrene	0.2	0.2	—	—	µg/L	**10 U**[d]	**10 U**[d]	**3 J**	**10 U**[d]	**10 U**[d]	**10 U**[d]	**10 U**[d]	0.2 U	NA	0.2 U	NA	NA	NA	0.2 U
butylbenzyl phthalate	—	—	—	—	µg/L	2 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	NA	10 U	NA	10 U
chrysene	—	—	—	—	µg/L	10 U	10 U	2 J	10 U	10 U	10 U	10 U	0.2 U	NA	0.2 U	NA	NA	NA	0.2 U
fluoranthene	—	—	—	—	µg/L	10 U	10 U	5 J	10 U	10 U	10 U	10 U	0.2 U	NA	0.2 U	NA	NA	NA	0.65
fluorene	—	—	—	—	µg/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.1 J	NA	0.16 J	NA	NA	NA	0.54
indeno(1,2,3-cd)pyrene	—	—	—	—	µg/L	10 U	10 U	2 J	10 U	10 U	10 U	10 U	0.2 U	NA	0.2 U	NA	NA	NA	0.2 U
2-methylnaphthalene	—	—	—	—	µg/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.2 U	NA	0.2 U	NA	NA	NA	0.24
naphthalene	—	—	—	—	µg/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	0.2 U	NA	0.11 J	NA	NA	NA	3.5
phenanthrene	—	—	—	—	µg/L	10 U	10 U	3 J	10 U	10 U	10 U	10 U	0.24	NA	0.23	NA	NA	NA	1.4
pyrene	—	—	—	—	µg/L	1 J	10 U	9 J	1 J	10 U	10 U	10 U	0.39	NA	0.28	NA	NA	NA	2.7
Pesticides/PCBs						NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA	NA
Metals																			
barium	2,000	1,000	—	569.5	µg/L	NA	NA	NA	NA	NA	NA	NA	67.3	NA	NA	169	NA	NA	NA
beryllium	4	4	—	2.50	µg/L	NA	NA	NA	NA	NA	NA	NA	2 U	NA	NA	***10 U***[d,e]	NA	NA	NA
calcium	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	10,500	NA	NA	23,500	NA	NA	NA
chromium	100	50	—	12.45	µg/L	NA	NA	NA	NA	NA	NA	NA	2.3 J	NA	NA	*25 U*[d]	NA	NA	NA
iron	—	—	—	6,586	µg/L	NA	NA	NA	NA	NA	NA	NA	631	NA	NA	158 U	NA	NA	NA
magnesium	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	19,600	NA	NA	52,000	NA	NA	NA
manganese	—	—	—	1,741	µg/L	NA	NA	NA	NA	NA	NA	NA	97.9	NA	NA	326	NA	NA	NA
mercury	2	2	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	0.086 U	NA	NA	0.046 U	NA	NA	NA
nickel	—	100	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	5 U	NA	NA	25 U	NA	NA	NA
potassium	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	20,900	NA	NA	46,500	NA	NA	NA
selenium	50	50	—	8.58	µg/L	NA	NA	NA	NA	NA	NA	NA	5 U	NA	NA	*25 U*[d]	NA	NA	NA
sodium	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	737,000	NA	NA	1,270,000	NA	NA	NA
vanadium	—	—	—	26.27	µg/L	NA	NA	NA	NA	NA	NA	NA	2.5 J	NA	NA	5.4 J	NA	NA	NA
Low Level Mercury																			
mercury	2	2	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry																			
solids, total dissolved	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	1,660,000	NA	NA	2,470,000	NA	1,920,000	NA

Table 4-3b
Groundwater Sampling Results, AOC 23 EBS Parcel 71

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	A23SB03 C077G105A 5 - 9 02-Dec-05	A23SB04 C077G106 6 - 11 30-Nov-05	A23SB05 C077G107 8 - 12 30-Nov-05	A23SB05 C077G108 (FD) 8 - 12 30-Nov-05	A23SB06 C077G109 6 - 11 30-Nov-05	A23SB06 C077G109A 6 - 11 02-Dec-05	S06-DGS-VE02 385-S06-028 5.4 - 6.9 06-Aug-01
VOCs												
benzene	5	1	—[b]	—	µg/L	NA	0.32 J	0.5 U	0.5 U	0.5 U	NA	1 U
carbon disulfide	—	—	—	—	µg/L	NA	10	0.38 J	0.3 J	1.3	NA	NA
1,1-dichloroethane	—	5	—	—	µg/L	NA	0.5 U	0.5 U	0.5 U	0.78	NA	1 U
cis-1,2-dichloroethene	70	6	—	—	µg/L	NA	0.35 J	0.5 U	0.5 U	0.5 U	NA	1 U
ethylbenzene	700	300	—	—	µg/L	NA	0.53	0.5 U	0.5 U	0.5 U	NA	1 U
naphthalene	—	—	—	—	µg/L	NA	0.43 J	0.5	0.5 U	0.5 U	NA	1 U
toluene	1,000	150	—	—	µg/L	NA	1.1	0.29 J	0.41 J	0.19 J	NA	1 U
1,2,4-trimethylbenzene	—	—	—	—	µg/L	NA	0.24 J	0.5 U	0.5 U	0.5 U	NA	NA
m-, p-xylene	—	—	—	—	µg/L	NA	0.79	0.5 U	0.19 J	0.5 U	NA	1 U
o-xylene	—	—	—	—	µg/L	NA	0.46 J	0.5 U	0.5 U	0.5 U	NA	1 U
Petroleum Hydrocarbons												
diesel	—	—	100	—	µg/L	NA	**150**	NA	NA	**150**	NA	**200 UJ**[d]
gasoline	—	—	100	—	µg/L	NA	100 U	NA	NA	100 U	NA	50 U
motor oil	—	—	100	—	µg/L	NA	**500 U**[d]	NA	NA	**500 U**[d]	NA	**200 UJ**[d]
SVOCs												
acenaphthene	—	—	—	—	µg/L	NA	0.47	0.22	0.24	NA	1.9	NA
acenaphthylene	—	—	—	—	µg/L	NA	0.17 J	0.2 U	0.2 U	NA	0.2 U	NA
anthracene	—	—	—	—	µg/L	NA	0.13 J	0.2 U	0.2 U	NA	0.2 U	NA
benz(a)anthracene	—	—	—	—	µg/L	NA	0.2 U	0.2 U	0.2 U	NA	0.2 U	NA
benzo(b)fluoranthene	—	—	—	—	µg/L	NA	0.2 U	0.2 U	0.2 U	NA	0.2 U	NA
benzo(g,h,i)perylene	—	—	—	—	µg/L	NA	0.2 U	0.2 U	0.2 U	NA	0.2 U	NA
benzo(a)pyrene	0.2	0.2	—	—	µg/L	NA	0.2 U	0.2 U	0.2 U	NA	0.2 U	NA
butylbenzyl phthalate	—	—	—	—	µg/L	NA	10 U	NA	NA	10 U	NA	NA
chrysene	—	—	—	—	µg/L	NA	0.2 U	0.2 U	0.2 U	NA	0.2 U	NA
fluoranthene	—	—	—	—	µg/L	NA	0.47	0.093 J	0.2 U	NA	0.24	NA
fluorene	—	—	—	—	µg/L	NA	0.16 J	0.2 U	0.2 U	NA	0.51	NA
indeno(1,2,3-cd)pyrene	—	—	—	—	µg/L	NA	0.2 U	0.2 U	0.2 U	NA	0.2 U	NA
2-methylnaphthalene	—	—	—	—	µg/L	NA	NA	NA	NA	NA	0.2 U	NA
naphthalene	—	—	—	—	µg/L	NA	0.14 J	0.2 U	0.2 U	NA	0.18 J	NA
phenanthrene	—	—	—	—	µg/L	NA	0.56	0.11 J	0.1 J	NA	0.37	NA
pyrene	—	—	—	—	µg/L	NA	1.8	0.39	0.36	NA	0.67	NA
Pesticides/PCBs						ND	ND	NA	NA	NA	ND	NA
Metals												
barium	2,000	1,000	—	569.5	µg/L	189	444	NA	NA	NA	72.7	NA
beryllium	4	4	—	2.50	µg/L	2 U	*3.1 J*	NA	NA	NA	0.26 J	NA
calcium	—	—	—	—	µg/L	40,700	284,000	NA	NA	NA	12,300	NA
chromium	100	50	—	12.45	µg/L	2.9 J	*42.2 J*	NA	NA	NA	5.9	NA
iron	—	—	—	6,586	µg/L	2,630	*6,900*	NA	NA	NA	179	NA
magnesium	—	—	—	—	µg/L	293,000	903,000	NA	NA	NA	22,600	NA
manganese	—	—	—	1,741	µg/L	595	*2,550*	NA	NA	NA	147	NA
mercury	2	2	—	—	µg/L	0.2 U	0.076 U	NA	NA	NA	NA	NA
nickel	—	100	—	—	µg/L	5 U	50 U	NA	NA	NA	7.2	NA
potassium	—	—	—	—	µg/L	144,000 J	276,000	NA	NA	NA	30,000	NA
selenium	50	50	—	8.58	µg/L	3.3 J	*50 U*[d]	NA	NA	NA	5 U	NA
sodium	—	—	—	—	µg/L	3,870,000	8,910,000	NA	NA	NA	1,190,000	NA
vanadium	—	—	—	26.27	µg/L	1.2 J	*31.4 J*	NA	NA	NA	7	NA
Low Level Mercury												
mercury	2	2	—	—	µg/L	NA	NA	NA	NA	NA	0.0016 J	NA
General Chemistry												
solids, total dissolved	—	—	—	—	µg/L	10,800,000	21,900,000	4,390,000	4,440,000	NA	3,020,000	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] bolded font indicates result above one of the following Fed MCL, Cal MCL, TPH ESL
[d] detection limit is above criteria
[e] italicized font indicates result above background

Acronyms/Abbreviations:
AOC – area of concern
Cal – California
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
GW – groundwater
µg/L – micrograms per liter
MCL – maximum contaminant level
NA – not analyzed
ND – not detected
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 4-3c
Groundwater Sampling Results Compared to
Surface Water Preliminary Screening Criteria, AOC 23 EBS Parcel 71

Analyte	PRELIMINARY SCREENING CRITERIA SW TPH ESL	CTR CCC	CTR HHCO	NRWQC CCC	NRWQC HHCO	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	071-SS-012 071M-017 7.5 - 8.5 04-Oct-95	071-SS-013 071M-018 7.5 - 8.5 06-Oct-95
VOCs									
carbon disulfide	—[b]	—	—	—	—	—	µg/L	2	1 UJ
Petroleum Hydrocarbons									
diesel	640	—	—	—	—	—	µg/L	110 J	100 U
SVOCs								ND	ND

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Acronyms/Abbreviations:
AOC – area of concern
CCC – criterion continuous concentration
CTR – California Toxics Rule
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
HHCO – human-health consumption of organisms only
µg/L – micrograms per liter
ND – not detected
NRWQC – National Recommended Water Quality Criteria
SVOC – semivolatile organic compound
SW – surface water
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-4a
Soil Sampling Results, AOC 23 EBS Parcel 72

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: 072-001-001 / Sample: 072-0001 / [a] Depth Interval: 0.5 - 1 / Collection Date: 15-Mar-95	072-001-002 / 072-0002 / 0.5 - 1 / 15-Mar-95	072-001-003 / 072-0003 / 3 - 3.5 / 15-Mar-95
Pesticides/PCBs								
Aroclor 1260	220	—[b]	—	—	µg/kg	37 U	45	37 U
alpha-chlordane	1,600	—	—	—	µg/kg	1.9 U	2.1	1.9 U

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

Acronyms/Abbreviations:

AOC – area of concern
Cal – California
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/kg – micrograms per kilogram
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
Res – residential
TPH – total petroleum hydrocarbons

Review Qualifier:

U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit

Table 4-4b
Groundwater Sampling Results, AOC 23 EBS Parcel 72

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	A23SB07 / C077G110 / 6 - 11 / 30-Nov-05
VOCs						
carbon disulfide	—[b]	—	—	—	µg/L	1.1
toluene	1,000	150	—	—	µg/L	0.2 J
General Chemistry						
solids, total dissolved	—	—	—	—	µg/L	842,000

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established

Acronyms/Abbreviations:
AOC – area of concern
Cal – California
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
GW – groundwater
µg/L – micrograms per liter
MCL – maximum contaminant level
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifier:
J – indicates an estimated value

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Table 4-5a
Soil Sampling Results, AOC 23 EBS Parcel 110

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Result Units	Station ID: / Sample: / [a] Depth Interval: / Collection Date:	110-IW-001 110I-001 8.5 - 9 03-Jan-95	110-IW-001 110I-001M 8.5 - 9 03-Jan-95	110-IW-002 110I-002 5 - 5.5 14-Feb-95	110-IW-002 110I-002M 5 - 5.5 14-Feb-95	110-IWPS5-001 110P-001 8.5 - 9 03-Jan-95	110-IWPS5-001 110P-001M 8.5 - 9 03-Jan-95	110-Z17-001 110-0001M 1 - 1.5 09-Jun-95	110-Z17-002 110-0002M 2 - 2.5 09-Jun-95	123-Z17-013 123-0013M 2 - 2.5 12-Jun-95	123-Z17-013 123-0021M (FD) 2 - 2.5 12-Jun-95	124-Z17-004 124-0004M 0 - 0.5 28-Jun-95
VOCs																	
acetone	14,000,000	—[b]	—	—	µg/kg		12 U	NA	12 U	NA	160	NA	NA	NA	NA	NA	NA
2-butanone	22,000,000	—	—	—	µg/kg		12 U	10 U	12 U	10 U	30 U	10 U	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	µg/kg		12 U	NA	12 U	NA	2 J	NA	NA	NA	NA	NA	NA
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg		NA	10 U	NA	10 U	NA	10 U	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	µg/kg		12 U	10 U	12 U	10 U	13 U	10 U	NA	NA	NA	NA	NA
tetrachloroethene	480	—	—	—	µg/kg		12 U	10 U	12 U	10 U	13 U	10 U	NA	NA	NA	NA	NA
m-, p-xylene	—	—	—	—	µg/kg		NA	20 U	NA	20 U	NA	20 U	NA	NA	NA	NA	NA
Petroleum Hydrocarbons																	
diesel	—	—	100,000	—	µg/kg		12000 U	NA	12000 U	NA	13000 U	NA	1000 U	1000 U	1000 U	1000 U	33000
gasoline	—	—	100,000	—	µg/kg		600 U	NA	610 U	NA	650 U	NA	500 U	500 U	600 U	600 U	540 U
motor oil	—	—	500,000	—	µg/kg		24000 U	NA	49000 J	NA	26000 U	NA	26000 U	26000 U	81000	36000	**700000**[c]
SVOCs																	
acenaphthene	3,700,000	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
acenaphthylene	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[d]	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[d]	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[d]	380[d]	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[d]	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg		25 J	NA	31 J	NA	430 U	NA	340 U	350 U	390 U	380 U	1800 U
chrysene	62,000[d]	3,800[d]	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[d]	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg		390 U	NA	400 U	NA	430 U	NA	340 U	350 U	390 U	380 U	1800 U
fluoranthene	2,300,000	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[d]	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[d]	1,700[d]	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs																	
Aroclor 1260	220	—	—	—	µg/kg		39 U	NA	40 U	NA	43 U	NA	21 U	21 U	23 U	23 U	13 J
4,4'-DDT	1,700	—	—	—	µg/kg		3.9 U	NA	4 U	NA	4.3 U	NA	NA	NA	NA	NA	NA
Herbicides							ND	NA	ND	NA	ND	NA	NA	NA	NA	NA	NA
Metals																	
aluminum	76,000	—	—	13,960	mg/kg		5290 J	NA	5530	NA	*18500 J*[e]	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg		**3.8**	NA	**2.2**	NA	**5.5**	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg		26.7	NA	45.9	NA	*229*	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg		*1.5*[f]	*25 U*[f]	0.19 U	*25 U*[f]	*3.4*	*25 U*[f]	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	mg/kg		0.11	*25 U*[f]	0.1 UJ	*25 U*[f]	0.1 U	*25 U*[f]	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg		16100	NA	3750	NA	2490	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg		26	25 U	24.1	25 U	49.5	25 U	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg		6.7	NA	5.2	NA	9	NA	NA	NA	NA	NA	NA

Table 4-5a
Soil Sampling Results, AOC 23 EBS Parcel 110

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	110-IW-001 110I-001 8.5 - 9 03-Jan-95	110-IW-001 110I-001M 8.5 - 9 03-Jan-95	110-IW-002 110I-002 5 - 5.5 14-Feb-95	110-IW-002 110I-002M 5 - 5.5 14-Feb-95	110-IWPS5-001 110P-001 8.5 - 9 03-Jan-95	110-IWPS5-001 110P-001M 8.5 - 9 03-Jan-95	110-Z17-001 110-0001M 1 - 1.5 09-Jun-95	110-Z17-002 110-0002M 2 - 2.5 09-Jun-95	123-Z17-013 123-0013M 2 - 2.5 12-Jun-95	123-Z17-013 123-0021M (FD) 2 - 2.5 12-Jun-95	124-Z17-004 124-0004M 0 - 0.5 28-Jun-95
Metals (continued)																
copper	3,100	—	—	39.14	mg/kg	13.4	25 U	11.5 J	*48*	*39.2*	*65*	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	11300 J	NA	10800 J	NA	***23300 J***	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	2.8 J	25 U	14.3	25 U	*48.7 J*	*41*	9.6	2.6	4.4	2.7	24
magnesium	—	—	—	7,304	mg/kg	3680	NA	3200	NA	7090	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	*523*	NA	143	NA	170	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	mg/kg	0.18 U	***25 U*** [f]	0.18 U	***25 U*** [f]	*0.9*	***25 U*** [f]	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	30.7	44 U	28.1	30	*55.8*	*119*	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	849	NA	1020 J	NA	*2970*	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	mg/kg	0.63 U	NA	0.77 J	NA	0.69 U	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	mg/kg	0.62 U	*25 U* [f]	0.48 U	*25 U* [f]	0.74 U	*25 U* [f]	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	452	NA	128 U	NA	*2370*	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	mg/kg	*2.7*	NA	*3.7 J*	NA	*4.1*	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	23.4	NA	22.5	NA	*49.8*	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	35.6	25 U	31.8	49	*74.9*	*143*	NA	NA	NA	NA	NA
Organotins						ND	NA	ND	NA	ND	NA	NA	NA	NA	NA	NA

Table 4-5a
Soil Sampling Results, AOC 23 EBS Parcel 110

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	32EDC-5-80 C032CB06 0 - 0.5 23-May-02	32EDC-5-80 C032CB07 0.5 - 2 23-May-02	32EDC-5-80 C032CB08 2 - 4 23-May-02	32EDC-5-80 C032CB09 4 - 8 23-May-02	32EDC-5-80 C032CB10 (FD) 4 - 8 23-May-02	32EDC-5-91 C032CB55 0 - 0.5 16-May-02	32EDC-5-91 C032CB56 0.5 - 2 16-May-02	32EDC-5-91 C032CB57 2 - 4 16-May-02	32EDC-5-91 C032CB58 4 - 8 16-May-02	A23SB09 C077S379 1 - 2 05-Dec-05	A23SB09 C077S380 3 - 4 05-Dec-05
VOCs																
acetone	14,000,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	100 U	100 U
2-butanone	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	100 U	100 U
carbon disulfide	360,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	100 U	100 U
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	6 U
methylene chloride	9,100	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	50 U	60 U
tetrachloroethene	480	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	6 U
m-, p-xylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	6 U
Petroleum Hydrocarbons																
diesel	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	13000	1100 U
gasoline	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	1000 U	1000 U
motor oil	—	—	500,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	15000	11000 U
SVOCs																
acenaphthene	3,700,000	—	—	—	µg/kg	5.4 U	5.3 U	5.4 U	6 U	6 U	1.7 J	27 UJ	5.4 UJ	6.1 UJ	5 U	6 U
acenaphthylene	—	—	—	—	µg/kg	5.4 U	5.3 U	5.4 U	6 U	6 U	2.7 J	27 U	3.8 J	6.1 U	5 U	6 U
anthracene	22,000,000	—	—	—	µg/kg	5.4 U	5.3 U	5.4 U	6 U	6 U	1.4 J	27 UJ	5.4 UJ	1.7 J	5 U	6 U
benz(a)anthracene	620[d]	—	—	—	µg/kg	4.4 J	2.1 J	5.4 U	6 U	6 U	8.6	27 U	3.8 J	8.7	3 J	6 U
benzo(b)fluoranthene	620[d]	—	—	—	µg/kg	5.7	2.4 J	1.5 J	1.6 J	6 U	19	27 U	6.7	14	12 J	4.1 J
benzo(k)fluoranthene	6,200[d]	380[d]	—	—	µg/kg	5.2 J	2.2 J	5.4 U	6 U	6 U	17	27 U	6.3	12	12 J	3.9 J
benzo(g,h,i)perylene	—	—	—	—	µg/kg	7.6	3.5 J	3 J	2.5 J	2.1 J	32	47	13	17	5 UJ	3.6 J
benzo(a)pyrene	62[d]	—	—	—	µg/kg	7	3.2 J	5.4 U	6 U	6 U	32	**130**	11	22	8.7	1.7 J
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	300 U	300 U
chrysene	62,000[d]	3,800[d]	—	—	µg/kg	6	2.6 J	5.4 U	6 U	6 U	8.8	27 U	4.7 J	11	5	2.1 J
dibenz(a,h)anthracene	62[d]	—	—	—	µg/kg	5.4 U	5.3 U	5.4 U	6 U	6 U	4.3 J	13 J	1.7 J	2.3 J	5 UJ	6 UJ
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	530	160 J
fluoranthene	2,300,000	—	—	—	µg/kg	7.5	4.7 J	2.3 J	2.1 J	6 U	8.4	27 U	3.3 J	17	5.5	6 U
indeno(1,2,3-cd)pyrene	620[d]	—	—	—	µg/kg	6.1	3.3 J	1.8 J	2.2 J	1.9 J	21	27 U	8	13	5 UJ	6 UJ
2-methylnaphthalene	—	—	—	—	µg/kg	5.4 U	5.3 U	5.4 U	6 U	6 U	5.7 UJ	27 UJ	5.4 UJ	6.1 UJ	1.3 J	6 U
naphthalene	56,000[d]	1,700[d]	—	—	µg/kg	5.4 U	5.3 U	5.4 U	6 U	6 U	1.5 J	27 UJ	0.9 J	1 J	1.6 J	6 U
phenanthrene	—	—	—	—	µg/kg	1.5 J	1.8 J	5.4 U	6 U	6 U	5.7 UJ	27 UJ	5.4 UJ	6.1 UJ	1.9 J	6 U
pyrene	2,300,000	—	—	—	µg/kg	9.9	5.9	3.1 J	4.1 J	3 J	15	27 U	6.1	41	12	3.2 J
Pesticides/PCBs																
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	100 U	100 U
4,4'-DDT	1,700	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U	6 U
Herbicides						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	4220	3730
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	**4.6**	**2.9**
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	33.7	30.5
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.13 U	0.11 U
cadmium	37	—	—	1.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U	0.1 J
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	1920	1730
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	28.1	27.9
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.8	3.8

Table 4-5a
Soil Sampling Results, AOC 23 EBS Parcel 110

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	32EDC-5-80 C032CB06 0 - 0.5 23-May-02	32EDC-5-80 C032CB07 0.5 - 2 23-May-02	32EDC-5-80 C032CB08 2 - 4 23-May-02	32EDC-5-80 C032CB09 4 - 8 23-May-02	32EDC-5-80 C032CB10 (FD) 4 - 8 23-May-02	32EDC-5-91 C032CB55 0 - 0.5 16-May-02	32EDC-5-91 C032CB56 0.5 - 2 16-May-02	32EDC-5-91 C032CB57 2 - 4 16-May-02	32EDC-5-91 C032CB58 4 - 8 16-May-02	A23SB09 C077S379 1 - 2 05-Dec-05	A23SB09 C077S380 3 - 4 05-Dec-05
Metals (continued)																
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	8.5	5.5
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	9230	7820
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.4 J	1.8 J
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	2560	2020
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	114 J	83.7 J
mercury	23	—	—	0.52	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.025 U	0.1 U
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	26.3	23
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	605	526
selenium	390	—	—	1.78	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.32 J	0.7
silver	390	—	—	2.22	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.097 U	0.16 U
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	120 U	65.2 U
thallium	5.2	—	—	0.50	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	*2 U* [f]	*2 U* [f]
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	18.3	17.4
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	19.8	14.8
Organotins						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-5a
Soil Sampling Results, AOC 23 EBS Parcel 110

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	A23SB09 C077S381 7 - 8 05-Dec-05	A23SB10 C077S382 1 - 2 06-Dec-05	A23SB10 C077S383 2 - 3 06-Dec-05	A23SB10 C077S384 4 - 5.5 06-Dec-05	A23SB12 C077S385 0 - 2 30-Nov-05	A23SB12 C077S386 2 - 4 30-Nov-05	A23SB12 C077S387 4 - 8 30-Nov-05	A23SB13 C077S388 1 - 2 06-Dec-05	A23SB13 C077S389 2 - 3 06-Dec-05	A23SB13 C077S390 4 - 5 06-Dec-05	A23SB40 C077S451 1 - 2 06-Dec-05	A23SB40 C077S452 2 - 3 06-Dec-05	A23SB40 C077S453 7 - 8 06-Dec-05
VOCs																		
acetone	14,000,000	—[b]	—	—	µg/kg	100 U	100 U	100 U	55 J	100 U	100 U	19 J	12 J	100 U	110 J	330	49 J	22 J
2-butanone	22,000,000	—	—	—	µg/kg	100 U	100 U	100 U	200 UJ	100 U	0.99 J	200 U	100 U	100 U	8.1 J	24 J	2.4 J	100 UJ
carbon disulfide	360,000	—	—	—	µg/kg	4.1 J	100 U	100 U	200 UJ	100 U	1.5 J	5.8 J	1.7 J	100 U	3.5 J	1.6 J	19 J	6.6 J
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	6 U	6 U	6 U	2.1 J	1.3 J	0.63 J	9 U	5 U	5 U	6 U	6 U	5 U	6 UJ
methylene chloride	9,100	—	—	—	µg/kg	60 U	60 U	60 U	28 J	60 U	10 J	90 U	50 U	50 U	60 U	60 U	50 U	60 UJ
tetrachloroethene	480	—	—	—	µg/kg	6 U	6 U	2.4 J	1 J	2.8 J	5 UJ	9 UJ	5 U	5 U	6 U	6 U	5 U	6 UJ
m-, p-xylene	—	—	—	—	µg/kg	6 U	6 U	6 U	9 UJ	6 U	5 UJ	9 UJ	5 U	5 U	6 U	1.1 J	5 U	6 UJ
Petroleum Hydrocarbons																		
diesel	—	—	100,000	—	µg/kg	78000 J	16000	8200	**370000**	1200 U	1100 U	80000 J	14000	1100 U	**130000**	12000	1100 U	1200 U
gasoline	—	—	100,000	—	µg/kg	1000 U	1000 U	1000 U	2000 U	1000 U	1000 U	2000 U	1000 U	1000 U	630 J	28000 J	1000 UJ	1000 UJ
motor oil	—	—	500,000	—	µg/kg	140000	20000 J	9100 J	410000	12000 U	11000 U	150000 J	18000	11000 U	130000	14000	11000 U	12000 U
SVOCs																		
acenaphthene	3,700,000	—	—	—	µg/kg	6 U	6 U	6 U	9 U	6 U	5 U	9 UJ	5 U	5 U	6 UJ	6 U	5 U	6 U
acenaphthylene	—	—	—	—	µg/kg	6 U	6 U	6 U	9 U	6 U	5 U	2.7 J	5 U	5 U	6 UJ	6 U	5 U	6 U
anthracene	22,000,000	—	—	—	µg/kg	1.8 J	6 U	6 U	9 U	6 U	5 U	2.6 J	5 U	5 U	6 UJ	6 U	5 U	6 U
benz(a)anthracene	620[d]	—	—	—	µg/kg	11	38 J	27 J	9 U	6 U	5 U	46 J	21 J	5 U	6 UJ	6 U	5 U	6 U
benzo(b)fluoranthene	620[d]	—	—	—	µg/kg	40 J	65 J	6 U	9 U	3.7 J	4.1 J	89 J	9.1 J	5 U	6 UJ	6 U	5 U	6 U
benzo(k)fluoranthene	6,200[d]	380[d]	—	—	µg/kg	39 J	19 J	6 U	9 U	3.6 J	3.9 J	85 J	5 U	5 U	6 UJ	6 U	5 U	6 U
benzo(g,h,i)perylene	—	—	—	—	µg/kg	11 J	62	35	48	5.9 J	3.3 J	80 J	9.6	14	6 UJ	6 U	5 U	6 U
benzo(a)pyrene	62[d]	—	—	—	µg/kg	26	49 J	22 J	51 J	3.7 J	3.4 J	**76 J**	6.3 J	9.6 J	6 UJ	6 U	5 U	5.9 J
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	400 U	400 U	300 U	600 U	400 U	300 U	500 U	300 U	300 U	300 U	400 U	300 U	400 U
chrysene	62,000[d]	3,800[d]	—	—	µg/kg	11	6 U	6 U	9 U	6 U	1.8 J	23 J	5 U	5 U	6 UJ	6 U	5 U	6 U
dibenz(a,h)anthracene	62[d]	—	—	—	µg/kg	6 UJ	6 U	6 U	9 U	6 U	5 U	7.9 J	5 UJ	5 U	6 UJ	6 U	5 U	6 U
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	150 J	88 J	91 J	170 J	400 U	300 U	500 U	87 J	300 U	100 J	310 J	130 J	400 U
fluoranthene	2,300,000	—	—	—	µg/kg	22	42	15	39	6 U	2.7 J	50 J	3.2 J	6.5	7.8 J	6 U	5 U	6 U
indeno(1,2,3-cd)pyrene	620[d]	—	—	—	µg/kg	5.1 J	42	21	32	2.8 J	5 U	45 J	5.2	8.4	6 UJ	6 U	5 U	6 U
2-methylnaphthalene	—	—	—	—	µg/kg	6 U	15	13	28	6 U	5 U	9 UJ	5 U	5 U	6 UJ	6 U	5 U	6 U
naphthalene	56,000[d]	1,700[d]	—	—	µg/kg	3.7 J	6 U	6 U	9 U	6 U	5 U	3.7 J	5 U	5 U	6 UJ	6 U	5 U	6 U
phenanthrene	—	—	—	—	µg/kg	3.3 J	27 J	11 J	9 U	6 U	5 U	9.6 J	6.8 J	8.1 J	6 UJ	9.8 J	5 U	8.7 J
pyrene	2,300,000	—	—	—	µg/kg	61	52 J	12 J	160 J	2.7 J	4.2 J	160 J	5 U	5 U	9.4 J	6 U	5 U	6 U
Pesticides/PCBs																		
Aroclor 1260	220	—	—	—	µg/kg	100 U	100 UJ	100 U	200 UJ	100 U	100 U	200 U	100 UJ	100 UJ	100 UJ	100 U	100 U	100 U
4,4'-DDT	1,700	—	—	—	µg/kg	2.8 J	6 UJ	6 U	9 U	6 UJ	5 UJ	9 UJ	5 UJ	5 UJ	6 UJ	6 U	5 U	6 U
Herbicides						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																		
aluminum	76,000	—	—	13,960	mg/kg	*15200*	5460	5080	*30300*	4250	4050	*23700*	4180	3390	5790	3750	4040	4330
arsenic	0.39	0.062	—	9.14	mg/kg	***9.5***	**2.9**	**2.3**	***10.5***	**1**	**1.2**	***9.2***	**2.2**	**2**	**4.5**	**2.2**	**2.3**	**2.1**
barium	5,400	—	—	93.68	mg/kg	*158*	55.3 J	29.7 J	73.8 J	46.5	47.4	*260*	22.8 J	20.3 J	31.9 J	24.1 J	29.4 J	34.8 J
beryllium	150	—	—	1.27	mg/kg	0.68	0.17 J	0.13 J	0.7	0.069 U	0.053 U	0.53	0.11 J	0.087 J	0.13 J	0.1 J	0.12 J	0.12 J
cadmium	37	—	—	1.72	mg/kg	0.5 J	0.6 U	0.6 U	0.24 J	0.6 U	0.5 U	0.65 J	0.5 U	0.5 U	0.6 U	0.6 U	0.5 U	0.6 U
calcium	—	—	—	16,800	mg/kg	2560	2100	1880	4160	5970	1920	4050	2010	6000	2560	3680	7440	1760
chromium	210	—	—	54.84	mg/kg	*56.5*	32.9 J	30.3 J	*107 J*	26.6	27.1	*82*	29.6 J	21.3 J	26.1 J	30.5 J	29.2 J	29.7 J
cobalt	900	—	—	14.30	mg/kg	*15*	6.2	4.4	*17.7*	3.4	3.5	*14.5*	3.9	3	5.2	3.7	3.6	3.6

Table 4-5a
Soil Sampling Results, AOC 23 EBS Parcel 110

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	A23SB09 C077S381 7 - 8 05-Dec-05	A23SB10 C077S382 1 - 2 06-Dec-05	A23SB10 C077S383 2 - 3 06-Dec-05	A23SB10 C077S384 4 - 5.5 06-Dec-05	A23SB12 C077S385 0 - 2 30-Nov-05	A23SB12 C077S386 2 - 4 30-Nov-05	A23SB12 C077S387 4 - 8 30-Nov-05	A23SB13 C077S388 1 - 2 06-Dec-05	A23SB13 C077S389 2 - 3 06-Dec-05	A23SB13 C077S390 4 - 5 06-Dec-05	A23SB40 C077S451 1 - 2 06-Dec-05	A23SB40 C077S452 2 - 3 06-Dec-05	A23SB40 C077S453 7 - 8 06-Dec-05
Metals (continued)																		
copper	3,100	—	—	39.14	mg/kg	*43.7*	6.7	6.2	38.8	4.9	5.1	*63.4*	4.6	3.9	13.2	4.2	4.4	4.9
iron	23,000	—	—	22,280	mg/kg	***27300***	10700	9760	***49000***	8230	8410	***38700***	8620	7160	12600	8050	8430	8710
lead	400	150	—	37.66	mg/kg	32 J	3.5	3.4	12.9	2.1	1.8	*50.2*	1.7	1.2	3.9	1.2	1.2	1.7
magnesium	—	—	—	7,304	mg/kg	*8070*	2580	2420	*13700*	1980	2040	*12200*	2010	1630	2890	1830	1940	2140
manganese	1,800	—	—	383.0	mg/kg	229 J	146	140	*407*	74.1	72.1	*428*	102	86.5	154	105	111	77.9
mercury	23	—	—	0.52	mg/kg	*2.4*	0.038 U	0.057 U	0.05 U	0.032 U	0.025 U	*2.1*	0.052 U	0.026 U	0.039 U	0.19	0.051 U	0.024 U
nickel	1,600	—	—	55.72	mg/kg	*97.9*	33 J	30 J	*112 J*	25.2	24.2	*94.2*	26.2 J	20.6 J	26 J	23.3 J	24.7 J	24.9 J
potassium	—	—	—	1,232	mg/kg	*2620*	785	649	*4600*	612	627	*3900*	531	423	742	530	563	665
selenium	390	—	—	1.78	mg/kg	0.6 U	0.6 UJ	0.3 UJ	0.46 UJ	0.6 U	0.5 U	0.9 U	0.5 UJ	0.26 UJ	0.6 UJ	0.52 UJ	0.85 UJ	0.6 UJ
silver	390	—	—	2.22	mg/kg	0.3	0.12	0.1	0.2	0.17 U	0.22 U	0.67	0.1 U	0.1 U	0.16	0.046 J	0.12	0.073 J
sodium	—	—	—	1,230	mg/kg	*1420*	113 U	102 U	*1580*	105 J	90.1 J	*6010*	71.3 U	120 U	106 U	332 U	361 U	195 U
thallium	5.2	—	—	0.50	mg/kg	*2 U* [f]	*2 UJ* [f]	*2 UJ* [f]	*4 UJ* [f]	*2 U* [f]	*2 U* [f]	*4 U* [f]	*2 UJ* [f]	*2 UJ* [f]	*2 UJ* [f]	*3 UJ* [f]	*2 UJ* [f]	*2 UJ* [f]
vanadium	78	—	—	47.34	mg/kg	43.7	21.5 J	19.9 J	*78 J*	16.9	17.4	*61.1*	19.7 J	16.1 J	26.7 J	19 J	19.3 J	16.6 J
zinc	23,000	—	—	67.48	mg/kg	*135*	21.9	19.6	*86.5*	10.6	12.4	*210*	14.9	12.7	24	13.3	13.9	15.2
Organotins						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

[c] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL

[d] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[e] italicized font indicates result above background

[f] detection limit is above criteria

Review Qualifiers:

J – indicates an estimated value

U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit

UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Acronyms/Abbreviations:

AOC – area of concern

B(a)P – benzo(a)pyrene

Cal – California

DDT – dichlorodiphenyltrichloroethane

EBS – environmental baseline survey

ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)

FD – field duplicate

Fed – federal

µg/kg – micrograms per kilogram

mg/kg – milligrams per kilogram

NA – not analyzed

ND – not detected

PAH – polynuclear aromatic hydrocarbon

PCB – polychlorinated biphenyl

PRG – preliminary remediation goal

PSC – preliminary screening criterion

Res – residential

SVOC – semivolatile organic compound

TPH – total petroleum hydrocarbons

VOC – volatile organic compound

Table 4-5b
Groundwater Sampling Results, AOC 23 EBS Parcel 110

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Background	Result Units	Station ID: A23SB08 / Sample: C077G111 / [a]Depth Interval: 7 - 12 / Collection Date: 05-Dec-05	A23SB09 C077G112 4 - 9 06-Dec-05	A23SB09 C077G116 6 - 11 06-Dec-05	A23SB09 C077G117 (FD) 6 - 11 06-Dec-05	A23SB10 C077G113 5 - 10 06-Dec-05	A23SB11 C077G114 5 - 10 06-Dec-05	A23SB12 C077G115 8 - 13 06-Dec-05	A23SB40 C077G155 6 - 11 07-Dec-05
VOCs													
carbon disulfide	—[b]	—	—	—	µg/L	0.69	0.72	5.3	NA	0.49 J	0.5 U	0.5 U	0.29 J
1,1-dichloroethane	—	5	—	—	µg/L	0.33 J	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	0.5 U
cis-1,2-dichloroethene	70	6	—	—	µg/L	0.45 J	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	0.5 U
methyl tert-butyl ether	—	13	—	—	µg/L	0.28 J	0.5 U	0.5 U	NA	0.31 J	0.5 U	0.5 U	0.29 J
toluene	1,000	150	—	—	µg/L	0.5 U	0.5 U	0.31 J	NA	0.5 U	0.5 U	0.5 U	0.5 U
Petroleum Hydrocarbons													
diesel	—	—	100	—	µg/L	50 U	50 UJ	**150 J**[c]	50 U	**220 J**	50 U	**180 J**	50 U
SVOCs													
acenaphthene	—	—	—	—	µg/L	0.2 U	0.2 U	0.2 U	NA	1.7	0.2 U	0.2 U	0.2 U
anthracene	—	—	—	—	µg/L	0.2 U	0.2 U	0.2 U	NA	0.5	0.2 U	0.2 U	0.2 U
fluoranthene	—	—	—	—	µg/L	0.2 U	0.2 U	0.2 U	NA	1.5	0.2 U	0.2 U	0.2 U
fluorene	—	—	—	—	µg/L	0.2 U	0.2 U	0.2 U	NA	1.2	0.2 U	0.2 U	0.2 U
phenanthrene	—	—	—	—	µg/L	0.2 U	0.2 U	0.2 U	NA	2	0.2 U	0.2 U	0.2 U
pyrene	—	—	—	—	µg/L	0.12 J	0.2 U	0.12 J	NA	0.8	0.2 U	0.2 U	0.2 U
Pesticides/PCBs						ND	ND	ND	NA	ND	ND	ND	ND
Metals													
aluminum	1,000	1,000	—	1,070	µg/L	100 U	100 U	100 U	NA	100 U	36.4 J	100 U	100 UJ
arsenic	10	50	—	20.72	µg/L	8.7	6.7	*22.6*[d]	NA	7.7	6.6	5 U	8.6
barium	2,000	1,000	—	569.5	µg/L	173	118	20	NA	108	83.2	227	164 J
beryllium	4	4	—	2.50	µg/L	2 U	2 U	0.25 J	NA	0.29 J	2 U	0.27 J	2 U
calcium	—	—	—	—	µg/L	77,300	23,100	7,400	NA	16,400	12,500	235,000	26,500 J
chromium	100	50	—	12.45	µg/L	1.7 J	5 U	2 J	NA	4.5 J	1.6 J	4.3 J	3 J
iron	—	—	—	6,586	µg/L	3,540	2,270 J	500 J	NA	6,050 J	387 J	2,020 J	2,030
magnesium	—	—	—	—	µg/L	235,000	14,200	5,770	NA	18,600	11,100	717,000	29,800 J
manganese	—	—	—	1,741	µg/L	347	191	133	NA	121	148	1,080	230 J
potassium	—	—	—	—	µg/L	100,000 J	9,520	8,950	NA	28,200	14,800	245,000	32,000 J
selenium	50	50	—	8.58	µg/L	3.9 J	5 U	5 U	NA	5 U	5 U	3.2 J	5 U
sodium	—	—	—	—	µg/L	2,800,000	104,000	153,000	NA	815,000	211,000	7,370,000	497,000
thallium	2	2	—	16.15	µg/L	**2.7 J**	**5 U**[e]	**5 U**[e]	NA	**5 U**[e]	**5 U**[e]	**3.2 J**	**5 U**[e]
vanadium	—	—	—	26.27	µg/L	1.4 J	5 U	1.4 J	NA	3.6 J	1.1 J	2.8 J	2.6 J
General Chemistry													
solids, total dissolved	—	—	—	—	µg/L	7,650,000	504,000	556,000	NA	2,530,000	834,000	21,200,000	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL
[d] italicized font indicates result above background
[e] detection limit is above criteria

Acronyms/Abbreviations:
AOC – area of concern
Cal – California
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
GW – groundwater
µg/L – micrograms per liter
MCL – maximum contaminant level
NA – not analyzed
ND – not detected
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 4-6a
Soil Sampling Results, AOC 23 EBS Parcel 121

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	A23SB14 C077S391 1 - 2 09-Dec-05	A23SB14 C077S392 3 - 4 09-Dec-05	A23SB14 C077S393 4.5 - 6 09-Dec-05
VOCs								
acetone	14,000,000	—[b]	—	—	µg/kg	100 U	100 U	40 J
Petroleum Hydrocarbons								
diesel	—	—	100,000	—	µg/kg	1,200 U	23,000	54,000
motor oil	—	—	500,000	—	µg/kg	12,000 U	40,000	110,000
SVOCs								
benzo(g,h,i)perylene	—	—	—	—	µg/kg	6 UJ	17	18 J
benzo(a)pyrene	62[c]	—	—	—	µg/kg	6 UJ	24 J	23 J
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	400 U	300 U	370 J
fluoranthene	2,300,000	—	—	—	µg/kg	6 UJ	35 J	14 J
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	6 UJ	11 J	9.7 J
2-methylnaphthalene	—	—	—	—	µg/kg	6 UJ	5 U	21 J
phenanthrene	—	—	—	—	µg/kg	6 UJ	27 J	17 J
pyrene	2,300,000	—	—	—	µg/kg	6 UJ	39 J	80 J
Pesticides/PCBs						ND	ND	ND
Metals								
aluminum	76,000	—	—	13,960	mg/kg	*22,400*[d]	4,220	9,760
arsenic	0.39	0.062	—	9.14	mg/kg	**6.7**[e]	**1.5**	**3.6**
barium	5,400	—	—	93.68	mg/kg	72.2	29.7	*94.9*
beryllium	150	—	—	1.27	mg/kg	0.24	0.11 J	0.25 J
calcium	—	—	—	16,800	mg/kg	8,980	2,850	3,850
chromium	210	—	—	54.84	mg/kg	*59.9*	28.2	*61.2*
cobalt	900	—	—	14.30	mg/kg	*19.6*	3.9	10.2
copper	3,100	—	—	39.14	mg/kg	*56.5*	5.3	9.8
iron	23,000	—	—	22,280	mg/kg	***41,200***	9,200	20,100
lead	400	150	—	37.66	mg/kg	2.1	5	8
magnesium	—	—	—	7,304	mg/kg	*17,500*	2,220	5,210

Table 4-6a
Soil Sampling Results, AOC 23 EBS Parcel 121

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: A23SB14 / Sample: C077S391 / [a] Depth Interval: 1 - 2 / Collection Date: 09-Dec-05	A23SB14 C077S392 3 - 4 09-Dec-05	A23SB14 C077S393 4.5 - 6 09-Dec-05
Metals (continued)								
manganese	1,800	—	—	383.0	mg/kg	*1,040*	101	238
mercury	23	—	—	0.52	mg/kg	0.15	0.028 U	0.13 J
nickel	1,600	—	—	55.72	mg/kg	*56.4*	23.2	52.6
potassium	—	—	—	1,232	mg/kg	244	611	*1,520*
silver	390	—	—	2.22	mg/kg	0.1 U	0.1 U	0.25
sodium	—	—	—	1,230	mg/kg	801	118 U	857
vanadium	78	—	—	47.34	mg/kg	*75.6*	19.4	38.7
zinc	23,000	—	—	67.48	mg/kg	*97.3*	17	35.9

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[d] italicized font indicates result above background

[e] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL

Review Qualifiers:

J – indicates an estimated value

U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit

UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Acronyms/Abbreviations:

AOC – area of concern
B(a)P – benzo(a)pyrene
Cal – California
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
ND – not detected
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-6b
Groundwater Sampling Results, AOC 23 EBS Parcel 121

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Back-ground	Result Units	Station ID: A23SB14 Sample: C077G118 [a] Depth Interval: 2 - 7 Collection Date: 09-Dec-05	Station ID: A23SB14 Sample: C077G119 (FD) Depth Interval: 2 - 7 Collection Date: 09-Dec-05
VOCs							
carbon disulfide	—[b]	—	—	—	µg/L	1.5	NA
Petroleum Hydrocarbons							
diesel	—	—	100	—	µg/L	**180** [c]	NA
SVOCs						ND	ND
Pesticides/PCBs						ND	NA
Metals							
barium	2,000	1,000	—	569.5	µg/L	56.4 J	NA
calcium	—	—	—	—	µg/L	33,500 J	NA
chromium	100	50	—	12.45	µg/L	7.6	NA
iron	—	—	—	6,586	µg/L	591	NA
magnesium	—	—	—	—	µg/L	63,100 J	NA
manganese	—	—	—	1,741	µg/L	360 J	NA
potassium	—	—	—	—	µg/L	56,300	NA
sodium	—	—	—	—	µg/L	1,350,000	NA
vanadium	—	—	—	26.27	µg/L	7.9	NA
General Chemistry							
solids, total dissolved	—	—	—	—	µg/L	3,860,000	NA

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

[c] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL

Acronyms/Abbreviations:

AOC – area of concern
Cal – California
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
GW – groundwater
µg/L – micrograms per liter
MCL – maximum contaminant level
NA – not analyzed
ND – not detected
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifier:

J – indicates an estimated value

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Table 4-7a
Soil Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	03GB025 GPS03-025-1.0 0.5 - 1 18-Aug-94	03GB025 GPS03-025-3.0 2.5 - 3 18-Aug-94	03GB025 GPS03-025-6.0 5 - 6 18-Aug-94	03GB036 03GPS036-1.5 1 - 1.3 09-Sep-94	03GB036 03GPS036-3.0 2.5 - 3 09-Sep-94	122-002-003 122-0003M 1 - 1.5 05-Jun-95	123-001-001 123-0001 1 - 1.5 08-Jun-95	123-001-001 123-0001M 1 - 1.5 08-Jun-95	123-001-001 123-0015 4 - 4.5 08-Jun-95	123-001-001 123-0015M 4 - 4.5 08-Jun-95
VOCs															
acetone	14,000,000	—[b]	—	—	µg/kg	11 U	11 UJ	30 UJ	11 U	11 U	NA	NA	NA	12 U	24 U
benzene	640	—	—	—	µg/kg	11 U	11 U	13 U	11 U	11 U	NA	NA	NA	12 U	6 U
bromoform	62,000	—	—	—	µg/kg	11 U	11 U	13 U	11 U	11 U	NA	NA	NA	12 U	6 U
2-butanone	22,000,000	—	—	—	µg/kg	11 U	11 U	13 U	11 UJ	11 UJ	NA	NA	NA	12 U	12 U
sec-butylbenzene	220,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	µg/kg	11 U	11 U	13 U	11 UJ	11 UJ	NA	NA	NA	12 U	6 U
1,2-dichlorobenzene	600,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-dichloroethene	120,000	—	—	—	µg/kg	11 U	11 U	13 U	11 U	11 U	NA	NA	NA	12 U	6 U
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	6 U
trans-1,2-dichloroethene	69,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	6 U
p-isopropyltoluene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	µg/kg	11 UJ	11 UJ	13 UJ	11 U	11 U	NA	NA	NA	12 U	24 U
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-propylbenzene	240,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
tetrachloroethene	480	—	—	—	µg/kg	11 U	11 U	13 U	11 U	11 U	NA	NA	NA	12 U	6 U
toluene	520,000	—	—	—	µg/kg	11 U	11 U	13 U	1 J	11 U	NA	NA	NA	12 U	6 U
trichloroethene	53	2,900	—	—	µg/kg	11 U	11 U	13 U	11 U	11 U	NA	NA	NA	12 U	6 U
1,3,5-trimethylbenzene	21,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	µg/kg	11 U	11 U	13 U	11 U	11 U	NA	NA	NA	12 U	12 U
m-, p-xylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	6 U
Petroleum Hydrocarbons															
diesel	—	—	100,000	—	µg/kg	11000 U	11000 U	13000 U	10000 U	11000 U	NA	10000 U	1000 U	12000 U	1000 U
gasoline	—	—	100,000	—	µg/kg	540 U	530 U	650 U	530 U	550 U	NA	500 U	500 U	600 U	600 U
JP-5	—	—	100,000	—	µg/kg	11000 U	11000 U	13000 U	10000 U	11000 U	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	µg/kg	27000 U	26000 U	32000 U	38000 J	22000 U	NA	21000 U	26000 U	24000 U	30000 U
SVOCs															
acenaphthene	3,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	340 U	350 U	340 U	400 U
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	340 U	350 U	340 U	400 U
diethyl phthalate	49,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	340 U	350 U	340 U	400 U
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-7a
Soil Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Result Units	Station ID: / Sample: / [a] Depth Interval: / Collection Date:	03GB025 GPS03-025-1.0 0.5 - 1 18-Aug-94	03GB025 GPS03-025-3.0 2.5 - 3 18-Aug-94	03GB025 GPS03-025-6.0 5 - 6 18-Aug-94	03GB036 03GPS036-1.5 1 - 1.3 09-Sep-94	03GB036 03GPS036-3.0 2.5 - 3 09-Sep-94	122-002-003 122-0003M 1 - 1.5 05-Jun-95	123-001-001 123-0001 1 - 1.5 08-Jun-95	123-001-001 123-0001M 1 - 1.5 08-Jun-95	123-001-001 123-0015 4 - 4.5 08-Jun-95	123-001-001 123-0015M 4 - 4.5 08-Jun-95
Pesticides/PCBs																
Aroclor 1260	220	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	90	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	1,700	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	1,700	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
endosulfan II	370,000	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
heptachlor epoxide	53	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Herbicides							NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																
aluminum	76,000	—	—	13,960	mg/kg		NA	NA	NA	NA	NA	NA	4110 J	NA	4550 J	NA
antimony	31	—	—	9.50	mg/kg		NA	NA	NA	NA	NA	5.5 U	1.3 UJ	6.7	1.5 UJ	3.5 U
arsenic	0.39	0.062	—	9.14	mg/kg		NA	NA	NA	NA	NA	**2.6** [d]	**1.4**	**1.5**	**1.9**	**1.5**
barium	5,400	—	—	93.68	mg/kg		NA	NA	NA	NA	NA	48.6	23.7	22.5	36.2	25.8
beryllium	150	—	—	1.27	mg/kg		NA	NA	NA	NA	NA	0.42	0.23	0.23	0.17 U	0.23
cadmium	37	—	—	1.72	mg/kg		NA	NA	NA	NA	NA	0.38	0.06 U	0.26	0.07 U	0.24
calcium	—	—	—	16,800	mg/kg		NA	NA	NA	NA	NA	NA	1980	NA	1850	NA
chromium	210	—	—	54.84	mg/kg		NA	NA	NA	NA	NA	51.9	22.3 J	26.3	26 J	24.5
cobalt	900	—	—	14.30	mg/kg		NA	NA	NA	NA	NA	8	3.3	4.2	4.2	3.9
copper	3,100	—	—	39.14	mg/kg		NA	NA	NA	NA	NA	12	5	5.8	24.7	5
iron	23,000	—	—	22,280	mg/kg		NA	NA	NA	NA	NA	NA	7420	NA	8540	NA
lead	400	150	—	37.66	mg/kg		NA	NA	NA	NA	NA	5.7	2.1	2	2.4	1.9
magnesium	—	—	—	7,304	mg/kg		NA	NA	NA	NA	NA	NA	1880	NA	2300	NA
manganese	1,800	—	—	383.0	mg/kg		NA	NA	NA	NA	NA	NA	71.1	NA	85.5	NA
mercury	23	—	—	0.52	mg/kg		NA	NA	NA	NA	NA	0.18 U	0.16 UJ	*0.97* [e]	0.18 UJ	0.2
nickel	1,600	—	—	55.72	mg/kg		NA	NA	NA	NA	NA	43	24.8	23.6	24.8	21.4
potassium	—	—	—	1,232	mg/kg		NA	NA	NA	NA	NA	NA	560	NA	768	NA
selenium	390	—	—	1.78	mg/kg		NA	NA	NA	NA	NA	0.46 U	0.54 U	0.26 U	0.62 U	0.29 U
silver	390	—	—	2.22	mg/kg		NA	NA	NA	NA	NA	0.91 U	0.19 U	0.51 U	0.22 U	0.59 U
sodium	—	—	—	1,230	mg/kg		NA	NA	NA	NA	NA	NA	200	NA	250	NA
thallium	5.2	—	—	0.50	mg/kg		NA	NA	NA	NA	NA	0.46 U	*1.4*	0.26 U	*1.9*	0.29 U
vanadium	78	—	—	47.34	mg/kg		NA	NA	NA	NA	NA	32.3	16	15.9	19.2	15.1
zinc	23,000	—	—	67.48	mg/kg		NA	NA	NA	NA	NA	31.1	14.5	15.6	*83.9*	13.7
Organotins							NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-7a
Soil Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	123-001-002 123-0002M 1 - 1.5 22-Jun-95	123-001-002 123-0016M 3.5 - 4 22-Jun-95	123-001-003 123-0003M 1 - 1.5 08-Jun-95	123-001-003 123-0017M 4 - 4.5 08-Jun-95	123-002-004 123-0004M 1 - 1.5 05-Jun-95	123-002-004 123-0020M (FD) 1 - 1.5 05-Jun-95	123-002-005 123-0005 1 - 1.5 05-Jun-95	123-002-005 123-0005M 1 - 1.5 05-Jun-95	123-0022 123-0022 0 - 0.5 18-Aug-99	123-0023 123-0023 2 - 2.5 18-Aug-99	123-0024 123-0024 2 - 2.5 18-Aug-99	123-0025 123-0025 0 - 1 18-Aug-99
VOCs																	
acetone	14,000,000	—[b]	—	—	µg/kg	NA	25 U	NA	24 U	NA	NA	NA	NA	NA	NA	NA	NA
benzene	640	—	—	—	µg/kg	NA	6 U	NA	6 U	NA	NA	NA	NA	5.4 U	5.3 U	5.6 U	5.5 U
bromoform	62,000	—	—	—	µg/kg	NA	6 U	NA	6 U	NA	NA	NA	NA	5.4 U	5.3 U	5.6 U	5.5 U
2-butanone	22,000,000	—	—	—	µg/kg	NA	12 U	NA	12 U	NA	NA	NA	NA	NA	NA	NA	NA
sec-butylbenzene	220,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	5.3 U	5.6 U	5.5 U
carbon disulfide	360,000	—	—	—	µg/kg	NA	6 U	NA	6 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2-dichlorobenzene	600,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	5.3 U	5.6 U	5.5 U
1,1-dichloroethene	120,000	—	—	—	µg/kg	NA	6 U	NA	6 U	NA	NA	NA	NA	5.4 U	5.3 U	5.6 U	5.5 U
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	NA	6 U	NA	6 U	NA	NA	NA	NA	5.4 U	5.3 U	5.6 U	5.5 U
trans-1,2-dichloroethene	69,000	—	—	—	µg/kg	NA	6 U	NA	6 U	NA	NA	NA	NA	5.4 U	5.3 U	5.6 U	5.5 U
p-isopropyltoluene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	5.3 U	5.6 U	5.5 U
methyl tert-butyl ether	17,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	5.3 U	5.6 U	5.5 U
methylene chloride	9,100	—	—	—	µg/kg	NA	40	NA	24 U	NA	NA	NA	NA	5.4 U	5.3 U	2 J	2 J
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-propylbenzene	240,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	5.3 U	5.6 U	5.5 U
tetrachloroethene	480	—	—	—	µg/kg	NA	6 U	NA	6 U	NA	NA	NA	NA	5.4 U	5.3 U	5.6 U	5.5 U
toluene	520,000	—	—	—	µg/kg	NA	6 U	NA	6 U	NA	NA	NA	NA	5.4 UJ	5.3 UJ	5.6 UJ	5.5 UJ
trichloroethene	53	2,900	—	—	µg/kg	NA	6 U	NA	6 U	NA	NA	NA	NA	5.4 U	5.3 U	5.6 U	5.5 U
1,3,5-trimethylbenzene	21,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	5.3 U	5.6 U	5.5 U
vinyl chloride	79	—	—	—	µg/kg	NA	12 U	NA	12 U	NA	NA	NA	NA	5.4 U	5.3 U	5.6 U	5.5 U
m-, p-xylene	—	—	—	—	µg/kg	NA	6 U	NA	6 U	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons																	
diesel	—	—	100,000	—	µg/kg	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	11000 U	1000 U	15000	11000 U	**210000**	3000 J
gasoline	—	—	100,000	—	µg/kg	500 U	600 U	600 U	600 U	500 U	500 U	500 U	500 U	540 U	530 U	560 U	550 U
JP-5	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	µg/kg	78000	31000 U	28000 U	30000 U	26000 U	26000 U	21000 U	26000 U	100000	11000 U	260000	18000
SVOCs																	
acenaphthene	3,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	350 U	410 U	380 U	400 U	NA	NA	NA	NA	NA	NA	2200 U	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	350 U	410 U	380 U	400 U	NA	NA	NA	NA	NA	NA	2200 U	NA
diethyl phthalate	49,000,000	—	—	—	µg/kg	350 U	410 U	380 U	400 U	NA	NA	NA	NA	NA	NA	2200 U	NA
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-7a
Soil Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Result Units	Station ID: / Sample: / [a]Depth Interval: / Collection Date:	123-001-002 123-0002M 1 - 1.5 22-Jun-95	123-001-002 123-0016M 3.5 - 4 22-Jun-95	123-001-003 123-0003M 1 - 1.5 08-Jun-95	123-001-003 123-0017M 4 - 4.5 08-Jun-95	123-002-004 123-0004M 1 - 1.5 05-Jun-95	123-002-004 123-0020M (FD) 1 - 1.5 05-Jun-95	123-002-005 123-0005 1 - 1.5 05-Jun-95	123-002-005 123-0005M 1 - 1.5 05-Jun-95	123-0022 123-0022 0 - 0.5 18-Aug-99	123-0023 123-0023 2 - 2.5 18-Aug-99	123-0024 123-0024 2 - 2.5 18-Aug-99	123-0025 123-0025 0 - 1 18-Aug-99
Pesticides/PCBs																		
Aroclor 1260	220	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	**500 J**	14 J	130 J	16 J
alpha-BHC	90	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	1.1 UJ	1.1 U	1.1 UJ	1.1 U
4,4'-DDE	1,700	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	0.2 J	2 J	2.2 UJ	2.2 U
4,4'-DDT	1,700	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	2.2 UJ	5.8	2.2 UJ	2.2 U
endosulfan II	370,000	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	3 J	2.1 U	2.2 UJ	2.2 U
heptachlor epoxide	53	—	—	—	µg/kg		NA	NA	NA	NA	NA	NA	NA	NA	1.1 UJ	1.1 U	0.5 J	1.1 U
Herbicides							NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																		
aluminum	76,000	—	—	13,960	mg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	mg/kg		3.1 U	3.7 U	3.4 U	3.7 U	NA	NA	NA	NA	5.4 U	5.3 U	5.6 U	5.5 U
arsenic	0.39	0.062	—	9.14	mg/kg		**1.9**	**1.6**	**1.7**	**1.7**	NA	NA	NA	NA	***14.3***	**5.2**	**1.7**	**2.4**
barium	5,400	—	—	93.68	mg/kg		20.2	20.3	19.2	29.1	NA	NA	NA	NA	61.1	54.9	31.3	43.8
beryllium	150	—	—	1.27	mg/kg		0.24	0.25	0.21	0.24	NA	NA	NA	NA	0.22 U	0.21 U	0.22 U	0.22 U
cadmium	37	—	—	1.72	mg/kg		0.13	0.13	0.24	0.27	NA	NA	NA	NA	0.25	0.094 J	0.063 J	0.08 J
calcium	—	—	—	16,800	mg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg		25.6	26.5	22.9	25.1	NA	NA	NA	NA	34.7	28.4	33	27.6
cobalt	900	—	—	14.30	mg/kg		3.8	4.3	4.2	4.3	NA	NA	NA	NA	9.8	6.6	6.3	7.5
copper	3,100	—	—	39.14	mg/kg		6	4.9	6.6	8.6	NA	NA	NA	NA	24.7	10.8	10.8	14.2
iron	23,000	—	—	22,280	mg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg		3	1.9	1.9	1.9	NA	NA	NA	NA	16.2	5.6	8.1	9.8
magnesium	—	—	—	7,304	mg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	mg/kg		0.1 U	0.12 U	0.11 U	*J*	NA	NA	NA	NA	0.12 J	0.056 J	0.056 J	0.042 J
nickel	1,600	—	—	55.72	mg/kg		21.6	22.8	20	22.9	NA	NA	NA	NA	38.5	24.5	26.8	23.4
potassium	—	—	—	1,232	mg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	mg/kg		0.26 U	0.31 U	0.28 U	0.31 U	NA	NA	NA	NA	0.54 U	0.53 U	0.56 U	0.55 U
silver	390	—	—	2.22	mg/kg		0.51 U	0.61 U	0.56 U	0.61 U	NA	NA	NA	NA	0.54 U	0.53 U	0.56 U	0.55 U
sodium	—	—	—	1,230	mg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	mg/kg		0.26 U	0.31 U	0.28 U	0.31 U	NA	NA	NA	NA	*0.54 U* [f]	*0.53 U* [f]	*0.56 U* [f]	*0.55 U* [f]
vanadium	78	—	—	47.34	mg/kg		16.8	18.7	14	17.1	NA	NA	NA	NA	30.6	26.3	27.8	35.4
zinc	23,000	—	—	67.48	mg/kg		13.8	13.6	15.9	19	NA	NA	NA	NA	58.7	34.5	27.7	44
Organotins							NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-7a
Soil Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	123-0026 / 123-0026 / 0 - 1 / 18-Aug-99	123-0027 / 123-0027 / 0 - 1 / 18-Aug-99	123-0028 / 123-0028 / 0 - 1 / 18-Aug-99	123-0029 / 123-0029 / 0 - 1 / 18-Aug-99	123-0030 / 123-0030 / 0 - 1 / 18-Aug-99	123-003-006 / 123-0006M / 1.5 - 2 / 08-Jun-95	123-003-007 / 123-0007 / 1 - 1.5 / 21-Jun-95	123-003-007 / 123-0007M / 1 - 1.5 / 21-Jun-95	123-003-008 / 123-0008M / 1.5 - 2 / 08-Jun-95	123-0031 / 123-0031 / 0 - 1 / 18-Aug-99	123-004-009 / 123-0009M / 2 - 2.5 / 08-Jun-95	123-004-009 / 123-0018M / 4 - 4.5 / 08-Jun-95
VOCs																	
acetone	14,000,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	22 U
benzene	640	—	—	—	µg/kg	5.3 U	5.6 U	5.4 U	5.5 U	5.5 U	NA	NA	NA	NA	5.3 U	NA	5 U
bromoform	62,000	—	—	—	µg/kg	5.3 U	5.6 U	5.4 U	5.5 U	5.5 U	NA	NA	NA	NA	5.3 U	NA	5 U
2-butanone	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11 U
sec-butylbenzene	220,000	—	—	—	µg/kg	5.3 U	5.6 U	5.4 U	5.5 U	5.5 U	NA	NA	NA	NA	5.3 U	NA	NA
carbon disulfide	360,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U
1,2-dichlorobenzene	600,000	—	—	—	µg/kg	5.3 U	5.6 U	5.4 U	5.5 U	5.5 U	NA	NA	NA	NA	5.3 U	NA	NA
1,1-dichloroethene	120,000	—	—	—	µg/kg	5.3 U	5.6 U	5.4 U	5.5 U	5.5 U	NA	NA	NA	NA	5.3 U	NA	5 U
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	5.3 U	5.6 U	5.4 U	5.5 U	5.5 U	NA	NA	NA	NA	5.3 U	NA	5 U
trans-1,2-dichloroethene	69,000	—	—	—	µg/kg	5.3 U	5.6 U	5.4 U	5.5 U	5.5 U	NA	NA	NA	NA	5.3 U	NA	5 U
p-isopropyltoluene	—	—	—	—	µg/kg	5.3 U	5.6 U	5.4 U	5.5 U	5.5 U	NA	NA	NA	NA	5.3 U	NA	NA
methyl tert-butyl ether	17,000	—	—	—	µg/kg	5.3 U	5.6 U	5.4 U	5.5 U	5.5 U	NA	NA	NA	NA	5.3 U	NA	NA
methylene chloride	9,100	—	—	—	µg/kg	2 J	2 J	2 J	5.5 U	5.5 U	NA	NA	NA	NA	2 J	NA	22 U
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-propylbenzene	240,000	—	—	—	µg/kg	5.3 U	5.6 U	5.4 U	5.5 U	5.5 U	NA	NA	NA	NA	5.3 U	NA	NA
tetrachloroethene	480	—	—	—	µg/kg	5.3 U	5.6 U	5.4 U	5.5 U	5.5 U	NA	NA	NA	NA	5.3 U	NA	5 U
toluene	520,000	—	—	—	µg/kg	5.3 UJ	5.6 UJ	5.4 UJ	5.5 UJ	5.5 UJ	NA	NA	NA	NA	5.3 UJ	NA	5 U
trichloroethene	53	2,900	—	—	µg/kg	5.3 U	5.6 U	5.4 U	5.5 U	5.5 U	NA	NA	NA	NA	5.3 U	NA	5 U
1,3,5-trimethylbenzene	21,000	—	—	—	µg/kg	5.3 U	5.6 U	5.4 U	5.5 U	5.5 U	NA	NA	NA	NA	5.3 U	NA	NA
vinyl chloride	79	—	—	—	µg/kg	5.3 U	5.6 U	5.4 U	5.5 U	5.5 U	NA	NA	NA	NA	5.3 U	NA	11 U
m-, p-xylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5 U
Petroleum Hydrocarbons																	
diesel	—	—	100,000	—	µg/kg	3000 J	11000 U	54000 U	55000 U	14000 J	1000 U	11000 U	1000 U	5000	4000 J	2000	1000 U
gasoline	—	—	100,000	—	µg/kg	530 U	560 U	540 U	550 U	550 U	500 U	600 U	600 U	500 U	530 U	500 U	500 U
JP-5	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	µg/kg	11000 U	11000 U	86000	110000	140000	27000 U	22000 U	28000 U	27000 U	67000	27000	27000 U
SVOCs																	
acenaphthene	3,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	NA	NA	540 U	NA	NA	350 U	370 U	370 U	350 U	NA	350 U	350 U
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	NA	540 U	NA	NA	350 U	370 U	370 U	350 U	NA	350 U	350 U
diethyl phthalate	49,000,000	—	—	—	µg/kg	NA	NA	540 U	NA	NA	350 U	370 U	370 U	350 U	NA	350 U	350 U
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-7a
Soil Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Result Units	Station ID: 123-0026 / Sample: 123-0026 / [a]Depth Interval: 0 - 1 / Collection Date: 18-Aug-99	123-0027 / 123-0027 / 0 - 1 / 18-Aug-99	123-0028 / 123-0028 / 0 - 1 / 18-Aug-99	123-0029 / 123-0029 / 0 - 1 / 18-Aug-99	123-0030 / 123-0030 / 0 - 1 / 18-Aug-99	123-003-006 / 123-0006M / 1.5 - 2 / 08-Jun-95	123-003-007 / 123-0007 / 1 - 1.5 / 21-Jun-95	123-003-007 / 123-0007M / 1 - 1.5 / 21-Jun-95	123-003-008 / 123-0008M / 1.5 - 2 / 08-Jun-95	123-0031 / 123-0031 / 0 - 1 / 18-Aug-99	123-004-009 / 123-0009M / 2 - 2.5 / 08-Jun-95	123-004-009 / 123-0018M / 4 - 4.5 / 08-Jun-95
Pesticides/PCBs																	
Aroclor 1260	220	—	—	—	µg/kg	27 U	28 U	27 U	11 J	28 U	21 U	37 U	22 U	22 U	130 U	NA	NA
alpha-BHC	90	—	—	—	µg/kg	1.1 U	1.1 U	1.1 U	0.2 J	1.1 U	NA	NA	NA	NA	5.3 U	NA	NA
4,4'-DDE	1,700	—	—	—	µg/kg	2.1 U	2.3 U	2.2 U	2.2 U	2.2 U	NA	NA	NA	NA	11 U	NA	NA
4,4'-DDT	1,700	—	—	—	µg/kg	2.1 U	2.3 U	2.2 U	2.2 U	2.2 U	NA	NA	NA	NA	11 U	NA	NA
endosulfan II	370,000	—	—	—	µg/kg	2.1 U	2.3 U	2.2 U	2.2 U	2.2 U	NA	NA	NA	NA	11 U	NA	NA
heptachlor epoxide	53	—	—	—	µg/kg	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	NA	NA	NA	NA	5.3 U	NA	NA
Herbicides						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																	
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	9470	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	mg/kg	5.3 U	5.6 U	5.4 U	5.5 U	5.5 U	3.1 U	1.4 UJ	3.3 U	3.2 U	5.3 U	3.2 U	3.2 U
arsenic	0.39	0.062	—	9.14	mg/kg	**1.7**	**3**	**2.2**	**4.1**	**4.9**	**1.6**	**1.4**	**2**	**1.6**	**1.8**	**1.9**	**1.2**
barium	5,400	—	—	93.68	mg/kg	32.9	*102*	34.8	42.9	50.7	34.2	59.7	74.9	27	47.8	27.6	20.4
beryllium	150	—	—	1.27	mg/kg	0.21 U	0.23 U	0.22 U	0.22 U	0.22 U	0.26	0.58	0.4	0.3	0.21 U	0.43	0.18
cadmium	37	—	—	1.72	mg/kg	0.21 U	0.018 J	0.04 J	0.17 J	0.17 J	0.26	0.07 U	0.45	0.61	0.067 J	0.58	0.18
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	7910	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	27.8	25.1	34.7	26	34.3	28.9	17 J	20.3	32	48.5	27.9	19
cobalt	900	—	—	14.30	mg/kg	4.4	9	6.1	7.9	9.8	4.3	9.5	8.1	7.4	5.8	8.7	3.3
copper	3,100	—	—	39.14	mg/kg	5.4	20.2	10	18.4	23.5	6.8	15.6	24.5	17.3	8.9	17.4	12.4
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	15100 J	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	2.1	3.6	10.1	18.4	*59.4*	2	*112 J*	*135*	1.9	8.1	2.4	1.3
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	3930	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	359	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	mg/kg	0.026 J	*1.6*	0.055 J	0.082 J	0.15 J	0.11 U	0.17 U	0.17	0.33	0.21 U	0.3	0.2
nickel	1,600	—	—	55.72	mg/kg	24.3	23.2	26.4	23	29.9	24.1	22.4	18.1	29.7	25.5	18.6	17.4
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	633	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	mg/kg	0.53 U	0.56 U	0.54 U	0.55 U	0.55 U	0.26 U	0.58 UJ	0.28 U	0.27 U	0.53 U	0.27 U	0.27 U
silver	390	—	—	2.22	mg/kg	0.53 U	0.56 U	0.54 U	0.55 U	0.55 U	0.52 U	0.2 U	0.55 U	0.54	0.53 U	0.54 U	0.54 U
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	887	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	mg/kg	*0.53 U* [f]	*0.56 U* [f]	*0.54 U* [f]	*0.55 U* [f]	*0.55 U* [f]	0.26 U	*0.71*	0.28 U	0.27 U	*0.53 U* [f]	0.27 U	0.27 U
vanadium	78	—	—	47.34	mg/kg	19.3	37	30.1	41.5	32.7	16.7	28.1	30.7	22.7	30.6	46.2	11.6
zinc	23,000	—	—	67.48	mg/kg	15.8	39.6	27.4	*68.6*	*73.9*	16.1	33.2	36	*122*	24.7	24	17.8
Organotins						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-7a
Soil Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	123-004-010 123-0010 2 - 2.5 08-Jun-95	123-004-010 123-0010M 2 - 2.5 08-Jun-95	123-004-010 123-0019 4 - 4.5 08-Jun-95	123-004-010 123-0019M 4 - 4.5 08-Jun-95	123-0044 123-0044 (FD) 0.5 - 1 18-Aug-99	123-005-011 123-0011M 2 - 2.5 21-Jun-95	123-005-012 123-0012M 2 - 2.5 21-Jun-95	123-IW-001 123I-001 6.5 - 7 04-Jan-95	123-IW-001 123I-001M 6.5 - 7 04-Jan-95	123-Z17-014 123-0014 1.5 - 2 09-Jun-95	123-Z17-014 123-0014M 1.5 - 2 09-Jun-95
VOCs																
acetone	14,000,000	—[b]	—	—	µg/kg	NA	NA	12 U	24 U	NA	NA	NA	12 U	NA	NA	NA
benzene	640	—	—	—	µg/kg	NA	NA	12 U	6 U	5.4 U	NA	NA	12 U	10 U	NA	NA
bromoform	62,000	—	—	—	µg/kg	NA	NA	12 U	6 U	5.4 U	NA	NA	12 U	NA	NA	NA
2-butanone	22,000,000	—	—	—	µg/kg	NA	NA	12 U	12 U	NA	NA	NA	12 U	10 U	NA	NA
sec-butylbenzene	220,000	—	—	—	µg/kg	NA	NA	NA	NA	5.4 U	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	µg/kg	NA	NA	12 U	6 U	NA	NA	NA	12 U	NA	NA	NA
1,2-dichlorobenzene	600,000	—	—	—	µg/kg	NA	NA	NA	NA	5.4 U	NA	NA	NA	NA	NA	NA
1,1-dichloroethene	120,000	—	—	—	µg/kg	NA	NA	12 U	6 U	5.4 U	NA	NA	12 U	10 U	NA	NA
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	NA	NA	NA	6 U	5.4 U	NA	NA	NA	10 U	NA	NA
trans-1,2-dichloroethene	69,000	—	—	—	µg/kg	NA	NA	NA	6 U	5.4 U	NA	NA	NA	10 U	NA	NA
p-isopropyltoluene	—	—	—	—	µg/kg	NA	NA	NA	NA	5.4 U	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	µg/kg	NA	NA	NA	NA	5.4 U	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	µg/kg	NA	NA	12 U	24 U	4 J	NA	NA	12 U	10 U	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-propylbenzene	240,000	—	—	—	µg/kg	NA	NA	NA	NA	5.4 U	NA	NA	NA	NA	NA	NA
tetrachloroethene	480	—	—	—	µg/kg	NA	NA	12 U	6 U	5.4 U	NA	NA	12 U	10 U	NA	NA
toluene	520,000	—	—	—	µg/kg	NA	NA	12 U	6 U	5.4 UJ	NA	NA	12 U	10 U	NA	NA
trichloroethene	53	2,900	—	—	µg/kg	NA	NA	12 U	6 U	5.4 U	NA	NA	12 U	10 U	NA	NA
1,3,5-trimethylbenzene	21,000	—	—	—	µg/kg	NA	NA	NA	NA	5.4 U	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	µg/kg	NA	NA	12 U	12 U	5.4 U	NA	NA	12 U	10 U	NA	NA
m-, p-xylene	—	—	—	—	µg/kg	NA	NA	NA	6 U	NA	NA	NA	NA	20 U	NA	NA
Petroleum Hydrocarbons																
diesel	—	—	100,000	—	µg/kg	11000 U	1000 U	12000 U	1000 U	11000 U	40000	13000	12000 U	NA	10000 U	1000 U
gasoline	—	—	100,000	—	µg/kg	500 U	500 U	600 U	600 U	540 U	500 U	600 U	600 U	NA	500 U	500 U
JP-5	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	µg/kg	21000 U	26000 U	24000 U	29000 U	11000 U	**600000**	200000	24000 U	NA	21000 U	27000 U
SVOCs																
acenaphthene	3,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	350 U	340 U	390 U	390 U	NA	360 U	380 U	400 U	NA	350 U	350 U
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	170 J	340 U	43 J	390 U	NA	360 U	380 U	400 U	NA	69 J	350 U
diethyl phthalate	49,000,000	—	—	—	µg/kg	350 U	340 U	390 U	390 U	NA	360 U	380 U	21 J	NA	350 U	350 U
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-7a
Soil Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	123-004-010 / 123-0010 / 2 - 2.5 / 08-Jun-95	123-004-010 / 123-0010M / 2 - 2.5 / 08-Jun-95	123-004-010 / 123-0019 / 4 - 4.5 / 08-Jun-95	123-004-010 / 123-0019M / 4 - 4.5 / 08-Jun-95	123-0044 / 123-0044 (FD) / 0.5 - 1 / 18-Aug-99	123-005-011 / 123-0011M / 2 - 2.5 / 21-Jun-95	123-005-012 / 123-0012M / 2 - 2.5 / 21-Jun-95	123-IW-001 / 123I-001 / 6.5 - 7 / 04-Jan-95	123-IW-001 / 123I-001M / 6.5 - 7 / 04-Jan-95	123-Z17-014 / 123-0014 / 1.5 - 2 / 09-Jun-95	123-Z17-014 / 123-0014M / 1.5 - 2 / 09-Jun-95
Pesticides/PCBs																
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	5 J	NA	NA	40 U	NA	35 U	22 U
alpha-BHC	90	—	—	—	µg/kg	NA	NA	NA	NA	1.1 U	NA	NA	2 U	NA	NA	NA
4,4'-DDE	1,700	—	—	—	µg/kg	NA	NA	NA	NA	2.1 U	NA	NA	4 U	NA	NA	NA
4,4'-DDT	1,700	—	—	—	µg/kg	NA	NA	NA	NA	0.3 J	NA	NA	4 U	NA	NA	NA
endosulfan II	370,000	—	—	—	µg/kg	NA	NA	NA	NA	2.1 U	NA	NA	4 U	NA	NA	NA
heptachlor epoxide	53	—	—	—	µg/kg	NA	NA	NA	NA	1.1 U	NA	NA	2 U	NA	NA	NA
Herbicides						NA	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA
Metals																
aluminum	76,000	—	—	13,960	mg/kg	8210 J	NA	4040 J	NA	NA	NA	NA	5190 J	NA	NA	NA
antimony	31	—	—	9.50	mg/kg	1.3 UJ	3.1 U	1.5 UJ	3.5 U	5.4 U	3.2 U	3.4 U	0.51 UJ	*25 U* [f]	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	**2.1 UJ** [f]	**1.8**	**1.3 UJ** [f]	**1.6**	**8.6**	**1.7**	**1.3**	**4.3**	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	35.3	31.5	53	37.4	41.5	34.6	40.1	15.8	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	0.33	0.24	0.16 U	0.26	0.21 U	0.25	0.21	*1.5*	*25 U* [f]	NA	NA
cadmium	37	—	—	1.72	mg/kg	0.06 U	0.22	0.07 U	0.33	0.067 J	0.2	0.16	0.15	*25 U* [f]	NA	NA
calcium	—	—	—	16,800	mg/kg	1800	NA	1600	NA	NA	NA	NA	10200	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	34.1 J	25.5	24.6 J	28.7	31.8	24.4	22.1	30.2	25 U	NA	NA
cobalt	900	—	—	14.30	mg/kg	4.5	4.2	4	4.2	5.5	4.2	3.5	6.5	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	13 J	7.1	6.9 J	10.5	10.1	6.1	5.3	12.1	25 U	NA	NA
iron	23,000	—	—	22,280	mg/kg	9430 J	NA	7090 J	NA	NA	NA	NA	11200 J	NA	NA	NA
lead	400	150	—	37.66	mg/kg	2.5	2.1	2.4	2	5	2.9	2.4	3.1 J	25 U	2.7	2.8
magnesium	—	—	—	7,304	mg/kg	2550 J	NA	1920 J	NA	NA	NA	NA	3720	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	77 J	NA	67.4 J	NA	NA	NA	NA	300	NA	NA	NA
mercury	23	—	—	0.52	mg/kg	0.16 UJ	0.35	0.17 UJ	*0.87*	0.022 J	0.31	0.26	0.18 U	***25 U*** [f]	NA	NA
nickel	1,600	—	—	55.72	mg/kg	29.7 J	19	19.7 J	24.9	28.1	23.6	16.5	31.7	29	NA	NA
potassium	—	—	—	1,232	mg/kg	1050	NA	711	NA	NA	NA	NA	789	NA	NA	NA
selenium	390	—	—	1.78	mg/kg	0.55 U	0.26 U	0.61 U	0.29 U	0.54 U	0.27 U	0.28 U	0.63 U	NA	NA	NA
silver	390	—	—	2.22	mg/kg	0.19 U	0.52 U	0.21 U	0.58 U	0.54 U	0.53 U	0.56 U	0.47 U	*25 U* [f]	NA	NA
sodium	—	—	—	1,230	mg/kg	304 J	NA	172	NA	NA	NA	NA	255	NA	NA	NA
thallium	5.2	—	—	0.50	mg/kg	*3.2*	0.26 U	*1.8*	0.29 U	*0.54 U* [f]	0.27 U	0.28 U	*3.5*	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	19.1	15.5	16.5	15.9	23	15.7	15.3	24.9	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	45.1 J	18.4	18.5 J	*163*	25.5	15.9	11	35.8	25 U	NA	NA
Organotins						NA	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA

Table 4-7a
Soil Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	32EDC-5-100 C032CB94 0 - 0.5 23-May-02	32EDC-5-100 C032CB95 0.5 - 2 23-May-02	32EDC-5-100 C032CB96 2 - 4 23-May-02	32EDC-5-100 C032CB97 4 - 8 23-May-02	32EDC-5-100 C032CB98 (FD) 4 - 8 23-May-02	32EDC-5-90 C032CB50 0 - 0.5 23-May-02	32EDC-5-90 C032CB51 0.5 - 2 23-May-02	32EDC-5-90 C032CB52 2 - 4 23-May-02	32EDC-5-90 C032CB53 4 - 8 23-May-02	32EDC-5-90 C032CB54 (FD) 4 - 8 23-May-02	A23SB15 C077S394 1.5 - 2.5 05-Dec-05
VOCs																
acetone	14,000,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzene	640	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bromoform	62,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-butanone	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-butylbenzene	220,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
carbon disulfide	360,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-dichlorobenzene	600,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-dichloroethene	120,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,2-dichloroethene	69,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-isopropyltoluene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-propylbenzene	240,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
tetrachloroethene	480	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
toluene	520,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trichloroethene	53	2,900	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-trimethylbenzene	21,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vinyl chloride	79	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
m-, p-xylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons																
diesel	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gasoline	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
JP-5	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																
acenaphthene	3,700,000	—	—	—	µg/kg	5.5 U	5.4 U	5.8 U	6.4 U	5.9 U	5.6 U	5.4 U	6.4 U	6.2 U	6 U	NA
acenaphthylene	—	—	—	—	µg/kg	14	2.3 J	1.6 J	6.4 U	1.4 J	2.2 J	6.5	4.7 J	2.8 J	2.4 J	NA
anthracene	22,000,000	—	—	—	µg/kg	11	1.6 J	1.4 J	6.4 U	0.62 J	1.7 J	5.2 J	2.4 J	1.9 J	6 UJ	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	46 J	6.3 J	8	4.8 J	6.3	9 J	27 J	10 J	12 J	7 J	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	55	8.2	8.3	6.7	10	14	22	24	23	16	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	70	8.8	9.1	7.2	11	9.6	36	16	14	9.4	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	110	17	16	13	19	16 J	29 J	34 J	25 J	19 J	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	**78**	12	13	11	18	18	38	28	30	20	NA
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	68 J	10 J	9.9	4.5 J	5.6 J	11 J	33 J	16 J	14 J	8.8 J	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	19	2.2 J	2 J	1.2 J	1.8 J	5.6 U	5.3 J	4.3 J	6.2 U	6 U	NA
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
diethyl phthalate	49,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	68	8.5	11	4.5 J	6.5	17 J	61 J	17 J	23 J	12 J	NA
fluorene	2,700,000	—	—	—	µg/kg	1.8 J	5.4 U	5.8 U	6.4 U	5.9 U	5.6 U	5.4 U	6.4 U	6.2 U	6 U	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	110	16	16	13	20	9.9 J	19 J	19 J	15 J	12 J	NA
2-methylnaphthalene	—	—	—	—	µg/kg	12	2.2 J	1.7 J	0.46 J	0.45 J	5.6 UJ	5.4 UJ	6.4 UJ	6.2 UJ	6 UJ	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	10	1.8 J	1.7 J	0.79 J	1.2 J	5.6 UJ	5.4 UJ	6.4 UJ	6.2 UJ	6 UJ	NA
phenanthrene	—	—	—	—	µg/kg	29	3.9 J	3.7 J	1.3 J	1.9 J	6.9 J	29 J	5.2 J	7.8 J	4.1 J	NA
pyrene	2,300,000	—	—	—	µg/kg	110	14	16	11	24	26 J	89 J	33 J	49 J	30 J	NA

Table 4-7a
Soil Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	32EDC-5-100 C032CB94 0 - 0.5 23-May-02	32EDC-5-100 C032CB95 0.5 - 2 23-May-02	32EDC-5-100 C032CB96 2 - 4 23-May-02	32EDC-5-100 C032CB97 4 - 8 23-May-02	32EDC-5-100 C032CB98 (FD) 4 - 8 23-May-02	32EDC-5-90 C032CB50 0 - 0.5 23-May-02	32EDC-5-90 C032CB51 0.5 - 2 23-May-02	32EDC-5-90 C032CB52 2 - 4 23-May-02	32EDC-5-90 C032CB53 4 - 8 23-May-02	32EDC-5-90 C032CB54 (FD) 4 - 8 23-May-02	A23SB15 C077S394 1.5 - 2.5 05-Dec-05
Pesticides/PCBs																
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100 U
alpha-BHC	90	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	1,700	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	1,700	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
endosulfan II	370,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
heptachlor epoxide	53	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Herbicides						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4050
antimony	31	—	—	9.50	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.8**
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	28.6
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.14 J
cadmium	37	—	—	1.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2100
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	30.9
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.9
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.2
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8600
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.2 J
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2060
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	81.7 J
mercury	23	—	—	0.52	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02 U
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	24.5
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	545
selenium	390	—	—	1.78	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.5 U
silver	390	—	—	2.22	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.1 U
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	66.3 U
thallium	5.2	—	—	0.50	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	*2 U* [f]
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.7
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	15.1
Organotins						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-7a
Soil Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	A23SB15 C077S395 2.5 - 3.5 05-Dec-05	A23SB15 C077S396 6.5 - 7.5 05-Dec-05	A23SB16 C077S397 1.5 - 2 05-Dec-05	A23SB16 C077S398 3 - 4 05-Dec-05	A23SB16 C077S399 7.5 - 8 05-Dec-05	A23SB18 C077S400 1 - 2 06-Dec-05	A23SB18 C077S401 3 - 4 06-Dec-05	A23SB18 C077S402 6.5 - 8 06-Dec-05	A23SB19 C077S403 0.25 - 1.25 08-Dec-05	A23SB19 C077S404 2 - 3 08-Dec-05	A23SB19 C077S405 4 - 5 08-Dec-05	A23SB21 C077S406 1 - 2 08-Dec-05	A23SB21 C077S407 2.5 - 4 08-Dec-05
VOCs																		
acetone	14,000,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	88 J	100 U	330 J	56 J	50 J	10 J	100 U	3.5 J
benzene	640	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 U	6 U	9 UJ	5 U	5 U	6 U	5 U	5 U
bromoform	62,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 UJ	6 U	9 UJ	5 U	5 U	6 U	5 U	5 U
2-butanone	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	100 U	100 U	27 J	1.8 J	1.7 J	100 U	100 U	100 U
sec-butylbenzene	220,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	20 UJ	20 U	40 UJ	20 UJ	20 UJ	20 U	20 U	20 U
carbon disulfide	360,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	100 U	100 U	2.8 J	100 U	100 U	6.7 J	1.3 J	100 U
1,2-dichlorobenzene	600,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 UJ	6 U	9 UJ	5 UJ	5 UJ	2.4 J	5 U	5 U
1,1-dichloroethene	120,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 U	6 U	9 UJ	5 U	5 U	6 U	5 U	5 U
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 UJ	6 U	4.9 J	5 U	14 J	6 U	5 U	5 U
trans-1,2-dichloroethene	69,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 U	6 U	9 UJ	5 U	1.1 J	6 U	5 U	5 U
p-isopropyltoluene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 UJ	6 U	9 UJ	5 UJ	5 UJ	6 U	5 U	5 U
methyl tert-butyl ether	17,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	1.4 J	50 U	3.7 J	1.2 J	1.1 J	50 U	40 U	40 U
methylene chloride	9,100	—	—	—	µg/kg	NA	NA	NA	NA	NA	16 J	60 U	90 J	13 J	12 J	60 U	50 U	50 U
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	20 UJ	20 U	40 UJ	20 UJ	20 UJ	20 U	20 UJ	20 U
n-propylbenzene	240,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 UJ	6 U	9 UJ	5 UJ	5 UJ	6 U	5 U	5 U
tetrachloroethene	480	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 UJ	6 U	9 UJ	5 U	3.6 J	6 U	5 U	5 U
toluene	520,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	0.84 J	6 U	9 UJ	5 U	5 U	6 U	5 U	5 U
trichloroethene	53	2,900	—	—	µg/kg	NA	NA	NA	NA	NA	6 U	6 U	9 UJ	5 U	15 J	6 U	5 U	5 U
1,3,5-trimethylbenzene	21,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	20 UJ	20 U	40 UJ	20 UJ	20 UJ	20 U	20 U	20 U
vinyl chloride	79	—	—	—	µg/kg	NA	NA	NA	NA	NA	10 U	10 U	20 UJ	10 U	10 U	10 U	10 U	10 U
m-, p-xylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	0.62 J	6 U	9 UJ	5 U	5 U	6 U	5 U	5 U
Petroleum Hydrocarbons																		
diesel	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	13000	1200 U	**130000**	20000	1100 U	1200 U	1100 U	1100 U
gasoline	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	1000 U	1000 U	2000 U	1000 U	1000 U	1000 U	1000 U	360 J
JP-5	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	1200 U	1200 UJ	1800 UJ	1100 U	1100 U	1200 U	1100 U	1100 U
motor oil	—	—	500,000	—	µg/kg	NA	NA	NA	NA	NA	18000	12000 U	240000	23000	11000 U	12000 U	11000 U	11000 U
SVOCs																		
acenaphthene	3,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 U	6 U	8.6 J	5 U	5 UJ	6 U	5 U	5 U
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 U	6 U	9 U	5 U	5 UJ	6 U	5 U	5 U
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 U	6 U	16	5 U	5 UJ	6 U	5 U	5 U
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	71 J	6 U	250 J	5 U	5 UJ	6 U	5 U	5 U
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	130 J	6 U	540 J	5 U	5 UJ	6 U	5 U	5 U
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	84 J	6 U	**450 J**	5 U	5 UJ	6 U	5 U	5 U
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	100	6 U	400	5 U	4.7 J	6 U	5 U	5.4
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	**110 J**	6 U	**470 J**	5 U	4.4 J	6 U	5 U	5 U
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	400 U	300 U	600 U	300 U	300 U	400 U	300 U	300 U
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	24	6 U	200	5 U	5 UJ	6 U	5 U	5 U
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 U	6 U	57 J	5 U	5 UJ	6 U	5 U	8 J
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	400 U	300 U	600 U	180 J	140 J	120 J	130 J	300 U
diethyl phthalate	49,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	400 U	300 U	600 U	300 U	300 U	400 U	300 U	300 U
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	120	6 U	500	5 U	2.6 J	6 U	5 U	5 U
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 U	6 U	9 U	5 U	5 UJ	6 U	5 U	5 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	77	6 U	280	5 U	2.5 J	6 U	5 U	5 U
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 U	6 U	24	5 U	5 UJ	6 U	5 U	5 U
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	6 U	6 U	21	5 U	5 UJ	6 U	5 U	5 U
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	58 J	6 U	180 J	5 U	5 UJ	6 U	5 U	5 U
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	170 J	6 U	850 J	5 U	5 UJ	6 U	5 U	5 U

Table 4-7a
Soil Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	A23SB15 C077S395 2.5 - 3.5 05-Dec-05	A23SB15 C077S396 6.5 - 7.5 05-Dec-05	A23SB16 C077S397 1.5 - 2 05-Dec-05	A23SB16 C077S398 3 - 4 05-Dec-05	A23SB16 C077S399 7.5 - 8 05-Dec-05	A23SB18 C077S400 1 - 2 06-Dec-05	A23SB18 C077S401 3 - 4 06-Dec-05	A23SB18 C077S402 6.5 - 8 06-Dec-05	A23SB19 C077S403 0.25 - 1.25 08-Dec-05	A23SB19 C077S404 2 - 3 08-Dec-05	A23SB19 C077S405 4 - 5 08-Dec-05	A23SB21 C077S406 1 - 2 08-Dec-05	A23SB21 C077S407 2.5 - 4 08-Dec-05
Pesticides/PCBs																		
Aroclor 1260	220	—	—	—	µg/kg	100 U	100 U	100 U	100 U	200 U	100 UJ	100 UJ	200 U	100 U	100 U	100 U	100 U	100 U
alpha-BHC	90	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 U	6 U	9 UJ	5 UJ	5 UJ	6 UJ	5 UJ	5 UJ
4,4'-DDE	1,700	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 U	6 U	9 U	5 UJ	5 UJ	6 U	5 U	5 UJ
4,4'-DDT	1,700	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 U	6 UJ	9 UJ	5 UJ	5 UJ	6 U	5 UJ	5 UJ
endosulfan II	370,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 U	6 U	9 U	5 UJ	5 UJ	6 U	5 UJ	5 UJ
heptachlor epoxide	53	—	—	—	µg/kg	NA	NA	NA	NA	NA	6 U	6 U	9 U	5 UJ	5 UJ	6 U	5 U	5 UJ
Herbicides						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																		
aluminum	76,000	—	—	13,960	mg/kg	4700	9700	*24000*	4580	*18900*	5520	4560	*22200*	*28500*	4160	3460	3800	3580
antimony	31	—	—	9.50	mg/kg	0.6 U	0.7 U	0.91 U	0.6 U	0.8 U	NA	NA	0.69 J	0.6 U	0.5 U	0.6 U	0.5 U	0.5 U
arsenic	0.39	0.062	—	9.14	mg/kg	**2.2**	***12.2***	**2.9**	**3.5**	**6**	**2.7**	**2**	**8.4**	**1.1 U [f]**	**2.1**	**1.8**	**1.8**	**1.8**
barium	5,400	—	—	93.68	mg/kg	40.7	*176*	25.9	34.6	*215*	52.3 J	31.6 J	*231 J*	29	28.6	23.9	23.5	26.2
beryllium	150	—	—	1.27	mg/kg	0.14 J	0.27 J	0.27	0.13 U	0.53	0.16 J	0.13 J	0.62	0.088 J	0.12 J	0.099 J	0.11 J	0.12 J
cadmium	37	—	—	1.72	mg/kg	0.6 U	0.7 U	1.1	0.04 J	0.14 J	0.6 U	0.6 U	0.36 J	0.07 J	0.5 U	0.6 U	0.4 J	0.5 U
calcium	—	—	—	16,800	mg/kg	1980	2260	1770	1960	2840	2070	2150	3330	*24900*	1690	1490	1690	1490
chromium	210	—	—	54.84	mg/kg	28.9	48.6	40.8	27.1	*74.6*	33.5 J	29.4 J	*79.1 J*	4.3	24	23.2	27.3	25.2
cobalt	900	—	—	14.30	mg/kg	4.2	12.2	*46.8*	4.2	10.8	5.4	3.9	*14.9*	7.7	4.2	3.8	3.8	3.4
copper	3,100	—	—	39.14	mg/kg	6.1	13	*185*	6	34.1	7.7	5.5	*52.5*	*58.1*	4.8	4.1	4.6	4.2
iron	23,000	—	—	22,280	mg/kg	9430	18500	***47600***	9220	***33600***	11800	9170	***39600***	17500	8960	7430	8530	8040
lead	400	150	—	37.66	mg/kg	2 J	5.6 J	2.7 J	2.2 J	36.2 J	4.3	2.6	36.4	0.6 U	1.7	1.6	1.8	1.7
magnesium	—	—	—	7,304	mg/kg	2310	4840	*19500*	2390	*9920*	3270	2310	*12600*	4860	2030	1630	1960	1810
manganese	1,800	—	—	383.0	mg/kg	79.8 J	129 J	*991 J*	95 J	223 J	119	84	*409*	216	76.5	66.1	72.6	69.7
mercury	23	—	—	0.52	mg/kg	0.1 U	0.07 U	0.11 U	0.029 U	*2.6*	0.1 U	0.034 U	*1.2*	0.037 U	0.1 U	0.02 U	0.1 U	0.019 U
nickel	1,600	—	—	55.72	mg/kg	28.7	*64.9*	23.8	28.3	*75*	37.7 J	26 J	*94.2 J*	3.4	24.4	19.8	23.7	21.5
potassium	—	—	—	1,232	mg/kg	677	*1580*	276	713	*3700*	892	677	*4110*	*1530*	629	530	557	535
selenium	390	—	—	1.78	mg/kg	0.6 U	0.7 U	0.48 J	0.4 J	0.8 U	0.64 UJ	0.83 UJ	0.82 UJ	0.6 U	0.5 U	0.6 U	0.5 U	0.37 U
silver	390	—	—	2.22	mg/kg	0.1 U	0.1 U	0.042 U	0.1 U	0.32	0.2	0.1 U	0.49	0.1 U	0.053 J	0.1 U	0.18	0.046 J
sodium	—	—	—	1,230	mg/kg	76.4 U	721	248 U	83.9 U	*2780*	147 U	94 U	*4600*	*1350*	61.6 J	110 J	76.9 J	173
thallium	5.2	—	—	0.50	mg/kg	*2 U [f]*	*3 U [f]*	*2 U [f]*	*2 U [f]*	*3 U [f]*	*2 UJ [f]*	*2 UJ [f]*	*4 UJ [f]*	*2 U [f]*	*2 U [f]*	*2 U [f]*	*2 U [f]*	*2 U [f]*
vanadium	78	—	—	47.34	mg/kg	18.3	32.7	***127***	18.4	*56.5*	21.2 J	19 J	*64 J*	*52*	17	15.2	16.4	15.4
zinc	23,000	—	—	67.48	mg/kg	17.1	38	*343*	17.7	*84*	23.6	17.2	*156*	24.3	15.3	12.3	18	13.5
Organotins						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-7a
Soil Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Units	Station ID: / Sample: / [a] Depth Interval: / Collection Date:	A23SB21 C077S408 4 - 5 08-Dec-05	A23SB22 C077S409 1 - 2 08-Dec-05	A23SB22 C077S410 3 - 4 08-Dec-05	A23SB22 C077S411 5 - 6 08-Dec-05	A23SB25 C077S412 1 - 2 07-Dec-05	A23SB25 C077S413 2.5 - 4 07-Dec-05	A23SB25 C077S414 5 - 6 07-Dec-05	A23SB26 C077S415 0.3 - 1.3 08-Dec-05	A23SB26 C077S416 2.5 - 4 08-Dec-05	A23SB26 C077S417 4 - 5 08-Dec-05	A23SB27 C077S418 1 - 2 07-Dec-05	A23SB27 C077S419 3 - 4 07-Dec-05	A23SB27 C077S420 5 - 6 07-Dec-05
VOCs																			
acetone	14,000,000	—[b]	—	—	µg/kg		3.3 J	59 J	3.3 J	5.9 J	100	97 J	95 J	13 J	10 J	9.6 J	89 J	86 J	120
benzene	640	—	—	—	µg/kg		5.6 J	7 U	6 U	6 U	6 U	6 U	6 U	5 U	5 U	9 U	5 U	5 U	7 U
bromoform	62,000	—	—	—	µg/kg		6 U	7 U	6 U	6 U	6 U	6 U	6 U	5 U	5 U	9 U	5 U	5 U	7 U
2-butanone	22,000,000	—	—	—	µg/kg		100 U	4.2 J	100 U	100 U	2.1 J	100 U	2.2 J	100 U	100 U	200 U	2.5 J	2.5 J	3.4 J
sec-butylbenzene	220,000	—	—	—	µg/kg		20 U	30 U	20 U	20 U	20 UJ	20 UJ	20 UJ	20 U	20 U	40 U	20 UJ	20 UJ	30 UJ
carbon disulfide	360,000	—	—	—	µg/kg		100 U	10 J	1.2 J	9.8 J	100 U	100 U	1.8 J	100 U	100 U	200 U	100 U	2.1 J	2.7 J
1,2-dichlorobenzene	600,000	—	—	—	µg/kg		6 U	7 U	6 U	6 U	6 UJ	6 UJ	6 UJ	5 U	5 U	9 U	5 UJ	5 UJ	7 UJ
1,1-dichloroethene	120,000	—	—	—	µg/kg		6 U	7 U	6 U	4.8 J	6 U	6 U	6 U	5 U	5 U	9 U	5 U	5 U	7 U
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg		21 J	7 U	6 U	190	2.6 J	2.1 J	1.4 J	5 U	5 U	9 U	5 U	1.4 J	7 U
trans-1,2-dichloroethene	69,000	—	—	—	µg/kg		6 U	7 U	6 U	16	6 U	6 U	6 U	5 U	5 U	9 U	5 U	5 U	7 U
p-isopropyltoluene	—	—	—	—	µg/kg		6 U	7 U	6 U	6 U	6 UJ	6 UJ	6 UJ	5 U	5 U	9 U	5 UJ	5 UJ	7 UJ
methyl tert-butyl ether	17,000	—	—	—	µg/kg		50 U	60 U	40 U	50 U	1.8 J	1.6 J	1.4 J	40 U	40 U	70 U	1.2 J	1.4 J	1.6 J
methylene chloride	9,100	—	—	—	µg/kg		60 U	70 U	60 U	60 U	60 U	60 U	60 U	4.8 J	60 U	90 U	12 J	14 J	18 J
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg		20 U	30 U	20 U	20 UJ	20 UJ	20 UJ	20 UJ	20 U	20 U	40 U	20 UJ	20 UJ	30 UJ
n-propylbenzene	240,000	—	—	—	µg/kg		6 U	7 U	6 U	6 U	6 UJ	6 UJ	6 UJ	5 U	5 U	9 U	5 UJ	5 UJ	7 UJ
tetrachloroethene	480	—	—	—	µg/kg		6 U	7 U	6 U	6 U	6 U	1.3 J	6 U	5 U	5 U	9 U	5 U	5 U	7 U
toluene	520,000	—	—	—	µg/kg		6 U	7 U	6 U	6 U	1.2 J	1.3 J	6 U	5 U	5 U	9 U	5 U	5 U	7 U
trichloroethene	53	2,900	—	—	µg/kg		6 U	7 U	6 U	6 U	6 U	6 U	6 U	5 U	5 U	9 U	5 U	5 U	7 U
1,3,5-trimethylbenzene	21,000	—	—	—	µg/kg		20 U	30 U	20 U	20 U	20 UJ	20 UJ	20 UJ	20 U	20 U	40 U	20 UJ	20 UJ	30 UJ
vinyl chloride	79	—	—	—	µg/kg		10 U	10 U	12	**210**	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
m-, p-xylene	—	—	—	—	µg/kg		6 U	7 U	6 U	6 U	6 U	6 U	6 U	5 U	5 U	9 U	5 U	5 U	7 U
Petroleum Hydrocarbons																			
diesel	—	—	100,000	—	µg/kg		1200 U	17000	1100 U	1200 U	44000 J	17000	16000	**440000**	1100 U	1800 U	22000	18000	17000
gasoline	—	—	100,000	—	µg/kg		1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	2000 U	NA	NA	NA
JP-5	—	—	100,000	—	µg/kg		1200 U	1400 U	1100 U	1200 U	1100 U	1200 U	1200 U	10000 U	1100 U	1800 U	3800	1100 U	1400 U
motor oil	—	—	500,000	—	µg/kg		12000 U	24000	11000 U	12000 U	66000 J	30000	23000	420000	11000 U	18000 U	29000	31000	24000
SVOCs																			
acenaphthene	3,700,000	—	—	—	µg/kg		6 U	170	6 U	6 U	6 U	6 U	6 U	5 U	5 UJ	9 UJ	NA	NA	NA
acenaphthylene	—	—	—	—	µg/kg		6 U	39 J	6 U	6 U	6 U	6 U	6 U	5 U	5 UJ	9 UJ	NA	NA	NA
anthracene	22,000,000	—	—	—	µg/kg		6 U	210	6 U	6 U	6 U	6 U	6 U	5 U	5 UJ	9 UJ	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg		6 U	500 J	6 U	6 U	6 U	6 U	6 U	42 J	5 UJ	9 UJ	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg		6 U	560 J	6 U	6 U	45 J	6 U	6 U	120 J	5 UJ	85 J	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg		6 U	140	6 U	6 U	2.1 J	6 U	6 U	81 J	5 UJ	17 J	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg		16	350	6 U	7	50	6 U	6 U	91	5 UJ	47 J	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg		17 J	**640 J**	6 U	6 U	21 J	6 U	6 U	**75 J**	5 UJ	56 J	NA	NA	NA
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg		98 J	400 U	300 U	77 J	300 U	300 U	400 U	300 U	300 U	500 U	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg		6 U	390	6 U	6 U	6 U	6 U	6 U	19	5 UJ	9 UJ	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg		6 U	**63 J**	6 U	6 U	6 U	6 U	6 U	5 U	5 UJ	9 UJ	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg		620 J	140 J	150 J	400 U	300 UJ	300 UJ	400 UJ	220 J	87 J	140 J	NA	NA	NA
diethyl phthalate	49,000,000	—	—	—	µg/kg		400 U	400 U	300 U	400 U	300 U	300 U	400 U	300 U	300 U	500 U	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg		15 J	1000 J	6 U	2.6 J	10	6 U	6 U	47 J	5 UJ	60 J	NA	NA	NA
fluorene	2,700,000	—	—	—	µg/kg		6 U	70 J	6 U	6 U	6 U	6 U	6 U	5 U	5 UJ	9 UJ	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg		9.6 J	260 J	6 U	3.8 J	32	6 U	6 U	49 J	5 UJ	29 J	NA	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg		6 U	29 J	6 U	6 U	39	6 U	6 U	12 J	5 UJ	20 J	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg		6 U	48 J	6 U	6 U	7.5	6 U	6 U	5 U	5 UJ	9 UJ	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg		9.4 J	940 J	6 U	6 U	16 J	7.3 J	6 U	17 J	5 UJ	19 J	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg		12 J	1500 J	6 U	4.1 J	6.2 J	6 U	6 U	76 J	5 UJ	110 J	NA	NA	NA

Table 4-7a
Soil Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: A23SB21	A23SB22	A23SB22	A23SB22	A23SB25	A23SB25	A23SB25	A23SB26	A23SB26	A23SB26	A23SB27	A23SB27	A23SB27
Sample:						C077S408	C077S409	C077S410	C077S411	C077S412	C077S413	C077S414	C077S415	C077S416	C077S417	C077S418	C077S419	C077S420
[a] Depth Interval:						4 - 5	1 - 2	3 - 4	5 - 6	1 - 2	2.5 - 4	5 - 6	0.3 - 1.3	2.5 - 4	4 - 5	1 - 2	3 - 4	5 - 6
Collection Date:						08-Dec-05	08-Dec-05	08-Dec-05	08-Dec-05	07-Dec-05	07-Dec-05	07-Dec-05	08-Dec-05	08-Dec-05	08-Dec-05	07-Dec-05	07-Dec-05	07-Dec-05
Pesticides/PCBs																		
Aroclor 1260	220	—	—	—	µg/kg	100 U	100 U	100 U	100 U	100 UJ	100 UJ	100 UJ	100 U	100 U	200 U	NA	NA	NA
alpha-BHC	90	—	—	—	µg/kg	6 UJ	7 U	6 U	6 U	6 UJ	6 UJ	6 UJ	5 U	5 U	9 U	NA	NA	NA
4,4'-DDE	1,700	—	—	—	µg/kg	6 UJ	7 U	6 U	6 U	6 UJ	6 UJ	6 UJ	5 U	5 U	9 U	NA	NA	NA
4,4'-DDT	1,700	—	—	—	µg/kg	6 UJ	7 UJ	6 UJ	6 UJ	6 UJ	6 UJ	6 UJ	5 UJ	5 UJ	9 U	NA	NA	NA
endosulfan II	370,000	—	—	—	µg/kg	6 UJ	7 UJ	6 UJ	6 UJ	6 UJ	6 UJ	6 UJ	5 UJ	5 UJ	9 U	NA	NA	NA
heptachlor epoxide	53	—	—	—	µg/kg	6 UJ	7 U	6 U	6 U	6 UJ	6 UJ	6 UJ	5 U	5 U	9 U	NA	NA	NA
Herbicides						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																		
aluminum	76,000	—	—	13,960	mg/kg	6090	*24900*	3890	4710	3300	3650	3560	5680	4590	8300	*16200*	*18300*	7560
antimony	31	—	—	9.50	mg/kg	0.6 U	0.7 U	0.6 U	0.6 U	0.6 UJ	0.6 UJ	0.6 UJ	0.5 U	0.6 U	0.9 U	0.6 UJ	0.6 UJ	0.7 UJ
arsenic	0.39	0.062	—	9.14	mg/kg	**2.5**	**1.7**	**1.9**	**1.8**	**2.2**	**1.8**	**1.9**	**2.3**	**2**	**2.8**	**8.6**	**5.6**	**3.7**
barium	5,400	—	—	93.68	mg/kg	55.6	43.3	24.4	43.8	29.6 J	75 J	26.5 J	44.2	30.6	67.4	65.1 J	76.2 J	45.3 J
beryllium	150	—	—	1.27	mg/kg	0.15 J	0.13 J	0.11 J	0.12 J	0.11 J	0.11 J	0.11 J	0.11 J	0.15 J	0.19 J	0.31	0.46	0.2 J
cadmium	37	—	—	1.72	mg/kg	0.6 U	0.7 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.5 U	0.6 U	0.9 U	0.6 U	0.15 J	0.7 U
calcium	—	—	—	16,800	mg/kg	2080	12200	1950	1750	1560 J	5760 J	1220 J	1830	2200	2870	7650 J	3300 J	2620 J
chromium	210	—	—	54.84	mg/kg	31.6	*70.1*	25.8	27.8	26.4	25.7	22.2	29.4	29	47.4	10.8	*70.2*	34.8
cobalt	900	—	—	14.30	mg/kg	5.6	*19.9*	3.6	4.4	3.6 J	3.5 J	3.6 J	14.2	4.6	8.1	7.9 J	14.3 J	6.7 J
copper	3,100	—	—	39.14	mg/kg	7	*53.7*	7	5.5	4.8	4.5	4.4	11.6	5.8	10.8	25.5	18.9	11.4
iron	23,000	—	—	22,280	mg/kg	12000	***39500***	8210	9820	7700	7510	7360	11800	9780	17200	***34800***	***36500***	14800
lead	400	150	—	37.66	mg/kg	2.1	2.9	1.9	2.1	4.7	1.6	2.9	3.7	2	3.4	3.8	12.2	6.3
magnesium	—	—	—	7,304	mg/kg	3020	*19500*	1860	2580	1740	1830	1800	4440	2220	4500	5250	6300	4050
manganese	1,800	—	—	383.0	mg/kg	117	*723*	74.8	86.2	102 J	60.9 J	65.2 J	322	95.9	182	*635 J*	*600 J*	160 J
mercury	23	—	—	0.52	mg/kg	0.024 U	*0.57*	0.1 U	0.04 U	0.023 U	0.031 U	0.1 U	0.019 U	0.026 U	0.046 U	0.13	0.043 U	0.073 U
nickel	1,600	—	—	55.72	mg/kg	37.3	55.2	22.3	29.1	22.5	21.7	20.8	35.2	26.2	48.3	8.4	*80.1*	37.7
potassium	—	—	—	1,232	mg/kg	895	534	575	781	495	583	587	661	616	*1290*	370	*1860*	1180
selenium	390	—	—	1.78	mg/kg	0.6 U	0.5 U	0.44 U	0.6 U	0.49 U	0.31 U	0.6 U	0.35 U	0.38 U	0.9 U	0.78 U	0.39 U	0.7 U
silver	390	—	—	2.22	mg/kg	0.18	0.14	0.071 J	0.1 U	0.1 U	0.1 U	0.11	0.83	0.14	0.19 J	0.1 U	0.069 J	0.11
sodium	—	—	—	1,230	mg/kg	101 J	920	79.1 J	321	59.7 U	118 U	284 U	153	72.2 J	563	530	457 U	264 U
thallium	5.2	—	—	0.50	mg/kg	*2 U* [f]	*3 U* [f]	*2 U* [f]	*2 U* [f]	*2 U* [f]	*2 U* [f]	*2 U* [f]	*2 U* [f]	*2 U* [f]	*4 U* [f]	*2 U* [f]	*2 U* [f]	*3 U* [f]
vanadium	78	—	—	47.34	mg/kg	21.7	***81.2***	15.8	18.9	14.5	14.7	14.2	12.8	18.6	31.9	33.1	46.9	25.8
zinc	23,000	—	—	67.48	mg/kg	22.2	55	13.7	18.6	14.1	13.3	12.4	27.7	17	31.7	*80.4*	54.5	29.9
Organotins						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-7a
Soil Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	A23SB28 C077S421 1 - 2 07-Dec-05	A23SB28 C077S422 3 - 4 07-Dec-05	A23SB28 C077S423 5 - 6.5 07-Dec-05	A23SB29 C077S424 1 - 2 07-Dec-05	A23SB29 C077S425 3 - 4 07-Dec-05	A23SB29 C077S426 6 - 7 07-Dec-05
VOCs											
acetone	14,000,000	—[b]	—	—	µg/kg	75 J	130 J	88 J	78 J	100	17 J
benzene	640	—	—	—	µg/kg	6 U	6 U	6 U	6 U	5 U	6 U
bromoform	62,000	—	—	—	µg/kg	1.2 J	6 U	6 U	6 U	5 U	6 U
2-butanone	22,000,000	—	—	—	µg/kg	1.9 J	3.9 J	2.2 J	2.2 J	3 J	100 U
sec-butylbenzene	220,000	—	—	—	µg/kg	2 J	20 U	30 UJ	20 UJ	20 UJ	20 U
carbon disulfide	360,000	—	—	—	µg/kg	100 U	100 U	100 U	100 U	100 U	100 U
1,2-dichlorobenzene	600,000	—	—	—	µg/kg	6 UJ	6 U	6 UJ	6 UJ	5 UJ	6 U
1,1-dichloroethene	120,000	—	—	—	µg/kg	6 U	6 U	6 U	6 U	5 U	6 U
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	1.1 J	2.3 J	6 U	6 U	1.3 J	6 U
trans-1,2-dichloroethene	69,000	—	—	—	µg/kg	6 U	6 U	6 U	6 U	5 U	6 U
p-isopropyltoluene	—	—	—	—	µg/kg	3 J	6 U	6 UJ	6 UJ	5 UJ	6 U
methyl tert-butyl ether	17,000	—	—	—	µg/kg	40 U	1.7 J	50 U	1.5 J	1.3 J	50 U
methylene chloride	9,100	—	—	—	µg/kg	12 J	19 J	16 J	15 J	14 J	60 U
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	7.4 J	20 U	30 UJ	20 UJ	20 UJ	20 U
n-propylbenzene	240,000	—	—	—	µg/kg	1.5 J	6 U	6 UJ	6 UJ	5 UJ	6 U
tetrachloroethene	480	—	—	—	µg/kg	6 U	1.2 J	6 U	6 U	5 U	6 U
toluene	520,000	—	—	—	µg/kg	6 U	1.4 J	6 U	6 U	5 U	6 U
trichloroethene	53	2,900	—	—	µg/kg	6 U	6 U	6 U	6 U	5 U	6 U
1,3,5-trimethylbenzene	21,000	—	—	—	µg/kg	2.5 J	20 U	30 UJ	20 UJ	20 UJ	20 U
vinyl chloride	79	—	—	—	µg/kg	10 U	10 U	10 U	10 U	10 U	10 U
m-, p-xylene	—	—	—	—	µg/kg	6 U	6 U	6 U	6 U	5 U	6 U
Petroleum Hydrocarbons											
diesel	—	—	100,000	—	µg/kg	33000	20000	19000	37000	42000	29000
gasoline	—	—	100,000	—	µg/kg	NA	NA	NA	1000 U	1000 U	1200 J
JP-5	—	—	100,000	—	µg/kg	1100 U	1100 U	1300 U	1200 U	1100 U	1200 U
motor oil	—	—	500,000	—	µg/kg	26000	29000	28000	32000	73000	49000
SVOCs											
acenaphthene	3,700,000	—	—	—	µg/kg	6 U	NA	NA	6 U	5 U	6 U
acenaphthylene	—	—	—	—	µg/kg	6 U	NA	NA	6 U	5 U	6 U
anthracene	22,000,000	—	—	—	µg/kg	6 U	NA	NA	6 U	5 U	6 U
benz(a)anthracene	620[c]	—	—	—	µg/kg	6 U	NA	NA	6 U	5 U	6 U
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	6 U	NA	NA	6 U	5 U	6 U
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	6 U	NA	NA	6 U	5 U	6 U
benzo(g,h,i)perylene	—	—	—	—	µg/kg	27	NA	NA	6 U	19	10
benzo(a)pyrene	62[c]	—	—	—	µg/kg	20 J	NA	NA	6 U	17 J	8 J
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	300 U	NA	NA	580 J	300 U	400 U
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	6 U	NA	NA	6 U	5 U	6 U
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	6 U	NA	NA	6 U	5 U	6 U
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	300 UJ	NA	NA	400 UJ	300 UJ	400 U
diethyl phthalate	49,000,000	—	—	—	µg/kg	300 U	NA	NA	400 U	300 U	400 U
fluoranthene	2,300,000	—	—	—	µg/kg	13	NA	NA	5.4 J	8.3	5.5 J
fluorene	2,700,000	—	—	—	µg/kg	6 U	NA	NA	6 U	5 U	6 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	17	NA	NA	6 U	13	5.8 J
2-methylnaphthalene	—	—	—	—	µg/kg	33	NA	NA	19	5 U	13
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	6 U	NA	NA	6 U	5 U	6 U
phenanthrene	—	—	—	—	µg/kg	15 J	NA	NA	17 J	8.2 J	9.5 J
pyrene	2,300,000	—	—	—	µg/kg	8.9 J	NA	NA	6 U	6.4 J	5.3 J

Table 4-7a
Soil Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: A23SB28 / Sample: C077S421 / [a] Depth Interval: 1 - 2 / Collection Date: 07-Dec-05	A23SB28 / C077S422 / 3 - 4 / 07-Dec-05	A23SB28 / C077S423 / 5 - 6.5 / 07-Dec-05	A23SB29 / C077S424 / 1 - 2 / 07-Dec-05	A23SB29 / C077S425 / 3 - 4 / 07-Dec-05	A23SB29 / C077S426 / 6 - 7 / 07-Dec-05
Pesticides/PCBs											
Aroclor 1260	220	—	—	—	µg/kg	100 UJ	NA	NA	100 UJ	100 UJ	100 UJ
alpha-BHC	90	—	—	—	µg/kg	6 UJ	NA	NA	6 UJ	5 UJ	6 UJ
4,4'-DDE	1,700	—	—	—	µg/kg	6 UJ	NA	NA	6 UJ	5 UJ	6 U
4,4'-DDT	1,700	—	—	—	µg/kg	6 UJ	NA	NA	6 UJ	5 UJ	6 U
endosulfan II	370,000	—	—	—	µg/kg	6 UJ	NA	NA	6 UJ	5 UJ	6 U
heptachlor epoxide	53	—	—	—	µg/kg	6 UJ	NA	NA	6 UJ	5 UJ	6 U
Herbicides						NA	NA	NA	NA	NA	NA
Metals											
aluminum	76,000	—	—	13,960	mg/kg	5090	4430	5420	*26600*	3840	4230
antimony	31	—	—	9.50	mg/kg	0.6 UJ	0.6 UJ	0.7 UJ	0.6 UJ	0.6 UJ	0.6 UJ
arsenic	0.39	0.062	—	9.14	mg/kg	**2.6**	**1.9**	**2.2**	***9.9***	**2**	**1.8**
barium	5,400	—	—	93.68	mg/kg	43.2 J	34.7 J	60.9 J	64.2 J	29.7 J	39.4 J
beryllium	150	—	—	1.27	mg/kg	0.13 J	0.14 J	0.14 J	0.31	0.11 J	0.13 J
cadmium	37	—	—	1.72	mg/kg	0.6 U	0.6 U	0.7 U	0.17 J	0.6 U	0.6 U
calcium	—	—	—	16,800	mg/kg	2210 J	1830 J	1900 J	16000 J	1750 J	1460 J
chromium	210	—	—	54.84	mg/kg	28.3	27.9	30.5	50.7	25.5	26
cobalt	900	—	—	14.30	mg/kg	4.6 J	4 J	5 J	*26.4 J*	3.9 J	4 J
copper	3,100	—	—	39.14	mg/kg	7	6.1	7.6	*41.1*	5.1	5.5
iron	23,000	—	—	22,280	mg/kg	10500	9550	11600	***37600***	8790	9290
lead	400	150	—	37.66	mg/kg	3.1	3	4.1	6	2.8	2.4
magnesium	—	—	—	7,304	mg/kg	2530	2400	3140	*11000*	2180	2430
manganese	1,800	—	—	383.0	mg/kg	120 J	100 J	110 J	*1330 J*	101 J	83.5 J
mercury	23	—	—	0.52	mg/kg	0.04 U	0.037 U	0.11 U	0.072 U	0.034 U	0.051 U
nickel	1,600	—	—	55.72	mg/kg	28	26.5	35.1	34.4	24.3	27.2
potassium	—	—	—	1,232	mg/kg	713	739	978	324	562	777
selenium	390	—	—	1.78	mg/kg	0.5 U	0.6 U	0.35 U	1.2 U	0.42 U	0.3 U
silver	390	—	—	2.22	mg/kg	0.12	0.075 J	0.1	0.088 J	0.1 U	0.066 J
sodium	—	—	—	1,230	mg/kg	210 U	153 U	275 U	1090	182 U	449 U
thallium	5.2	—	—	0.50	mg/kg	*2 U* [f]	*2 U* [f]	*3 U* [f]	*2 U* [f]	*2 U* [f]	*2 U* [f]
vanadium	78	—	—	47.34	mg/kg	20	18.6	20.3	*63.9*	17.6	16.7
zinc	23,000	—	—	67.48	mg/kg	20.1	18.4	22.3	*84.1*	15.4	17.5
Organotins						NA	NA	NA	NA	NA	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[d] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL
[e] italicized font indicates result above background
[f] detection limit is above criteria

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
BHC – benzene hexachloride
Cal – California
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
JP-5 – jet propellant grade 5
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
ND – not detected
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 4-7b
Groundwater Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	03GB036 / 03GPW036 / 10 - 12 / 09-Sep-94	03GB240 / GPW03-240 / 5 - 6 / 18-Aug-94	123-0040 / 123-0040 / 6 - 10 / 18-Aug-99	123-0041 / 123-0041 / 4 - 8 / 18-Aug-99	123-0042 / 123-0042 / 4 - 8 / 18-Aug-99	123-0043 / 123-0043 / 4 - 8 / 18-Aug-99	A23SB15 / C077G120 / 7 - 12 / 05-Dec-05	A23SB17 / C077G121 / 7 - 12 / 08-Dec-05	A23SB18 / C077G122 / 3 - 8 / 06-Dec-05	A23SB19 / C077G123 / 4 - 9 / 09-Dec-05	A23SB20 / C077G124 / 4 - 9 / 09-Dec-05	A23SB20 / C077G125 (FD) / 4 - 9 / 09-Dec-05	A23SB21 / C077G126 / 5 - 10 / 08-Dec-05
VOCs																		
benzene	5	1	—[b]	—	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	NA	0.5 U	0.49 J	0.5 U	0.5 U	NA	0.5 U
carbon disulfide	—	—	—	—	µg/L	1	0.8 J	NA	NA	NA	NA	NA	0.5 U	3.6	0.5 U	0.5 U	NA	0.5 U
1,2-dichlorobenzene	600	600	—	—	µg/L	NA	NA	1 U	1 U	1 U	1 U	NA	0.5 U	0.5 U	4.4	0.5 U	NA	0.5 U
1,3-dichlorobenzene	—	—	—	—	µg/L	NA	NA	1 U	1 U	1 U	1 U	NA	0.5 U	0.5 U	0.5 U	0.36 J	NA	0.5 U
1,1-dichloroethane	—	5	—	—	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	NA	0.5 U	0.57	0.5 U	0.5 U	NA	0.5 U
cis-1,2-dichloroethene	70	6	—	—	µg/L	NA	NA	1 U	1 U	1 U	1 U	NA	0.5 U	1.3	0.5 U	1.4	NA	0.37 J
trans-1,2-dichloroethene	100	10	—	—	µg/L	NA	NA	1 U	1 U	1 U	1 U	NA	0.5 U	0.5 U	0.5 U	0.5 U	NA	0.5 U
toluene	1,000	150	—	—	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	NA	0.5 U	0.21 J	0.5 U	0.21 J	NA	0.5 U
trichloroethene	5	5	—	—	µg/L	1 U	1 U	1 U	1 U	1 U	1 U	NA	0.55	0.3 J	0.5 U	0.5 U	NA	0.5 U
1,2,4-trimethylbenzene	—	—	—	—	µg/L	NA	NA	1 U	1 U	2	0.6 J	NA	0.5 U	0.5 U	0.5 U	0.5 U	NA	0.5 U
vinyl chloride	2	0.5	—	—	µg/L	0.5 U	0.5 U	**1 U**[c,d]	**1 U**[c]	**1 U**[c]	**1 U**[c]	NA	0.5 U	**2.8**	0.5 U	**0.62**	NA	0.5 U
total xylenes	10,000	1,800	—	—	µg/L	1 U	2	1 U	1 U	1 U	1 U	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons																		
diesel	—	—	100	—	µg/L	100 U	100 U	70 J	**200**	80 J	**240**	NA	**150**	**150 J**	50 U	50 U	NA	50 U
gasoline	—	—	100	—	µg/L	50 U	50 U	50 U	50 U	30 J	50 U	NA	100 U	100 U	17 J	100 U	NA	100 U
motor oil	—	—	100	—	µg/L	**610 J**	**860 J**	70 J	**200**	70 J	100	NA	**500 U**[c]	**500 UJ**[c]	**500 U**[c]	**500 U**[c]	NA	**500 U**[c]
SVOCs																		
acenaphthene	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	0.2 U	0.066 J	0.2 U	0.2 U	0.2 U	0.86
benz(a)anthracene	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
fluorene	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.16 J
phenanthrene	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	0.2 U	0.14 J	0.2 U	0.2 U	0.2 U	0.41
pyrene	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	0.2 U	0.37	0.18 J	0.2 U	0.11 J	0.2 U
Pesticides/PCBs																		
Aroclor 1016	0.5	0.5	—	—	µg/L	NA	NA	**2 U**[c]	**2 U**[c]	**2 U**[c]	**2 U**[c]	0.2 U	0.2 U	0.24	0.2 U	0.2 U	NA	0.2 U
Aroclor 1260	0.5	0.5	—	—	µg/L	NA	NA	**1 U**[c]	**1 U**[c]	**1 U**[c]	**1 U**[c]	0.2 U	0.2 U	0.34 J	0.2 U	0.2 U	NA	0.2 U
Metals																		
arsenic	10	50	—	20.72	µg/L	NA	NA	6.8	9.7	**16**	**13.9**	5 U	**10.5**	5.5	**11.7 U**[c]	8.4 U	8.1 U	6.3
barium	2,000	1,000	—	569.5	µg/L	NA	NA	45.9	43.3	46.9	45.7	22	111 J	335	110 J	286 J	245 J	104 J
beryllium	4	4	—	2.50	µg/L	NA	NA	2 U	2 U	2 U	2 U	2 U	2 UJ	0.34 J	2 U	2 U	0.28 J	2 UJ
cadmium	5	5	—	—	µg/L	NA	NA	0.23 J	0.15 J	2 U	0.16 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U
calcium	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	14,700	31,900 J	50,800	23,400 J	35,400 J	31,900 J	30,900 J
chromium	100	50	—	12.45	µg/L	NA	NA	0.53 J	0.54 J	0.58 J	2.1 J	9.5	2.1 UJ	5.4	2.1 J	4.9 J	4.5 J	1.7 UJ
cobalt	—	—	—	—	µg/L	NA	NA	3.7 J	0.81 J	1.2 J	2 J	5 U	0.96 U	5 U	1.1 U	5 U	5 U	5 U
copper	—	—	—	24.03	µg/L	NA	NA	4.7 J	2.1 J	1.7 J	2.4 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U
iron	—	—	—	6,586	µg/L	NA	NA	NA	NA	NA	NA	377	160 J	2,340 J	3,220	1,940	1,050	133 J
lead	15	—	—	11.45	µg/L	NA	NA	5 U	5 U	1.2 J	5 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
magnesium	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	20,100	21,500 J	61,700	12,900 J	59,700 J	50,100 J	15,500 J
manganese	—	—	—	1,741	µg/L	NA	NA	NA	NA	NA	NA	252	135 J	459	245 J	523 J	421 J	355 J
mercury	2	2	—	—	µg/L	NA	NA	0.5 U	0.5 U	0.5 U	0.12 J	0.062 U	0.062 U	0.2 U	0.084 U	0.068 U	0.12 U	0.086 U
molybdenum	—	—	—	—	µg/L	NA	NA	6.7	7.7	10.5	10	NA	NA	NA	NA	NA	NA	NA
nickel	—	100	—	—	µg/L	NA	NA	2.8 J	3 J	2.9 J	6.3	5 U	5 UJ	5 U	5 U	5 U	5 U	5 UJ
potassium	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	28,300	21,500	67,400	22,300	47,600 J	49,800 J	12,900

Table 4-7b
Groundwater Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	03GB036 / 03GPW036 / 10 - 12 / 09-Sep-94	03GB240 / GPW03-240 / 5 - 6 / 18-Aug-94	123-0040 / 123-0040 / 6 - 10 / 18-Aug-99	123-0041 / 123-0041 / 4 - 8 / 18-Aug-99	123-0042 / 123-0042 / 4 - 8 / 18-Aug-99	123-0043 / 123-0043 / 4 - 8 / 18-Aug-99	A23SB15 / C077G120 / 7 - 12 / 05-Dec-05	A23SB17 / C077G121 / 7 - 12 / 08-Dec-05	A23SB18 / C077G122 / 3 - 8 / 06-Dec-05	A23SB19 / C077G123 / 4 - 9 / 09-Dec-05	A23SB20 / C077G124 / 4 - 9 / 09-Dec-05	A23SB20 / C077G125 (FD) / 4 - 9 / 09-Dec-05	A23SB21 / C077G126 / 5 - 10 / 08-Dec-05
Metals (continued)																		
selenium	50	50	—	8.58	µg/L	NA	NA	*10 U* [c,e]	*10 U* [c]	*10 U* [c]	*10 U* [c]	5 U	7.6 U	*8.8*	3.7 U	7.5 U	5.3 U	6.6 U
silver	—	—	—	—	µg/L	NA	NA	10 U	10 U	0.61 J	10 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
sodium	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	592,000	276,000	1,490,000	273,000	1,110,000	1,090,000	240,000
thallium	2	2	—	16.15	µg/L	NA	NA	**10 U** [c]	**10 U** [c]	**10 U** [c]	**10 U** [c]	**5 U** [c]	**5 U** [c]	**3.4 J**	**5 U** [c]	**5 U** [c]	**5 U** [c]	**5 U** [c]
vanadium	—	—	—	26.27	µg/L	NA	NA	1.9 J	1.1 J	0.7 J	3.2 J	10	6.3	4.6 J	1.5 J	4.5 J	3.8 J	3.2 J
zinc	—	—	—	36.39	µg/L	NA	NA	12	*54.2*	3.2 J	9.1	*50 U* [c]	*50 U* [c]	*50 U* [c]	*50 U* [c]	*50 U* [c]	*50 U* [c]	*50 U* [c]
Low-Level Mercury																		
mercury	2	2	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry																		
solids, total dissolved	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	1,590,000	940,000	4,600,000	1,000,000	3,160,000	NA	798,000

Table 4-7b
Groundwater Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	A23SB22 C077G127 4 - 9 08-Dec-05	A23SB23 C077G128 5 - 10 06-Dec-05	A23SB23 C077G129 (FD) 5 - 10 06-Dec-05	A23SB24 C077G130 5 - 10 07-Dec-05	A23SB24 C077G131 (FD) 5 - 10 07-Dec-05	A23SB25 C077G132 5 - 10 07-Dec-05	A23SB26 C077G133 5 - 10 08-Dec-05	A23SB26 C077G134 (FD) 5 - 10 08-Dec-05	A23SB27 C077G135 5 - 10 07-Dec-05	A23SB28 C077G136 5 - 10 07-Dec-05	A23SB29 C077G137 5 - 10 08-Dec-05	A23SB29 C077G138 (FD) 5 - 10 08-Dec-05
VOCs																	
benzene	5	1	—[b]	—	µg/L	0.16 J	0.5 U	0.5 U	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	NA
carbon disulfide	—	—	—	—	µg/L	0.35 J	0.5 U	0.96	0.5 U	NA	0.5 U	0.5 U	NA	0.32 J	0.5 U	0.5 U	NA
1,2-dichlorobenzene	600	600	—	—	µg/L	0.5 U	0.5 U	0.5 U	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	NA
1,3-dichlorobenzene	—	—	—	—	µg/L	0.18 J	0.5 U	0.5 U	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	NA
1,1-dichloroethane	—	5	—	—	µg/L	2.8	0.5 U	0.5 U	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	NA
cis-1,2-dichloroethene	70	6	—	—	µg/L	1.2	0.5 U	0.5 U	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	NA
trans-1,2-dichloroethene	100	10	—	—	µg/L	0.37 J	0.5 U	0.5 U	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	NA
toluene	1,000	150	—	—	µg/L	0.5 U	0.5 U	0.42 J	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	NA
trichloroethene	5	5	—	—	µg/L	0.52	0.5 U	0.5 U	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	NA
1,2,4-trimethylbenzene	—	—	—	—	µg/L	0.5 U	0.5 U	0.5 U	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	NA
vinyl chloride	2	0.5	—	—	µg/L	0.5 U	0.5 U	0.5 U	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	NA
total xylenes	10,000	1,800	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons																	
diesel	—	—	100	—	µg/L	50 U	50 U	50 U	50 U	NA	50 U	50 U	NA	50 U	50 U	**240 J**	NA
gasoline	—	—	100	—	µg/L	100 U	100 U	100 U	100 U	NA	100 U	100 U	NA	NA	NA	100 U	NA
motor oil	—	—	100	—	µg/L	**500 U**[c]	**500 UJ**[c]	**500 UJ**[c]	**500 U**[c]	NA	**500 U**[c]	**500 U**[c]	NA	**500 U**[c]	**500 U**[c]	**500 U**[c]	NA
SVOCs																	
acenaphthene	—	—	—	—	µg/L	0.2 U	0.2 U	NA	0.2 U	NA	0.2 U	NA	NA	NA	NA	0.2 U	NA
benz(a)anthracene	—	—	—	—	µg/L	0.2 U	0.2 U	NA	0.2 U	NA	0.56	NA	NA	NA	NA	0.2 U	NA
fluorene	—	—	—	—	µg/L	0.2 U	0.2 U	NA	0.2 U	NA	0.2 U	NA	NA	NA	NA	0.2 U	NA
phenanthrene	—	—	—	—	µg/L	0.2 U	0.2 U	NA	0.2 U	NA	0.2 U	NA	NA	NA	NA	0.2 U	NA
pyrene	—	—	—	—	µg/L	0.2 U	0.2 U	NA	0.2 U	NA	0.2 U	NA	NA	NA	NA	0.2 U	NA
Pesticides/PCBs																	
Aroclor 1016	0.5	0.5	—	—	µg/L	NA	0.2 U	NA	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	0.2 U	NA
Aroclor 1260	0.5	0.5	—	—	µg/L	NA	0.2 UJ	NA	0.2 U	0.2 UJ	0.2 U	NA	NA	NA	NA	0.2 U	NA
Metals																	
arsenic	10	50	—	20.72	µg/L	**12.7**	5 U	NA	8.6	NA	**11.1**	5.6	7.1	7.3	5.5	3.9 J	7.4
barium	2,000	1,000	—	569.5	µg/L	369 J	99.5	NA	153 J	NA	533 J	141 J	142 J	76.3 J	68.3 J	159 J	234 J
beryllium	4	4	—	2.50	µg/L	2 UJ	2 U	NA	2 U	NA	0.28 J	2 UJ	2 UJ	2 U	2 U	2 UJ	0.28 J
cadmium	5	5	—	—	µg/L	5 U	5 U	NA	5 U	NA	5 U	5 U	5 U	5 U	5 U	5 U	5 U
calcium	—	—	—	—	µg/L	109,000 J	26,800	NA	37,900 J	NA	66,900 J	45,100 J	44,500 J	34,700 J	20,500 J	20,900 J	35,400 J
chromium	100	50	—	12.45	µg/L	4.8 UJ	2.1 J	NA	3 J	NA	6.6	2.5 UJ	1.9 UJ	3.8 J	3.3 J	4.6 UJ	6.2 UJ
cobalt	—	—	—	—	µg/L	5 U	4.7 U	NA	5 U	NA	5 U	5 U	5 U	5 U	3.3 U	5 U	5 U
copper	—	—	—	24.03	µg/L	5 U	5 U	NA	5 U	NA	5 U	5 U	5 U	5 U	5 U	5 U	5 U
iron	—	—	—	6,586	µg/L	29.9 J	624 J	NA	750	NA	4,850	191 J	196 J	1,880	980	3,260 J	4,900 J
lead	15	—	—	11.45	µg/L	3 U	3 U	NA	3 U	NA	3 U	3 U	3 U	3 U	3 U	3 U	3 U
magnesium	—	—	—	—	µg/L	86,200 J	16,000	NA	25,600 J	NA	76,000 J	18,500 J	18,200 J	26,500 J	17,900 J	32,400 J	55,800 J
manganese	—	—	—	1,741	µg/L	568 J	80	NA	439 J	NA	1,090 J	346 J	345 J	790 J	277 J	215 J	367 J
mercury	2	2	—	—	µg/L	NA	0.2 U	NA	0.2 U	NA	0.2 U	0.13 U	0.13 U	0.2 U	0.2 U	0.12 U	0.098 U
molybdenum	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	—	100	—	—	µg/L	5 UJ	5 U	NA	5 U	NA	5 U	5 UJ	5 UJ	5 U	5 U	5 UJ	5 UJ
potassium	—	—	—	—	µg/L	40,800	18,800	NA	26,500 J	NA	62,000 J	27,000	27,800	20,500 J	27,200 J	54,200	52,900

Table 4-7b
Groundwater Sampling Results, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	A23SB22 C077G127 4 - 9 08-Dec-05	A23SB23 C077G128 5 - 10 06-Dec-05	A23SB23 C077G129 (FD) 5 - 10 06-Dec-05	A23SB24 C077G130 5 - 10 07-Dec-05	A23SB24 C077G131 (FD) 5 - 10 07-Dec-05	A23SB25 C077G132 5 - 10 07-Dec-05	A23SB26 C077G133 5 - 10 08-Dec-05	A23SB26 C077G134 (FD) 5 - 10 08-Dec-05	A23SB27 C077G135 5 - 10 07-Dec-05	A23SB28 C077G136 5 - 10 07-Dec-05	A23SB29 C077G137 5 - 10 08-Dec-05	A23SB29 C077G138 (FD) 5 - 10 08-Dec-05
Metals (continued)																	
selenium	50	50	—	8.58	µg/L	*11.7 U* [c]	3.4 J	NA	3.7 U	NA	4.6 U	6.2	7.9 U	4.7 U	5 U	4.3 J	8 U
silver	—	—	—	—	µg/L	1 U	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U
sodium	—	—	—	—	µg/L	784,000	435,000	NA	354,000	NA	1,090,000	257,000	265,000	291,000	531,000	1,220,000	1,220,000
thallium	2	2	—	16.15	µg/L	**5 U** [c]	**5 U** [c]	NA	**5 U** [c]	NA	**5 U** [c]	**5 U** [c]	**5 U** [c]	**5 U** [c]	**5 U** [c]	**5 U** [c]	**5 U** [c]
vanadium	—	—	—	26.27	µg/L	7.4	3 J	NA	2.4 J	NA	5.1	2.1 J	1.9 J	2.6 J	3.3 J	4.2 J	7
zinc	—	—	—	36.39	µg/L	*50 U* [c]	*50 U* [c]	NA	*50 U* [c]	NA	*50 U* [c]	*50 U* [c]	*50 U* [c]	*50 U* [c]	*50 U* [c]	*50 U* [c]	*50 U* [c]
Low-Level Mercury																	
mercury	2	2	—	—	µg/L	0.00178	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry																	
solids, total dissolved	—	—	—	—	µg/L	NA	1,200,000	NA	1,130,000	NA	3,270,000	912,000	936,000	996,000	1,560,000	3,680,000	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] detection limit is above criteria
[d] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL
[e] italicized font indicates result above background

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Acronyms/Abbreviations:
AOC – area of concern
Cal – California
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
GW – groundwater
µg/L – micrograms per liter
MCL – maximum contaminant level
NA – not analyzed
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-7c
Groundwater Sampling Results Compared to
Surface Water Preliminary Screening Criteria, AOC 23 EBS Parcel 123

Analyte	PRELIMINARY SCREENING CRITERIA SW TPH ESL	CTR CCC	CTR HHCO	NRWQC CCC	NRWQC HHCO	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	A23SB22 / C077G127 / 4 - 9 / 08-Dec-05
VOCs								
benzene	—[b]	—	71	—	51	—	µg/L	0.16 J
carbon disulfide	—	—	—	—	—	—	µg/L	0.35 J
1,3-dichlorobenzene	—	—	2,600	—	960	—	µg/L	0.18 J
1,1-dichloroethane	—	—	—	—	—	—	µg/L	2.8
cis-1,2-dichloroethene	—	—	—	—	—	—	µg/L	1.2
trans-1,2-dichloroethene	—	—	140,000	—	10,000	—	µg/L	0.37 J
trichloroethene	—	—	81	—	30	—	µg/L	0.52
Petroleum Hydrocarbons								
SVOCs								
Metals								
arsenic	—	36	—	36	0.14	20.72	µg/L	**12.7**[c]
barium	—	—	—	—	—	569.5	µg/L	369 J
calcium	—	—	—	—	—	—	µg/L	109,000 J
iron	—	—	—	—	—	6,586	µg/L	29.9 J
magnesium	—	—	—	—	—	—	µg/L	86,200 J
manganese	—	—	—	—	—	1,741	µg/L	568 J
potassium	—	—	—	—	—	—	µg/L	40,800
sodium	—	—	—	—	—	—	µg/L	784,000
vanadium	—	—	—	—	—	26.27	µg/L	7.4
Low-Level Mercury								
mercury	—	0.025	0.051	0.94	—	—	µg/L	0.00178

Table 4-7c
Groundwater Sampling Results Compared to
Surface Water Preliminary Screening Criteria, AOC 23 EBS Parcel 123

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

[c] bolded font indicates result above one of the following: TPH ESL, CTR CCC, CTR HHCO, NRWQC CCC, NRWQC HHCO

Acronyms/Abbreviations:

AOC – area of concern
CCC – criterion continuous concentration
CTR – California Toxics Rule
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
HHCO – human-health consumption of organisms only
µg/L – micrograms per liter
NRWQC – National Recommended Water Quality Criteria
SVOC – semivolatile organic compound
SW – surface water
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifier:

J – indicates an estimated value

Table 4-8a
Soil Sampling Results, AOC 23 EBS Parcel 124

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	071-SS-014 071M-020 4.5 - 5.5 16-Oct-95	124-001-001 124-0001 1.5 - 2 27-Jun-95	124-001-001 124-0001M 1.5 - 2 27-Jun-95	124-001-001 124-0005 4 - 4.5 27-Jun-95	124-001-001 124-0005M 4 - 4.5 27-Jun-95	124-001-002 124-0002M 1 - 1.5 27-Jun-95	124-001-002 124-0006M 4 - 4.5 27-Jun-95	124-001-002 124-0008M (FD) 4 - 4.5 27-Jun-95	124-001-003 124-0003M 1.5 - 2 27-Jun-95	124-001-003 124-0007M 4 - 4.5 27-Jun-95	32EDC-5-78 C032CA00 2 - 4 22-May-02
VOCs																
acetone	14,000,000	—[b]	—	—	µg/kg	17 J	NA	NA	12	24 U	NA	24 U	24 U	NA	24 U	NA
benzene	640	—	—	—	µg/kg	12 U	NA	NA	12 U	6 U	NA	6 U	6 U	NA	6 U	NA
2-butanone	22,000,000	—	—	—	µg/kg	12 U	NA	NA	12 U	12 U	NA	12 U	12 U	NA	12 U	NA
carbon disulfide	360,000	—	—	—	µg/kg	12 U	NA	NA	12 U	6 U	NA	6 U	6 U	NA	6 U	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
toluene	520,000	—	—	—	µg/kg	12 U	NA	NA	12 U	6 U	NA	6 U	6 U	NA	6 U	NA
m-, p-xylene	—	—	—	—	µg/kg	NA	NA	NA	NA	6 U	NA	6 U	6 U	NA	6 U	NA
Petroleum Hydrocarbons																
diesel	—	—	100,000	—	µg/kg	28,000 U	42,000 J	88,000	12,000 U	1,000 U	5,000	1,000 U	1,000 U	91,000	1,000 U	NA
gasoline	—	—	100,000	—	µg/kg	655 J	600 J	500 U	600 U	600 U	500 U	600 U	600 U	3,000	600 U	NA
motor oil	—	—	500,000	—	µg/kg	28,000 U	22,000 U	290,000	28,000 J	30,000 U	94,000	30,000 U	29,000 U	**680,000**[d]	30,000 U	NA
SVOCs																
acenaphthene	3,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.6 J
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	390 UJ	56 J	980	590	400 U	8,100	400 U	390 U	6,200	410 U	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	390 UJ	110 J	360 U	37 J	400 U	1,800 U	400 U	390 U	1,800 U	410 U	NA
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.3 J
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U
pentachlorophenol	3,000	—	—	—	µg/kg	NA	880 U	1,800 U	20 J	2,000 U	**9,100 U**[c]	2,000 U	2,000 U	**8,900 U**[c]	2,000 U	NA
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U
Pesticides/PCBs																
Aroclor 1254	220	—	—	—	µg/kg	NA	36 U	15 J	38 U	24 U	22 U	24 U	24 U	50	24 U	NA
Aroclor 1260	220	—	—	—	µg/kg	NA	36 U	22 U	38 U	24 U	22 U	24 U	24 U	20 J	24 U	NA
Metals																
aluminum	76,000	—	—	13,960	mg/kg	NA	4,180	NA	3,570	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	**1.3**	**1.4**	**1.9**	**1.9**	**1.4**	**1.6**	**1.6**	**0.76**	**1.2**	NA
barium	5,400	—	—	93.68	mg/kg	NA	30.4	22.4	25.2	27.3	37.9	27.6	27.2	18.4	35.1	NA
beryllium	150	—	—	1.27	mg/kg	NA	0.27	0.27	0.33	0.19	0.25	0.23	0.24	0.32	0.24	NA
cadmium	37	—	—	1.72	mg/kg	NA	0.07 U	0.4	0.07 U	0.15	0.26	0.17	0.17	0.51	0.19	NA
calcium	—	—	—	16,800	mg/kg	NA	1,440	NA	1,460	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	24.5 J	21	21.3 J	22.8	20.1	24.9	25.6	10.6	26.7	NA

Table 4-8a
Soil Sampling Results, AOC 23 EBS Parcel 124

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	071-SS-014 071M-020 4.5 - 5.5 16-Oct-95	124-001-001 124-0001 1.5 - 2 27-Jun-95	124-001-001 124-0001M 1.5 - 2 27-Jun-95	124-001-001 124-0005 4 - 4.5 27-Jun-95	124-001-001 124-0005M 4 - 4.5 27-Jun-95	124-001-002 124-0002M 1 - 1.5 27-Jun-95	124-001-002 124-0006M 4 - 4.5 27-Jun-95	124-001-002 124-0008M (FD) 4 - 4.5 27-Jun-95	124-001-003 124-0003M 1.5 - 2 27-Jun-95	124-001-003 124-0007M 4 - 4.5 27-Jun-95	32EDC-5-78 C032CA00 2 - 4 22-May-02
Metals (continued)																
cobalt	900	—	—	14.30	mg/kg	NA	4.3	5.4	3.3	3.3	4.6	3.9	4.2	8	4.6	NA
copper	3,100	—	—	39.14	mg/kg	NA	8.5	9.7	5.8	13.1	10	32.1	11	8.5	16.6	NA
iron	23,000	—	—	22,280	mg/kg	NA	7,780 J	NA	6,380 J	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	2.6 J	4.6	2.1 J	1.8	2.1	2.1	2.2	2.4	2.3	NA
magnesium	—	—	—	7,304	mg/kg	NA	2,380	NA	1,830	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	88.3	NA	67.1	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	mg/kg	NA	0.16 U	0.11 U	0.17 U	0.12 U	0.11 U	0.12 U	0.12 U	0.11 U	0.12 U	NA
nickel	1,600	—	—	55.72	mg/kg	NA	27.2	18.6	20.8	20.4	17.9	21.5	24.4	9.4	27.8	NA
potassium	—	—	—	1,232	mg/kg	NA	745	NA	593	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	mg/kg	NA	0.2 U	0.53 U	0.21 U	0.6 U	0.53 U	0.59 U	0.59 U	0.53	0.59 U	NA
sodium	—	—	—	1,230	mg/kg	NA	266	NA	256	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	mg/kg	NA	*1.4* [f]	0.27 U	*1.2*	0.3 U	0.26 U	0.29 U	0.29 U	0.26 U	0.29 U	NA
vanadium	78	—	—	47.34	mg/kg	NA	16.7	19.4	14	12.5	16.9	15.5	15.8	24.8	16.2	NA
zinc	23,000	—	—	67.48	mg/kg	NA	24.6	19.2	15.9	22.2	22.3	51.8	21.5	20.1	26.6	NA

Table 4-8a
Soil Sampling Results, AOC 23 EBS Parcel 124

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	32EDC-5-78 C032CA97 0 - 0.5 22-May-02	32EDC-5-78 C032CA98 0.5 - 2 22-May-02	32EDC-5-78 C032CA99 (FD) 0.5 - 2 22-May-02	32EDC-5-78 C032CB01 4 - 8 22-May-02	32EDC-5-79 C032CB02 0 - 0.5 23-May-02	32EDC-5-79 C032CB03 0.5 - 2 23-May-02	32EDC-5-79 C032CB04 2 - 4 23-May-02	32EDC-5-79 C032CB05 4 - 8 23-May-02	A23SB31 C077S427 1 - 2 08-Dec-05	A23SB31 C077S428 2.5 - 3.5 08-Dec-05	A23SB31 C077S429 7 - 8 08-Dec-05
VOCs																
acetone	14,000,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	100 U	3.9 J	210
benzene	640	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	3 J	5 U	1.7 J
2-butanone	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	100 U	100 U	13 J
carbon disulfide	360,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	100 U	100 U	14 J
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	20 UJ	20 U	7.1 J
toluene	520,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	3.9 J	5 U	10 U
m-, p-xylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	1.2 J	5 U	10 U
Petroleum Hydrocarbons																
diesel	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	1,100 U	1,100 U	19,000
gasoline	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	1,000 U	1,000 U	2,000 U
motor oil	—	—	500,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	11,000 U	11,000 U	33,000
SVOCs																
acenaphthene	3,700,000	—	—	—	µg/kg	5.4 U	5.4 U	5.4 U	1.7 J	5.7 U	5.3 U	5.6 U	6.5 U	160	5 U	10 UJ
acenaphthylene	—	—	—	—	µg/kg	5.4 U	5.4 U	5.4 U	6.2 U	1.1 J	5.3 U	5.6 U	2.1 J	68 J	5 U	10 UJ
anthracene	22,000,000	—	—	—	µg/kg	5.4 U	5.4 U	5.4 U	6.2 U	0.67 J	5.3 U	5.6 U	1.4 J	210	5 U	10 UJ
benz(a)anthracene	620[c]	—	—	—	µg/kg	2 J	5.4 U	2.9 J	6.4	7.5	0.98 J	0.83 J	34	**640 J**	5 U	90 J
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	3.3 J	5.4 U	3.6 J	11	12	1.5 J	1.1 J	36	**650 J**	5 U	360 J
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	2.3 J	5.4 U	2.9 J	8.7	10	1.4 J	1.1 J	32	140	5 U	280 J
benzo(g,h,i)perylene	—	—	—	—	µg/kg	7.5	2.3 J	5.5	20	26	3.2 J	2.3 J	48	410	5 U	330 J
benzo(a)pyrene	62[c]	—	—	—	µg/kg	3.6 J	5.4 U	4.9 J	18	18	2.2 J	1.8 J	59	**650 J**	5 U	**330 J**
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	300 U	300 U	600 U
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	3.6 J	5.4 U	3.6 J	7.9	8.6	1.2 J	0.96 J	38	350	5 U	20 J
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	5.4 U	5.4 U	5.4 U	6.2 U	2.6 J	0.29 J	5.6 U	6.4 J	**63**	5 U	40 J
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	110 J	73 J	600 U
fluoranthene	2,300,000	—	—	—	µg/kg	5.9	1.7 J	4.9 J	10	14	1.9 J	1.3 J	42	1,200 J	5 U	170 J
fluorene	2,700,000	—	—	—	µg/kg	5.4 U	5.4 U	5.4 U	6.2 U	5.7 U	5.3 U	5.6 U	6.5 U	75	5 U	10 UJ
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	3.5 J	1.7 J	4.8 J	18	25	2.9 J	2.5 J	52	330	5 U	220 J
2-methylnaphthalene	—	—	—	—	µg/kg	5.4 U	5.4 U	5.4 U	6.2 U	0.4 J	5.3 U	5.6 U	0.86 J	24 J	5 U	23 J
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	5.4 U	5.4 U	5.4 U	4.8 J	0.54 J	5.3 U	5.6 U	1.9 J	65	5 U	59 J
pentachlorophenol	3,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	2,000 U	2,000 U	**4,000 U**[c]
phenanthrene	—	—	—	—	µg/kg	3.5 J	5.4 U	5.4 U	3.9 J	2.9 J	0.59 J	0.42 J	3.5 J	1,100 J	5 U	45 J
pyrene	2,300,000	—	—	—	µg/kg	6	2 J	6.7	26	20	2.9 J	1.9 J	65	1,500 J	5 U	650 J
Pesticides/PCBs																
Aroclor 1254	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	100 U	100 U	200 U
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	100 U	100 U	200 U
Metals																
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	3,570	3,880	*25,200*
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	**2.2**	**2.3**	***9.3***
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	20.8	39.1	*94.4*
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	0.11 J	0.13 J	0.68
cadmium	37	—	—	1.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	0.6 U	0.6 U	0.21 J
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	1,340	2,100	3,320
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	27	23.4	*88.3*

Table 4-8a
Soil Sampling Results, AOC 23 EBS Parcel 124

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: / Sample: / [a] Depth Interval: / Collection Date: 32EDC-5-78 C032CA97 0 - 0.5 22-May-02	32EDC-5-78 C032CA98 0.5 - 2 22-May-02	32EDC-5-78 C032CA99 (FD) 0.5 - 2 22-May-02	32EDC-5-78 C032CB01 4 - 8 22-May-02	32EDC-5-79 C032CB02 0 - 0.5 23-May-02	32EDC-5-79 C032CB03 0.5 - 2 23-May-02	32EDC-5-79 C032CB04 2 - 4 23-May-02	32EDC-5-79 C032CB05 4 - 8 23-May-02	A23SB31 C077S427 1 - 2 08-Dec-05	A23SB31 C077S428 2.5 - 3.5 08-Dec-05	A23SB31 C077S429 7 - 8 08-Dec-05
Metals (continued)																
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	3.8	3.6	*16.9*
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	4.9	3.9	*46.4*
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	8,240	7,530	***43,300***
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	1.9	1.6	21
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	1,990	1,700	*12,500*
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	71.6	61.4	*586*
mercury	23	—	—	0.52	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	0.021 U	0.1 U	*0.56*
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	23.6	20.9	*110*
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	550	571	*4,580*
silver	390	—	—	2.22	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	0.065 J	0.15	0.17 J
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	133	120	*4,700*
thallium	5.2	—	—	0.50	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	*2 U* [e]	*2 U* [e]	*4 U* [e]
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	15.1	15.3	*70.5*
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	14.1	12.2	*108*

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[d] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL
[e] detection limit is above criteria
[f] italicized font indicates result above background

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
Cal – California
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-8b
Groundwater Sampling Results, AOC 23 EBS Parcel 124

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	071-SS-014 071M-019 7.5 - 8.5 06-Oct-95	071-SS-014 071M-021 (FD) 7.5 - 8.5 06-Oct-95	13-MW-03 13-MW-03-B2675 3 - 18 23-Sep-03	13-MW-03 13-MW-03-B2835 3 - 18 22-Dec-03	13-MW-03 13-MW-03-C3093 3 - 18 08-Mar-04	13-MW-03 13-MW-03-C4142 3 - 18 24-Nov-04	A23SB30 C077G139 4 - 9 09-Dec-05	A23SB30 C077G140 (FD) 4 - 9 09-Dec-05	A23SB31 C077G141 3 - 8 08-Dec-05	A23SB32 C077G142 4 - 9 08-Dec-05
VOCs															
benzene	5	1	—[b]	—	µg/L	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	0.4 J	0.17 J
cis-1,2-dichloroethene	70	6	—	—	µg/L	NA	NA	1 U	1 U	1 U	0.5 U	0.5 U	NA	1.2	0.26 J
trans-1,2-dichloroethene	100	10	—	—	µg/L	NA	NA	1 U	1 UJ	1 U	0.5 U	0.5 U	NA	0.85	0.5 U
1,4-dioxane	—	—	—	—	µg/L	NA	NA	NA	NA	NA	0.18 J	NA	NA	NA	NA
vinyl chloride	2	0.5	—	—	µg/L	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	**1.9**[c]	0.5 U
Petroleum Hydrocarbons															
diesel	—	—	100	—	µg/L	100 U	100 U	NA	NA	NA	NA	50 U	NA	**220 J**	**130**
motor oil	—	—	100	—	µg/L	**680 J**	**660 J**	NA	NA	NA	NA	**500 U**[d]	NA	**500 U**[d]	**500 U**[d]
SVOCs															
benzo(g,h,i)perylene	—	—	—	—	µg/L	10 U	10 U	NA	NA	NA	NA	0.2 U	NA	0.2 U	0.12 J
butylbenzyl phthalate	—	—	—	—	µg/L	10 U	2 J	NA	NA	NA	NA	10 U	10 U	10 U	10 U
fluoranthene	—	—	—	—	µg/L	10 U	10 U	NA	NA	NA	NA	0.2 U	NA	0.2 U	0.26
phenanthrene	—	—	—	—	µg/L	10 U	10 U	NA	NA	NA	NA	0.081 J	NA	0.28	0.27
pyrene	—	—	—	—	µg/L	10 U	1 J	NA	NA	NA	NA	0.33	NA	0.2 U	0.48
Pesticides/PCBs						NA	NA	NA	NA	NA	NA	ND	NA	ND	ND
Metals															
arsenic	10	50	—	20.72	µg/L	NA	NA	NA	NA	NA	NA	**19.3**	NA	**11.9**	***25 U***[d,e]
barium	2,000	1,000	—	569.5	µg/L	NA	NA	NA	NA	NA	NA	166 J	NA	332 J	218 J
beryllium	4	4	—	2.50	µg/L	NA	NA	NA	NA	NA	NA	2 U	NA	0.25 J	***10 UJ***[d]
calcium	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	40,000 J	NA	42,400 J	41,800 J
chromium	100	50	—	12.45	µg/L	NA	NA	NA	NA	NA	NA	3.3 J	NA	5.5 UJ	***25 UJ***[d]
iron	—	—	—	6,586	µg/L	NA	NA	NA	NA	NA	NA	1,320	NA	2,920 J	604 J
magnesium	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	35,100 J	NA	61,200 J	73,200 J
manganese	—	—	—	1,741	µg/L	NA	NA	NA	NA	NA	NA	361 J	NA	282 J	558 J
mercury	2	2	—	—	µg/L	NA	NA	NA	NA	NA	NA	0.2 U	NA	NA	NA
potassium	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	23,200	NA	46,300	51,900
sodium	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	372,000	NA	992,000	1,050,000
vanadium	—	—	—	26.27	µg/L	NA	NA	NA	NA	NA	NA	1.5 J	NA	4.3 J	12.1 J
Low-Level Mercury															
mercury	2	2	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	0.00078	0.00184
General Chemistry															
solids, total dissolved	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	1,430,000	NA	3,000,000	3,270,000

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL
[d] detection limit is above criteria
[e] italicized font indicates result above background

Acronyms/Abbreviations:
AOC – area of concern
Cal – California
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
GW – groundwater
µg/L – micrograms per liter
MCL – maximum contaminant level
NA – not analyzed
ND – not detected
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 4-8c
Groundwater Sampling Results Compared to
Surface Water Preliminary Screening Criteria, AOC 23 EBS Parcel 124

Analyte	PRELIMINARY SCREENING CRITERIA: SW TPH ESL	CTR CCC	CTR HHCO	NRWQC CCC	NRWQC HHCO	Background	Result Units	Station ID: A23SB32 / Sample: C077G142 / [a] Depth Interval: 4 - 9 / Collection Date: 08-Dec-05
VOCs								
benzene	—[b]	—	71	—	51	—	µg/L	0.17 J
cis-1,2-dichloroethene	—	—	—	—	—	—	µg/L	0.26 J
Petroleum Hydrocarbons								
diesel	640	—	—	—	—	—	µg/L	130
SVOCs								
benzo(g,h,i)perylene	—	—	—	—	—	—	µg/L	0.12 J
fluoranthene	—	—	370	—	140	—	µg/L	0.26
phenanthrene	—	—	—	—	—	—	µg/L	0.27
pyrene	—	—	11,000	—	4,000	—	µg/L	0.48
Pesticides/PCBs								
Metals								
barium	—	—	—	—	—	569.5	µg/L	218 J
calcium	—	—	—	—	—	—	µg/L	41,800 J
iron	—	—	—	—	—	6,586	µg/L	604 J
magnesium	—	—	—	—	—	—	µg/L	73,200 J
manganese	—	—	—	—	—	1,741	µg/L	558 J
potassium	—	—	—	—	—	—	µg/L	51,900
sodium	—	—	—	—	—	—	µg/L	1,050,000
vanadium	—	—	—	—	—	26.27	µg/L	12.1 J
Low-Level Mercury								
mercury	—	0.025	0.051	0.94	—	—	µg/L	0.00184
General Chemistry								
solids, total dissolved	—	—	—	—	—	—	µg/L	3,270,000

Table 4-8c
Groundwater Sampling Results Compared to
Surface Water Preliminary Screening Criteria, AOC 23 EBS Parcel 124

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

Acronyms/Abbreviations:

AOC – area of concern
CCC – criterion continuous concentration
CTR – California Toxics Rule
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
HHCO – human-health consumption of organisms only
µg/L – micrograms per liter
NRWQC – National Recommended Water Quality Criteria
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
SW – surface water
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifier:

J – indicates an estimated value

Table 4-9a
Soil Sampling Results, AOC 23 EBS Parcel 125

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Result Units	Station ID: 125-001-001 / Sample: 125-0001 / [a] Depth Interval: 0.5 - 1 / Collection Date: 12-Jun-95	125-001-001 / 125-0001M / 0.5 - 1 / 12-Jun-95	125-001-001 / 125-0004 / 4 - 5 / 12-Jun-95	125-001-001 / 125-0004M / 4 - 5 / 12-Jun-95	125-001-002 / 125-0002M / 0.5 - 1 / 12-Jun-95	125-001-002 / 125-0005M / 4 - 4.5 / 12-Jun-95	125-001-003 / 125-0003M / 0.5 - 1 / 12-Jun-95	125-001-003 / 125-0006M / 4 - 4.5 / 12-Jun-95	125-001-003 / 125-0007M (FD) / 0.5 - 1 / 12-Jun-95	125-SS-001 / 125M-001 / 9 - 10 / 01-Jun-95	125-SS-001 / 125M-001M / 9 - 10 / 01-Jun-95	32EDC-5-77 / C032CA93 / 0 - 0.5 / 22-May-02
VOCs																	
benzene	640	—[b]	—	—	µg/kg	NA	NA	12 U	6 U	NA	5 U	NA	26 U	NA	NA	6 U	NA
2-butanone	22,000,000	—	—	—	µg/kg	NA	NA	3 J	12 U	NA	11 U	NA	53 U	NA	NA	12 U	NA
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	NA	NA	NA	6 U	NA	5 U	NA	26 U	NA	NA	6 U	NA
tetrachloroethene	480	—	—	—	µg/kg	NA	NA	12 U	6 U	NA	5 U	NA	26 U	NA	NA	6 U	NA
trichloroethene	53	2,900	—	—	µg/kg	NA	NA	12 U	6 U	NA	5 U	NA	26 U	NA	NA	6 U	NA
Petroleum Hydrocarbons																	
diesel	—	—	100,000	—	µg/kg	10,000 U	10,000	12,000 U	1,000 U	**300,000**[c]	1,000 U	1,000	1,000 U	44,000	NA	12,000 U	NA
gasoline	—	—	100,000	—	µg/kg	500 U	500 U	600 U	600 U	500 U	500 U	**1,700,000**	13,000	**2,000,000**	NA	600 U	NA
motor oil	—	—	500,000	—	µg/kg	81,000 J	26,000 U	49,000 J	30,000 U	350,000	27,000 U	26,000 U	26,000 U	62,000	NA	**590,000**	NA
SVOCs																	
acenaphthene	3,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.3 U
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.3 U
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.3 U
benz(a)anthracene	620[d]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.2 J
benzo(b)fluoranthene	620[d]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.7 J
benzo(k)fluoranthene	6,200[d]	380[d]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.3 U
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7
benzo(a)pyrene	62[d]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.5
chrysene	62,000[d]	3,800[d]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.8 J
dibenz(a,h)anthracene	62[d]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.3 U
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	340 U	340 U	400 U	400 U	360 U	350 U	350 U	350 U	350 U	41 J	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.5 J
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.3 U
indeno(1,2,3-cd)pyrene	620[d]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.8 J
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.3 U
naphthalene	56,000[d]	1,700[d]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.49 J
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.6 J
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.5 J
Pesticides/PCBs						NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA
Metals																	
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**1.1**	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	31.6	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.29	NA
cadmium	37	—	—	1.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.37	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	26.4	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.9	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8.8	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.9	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.12 U	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	20.9	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.3 U	NA
silver	390	—	—	2.22	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.59 U	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	23	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	16.6	NA
Organotins						NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA

Table 4-9a
Soil Sampling Results, AOC 23 EBS Parcel 125

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	32EDC-5-77 C032CA94 0.5 - 2 22-May-02	32EDC-5-77 C032CA95 2 - 4 22-May-02	32EDC-5-77 C032CA96 4 - 8 22-May-02	A23SB33 C077S430 1 - 2 02-Dec-05	A23SB33 C077S431 3 - 4 02-Dec-05	A23SB33 C077S432 6 - 7.5 02-Dec-05	A23SB34 C077S433 1 - 2 02-Dec-05	A23SB34 C077S434 2 - 3 02-Dec-05	A23SB34 C077S435 5 - 6 02-Dec-05	A23SB35 C077S436 0 - 2 02-Dec-05	A23SB35 C077S437 2 - 4 02-Dec-05	A23SB35 C077S438 4 - 8 02-Dec-05	A23SB36 C077S439 1 - 2 02-Dec-05	A23SB36 C077S440 2 - 3 02-Dec-05
VOCs																			
benzene	640	—[b]	—	—	µg/kg	NA	NA	NA	5 UJ	5 UJ	6 UJ	2.7 J	5 U	6 U	6 U	6 U	8 U	5 U	5 U
2-butanone	22,000,000	—	—	—	µg/kg	NA	NA	NA	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	200 U	100 U	100 U
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	NA	NA	NA	5 U	5 U	6 U	6 U	0.67 J	6 U	0.86 J	0.58 J	2.8 J	0.73 J	5 U
tetrachloroethene	480	—	—	—	µg/kg	NA	NA	NA	5 UJ	5 UJ	23 J	6 U	5 U	6 U	6 U	6 U	8 U	5 U	5 U
trichloroethene	53	2,900	—	—	µg/kg	NA	NA	NA	5 UJ	5 UJ	1.8 J	6 U	5 U	6 U	6 U	6 U	8 U	5 U	5 U
Petroleum Hydrocarbons																			
diesel	—	—	100,000	—	µg/kg	NA	NA	NA	15,000	7,800	27,000	11,000	8,400	7,900	1,100 U	1,100 U	**470,000**	8,600	NA
gasoline	—	—	100,000	—	µg/kg	NA	NA	NA	1,000 U	390 J	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	2,000 U	380 J	1,000 U
motor oil	—	—	500,000	—	µg/kg	NA	NA	NA	19,000	6,500 J	50,000	9,000 J	6,500 J	6,000 J	11,000 U	11,000 U	**970,000**	7,500 J	NA
SVOCs																			
acenaphthene	3,700,000	—	—	—	µg/kg	5.7 U	5.4 U	5.7 U	1.5 J	5 U	27	6 U	5 U	6 U	1.7 J	6 U	22 J	5 U	NA
acenaphthylene	—	—	—	—	µg/kg	5.7 U	5.4 U	5.7 U	6.8	5 U	34	6 U	5 U	6 U	6 U	6 U	28 J	5 U	NA
anthracene	22,000,000	—	—	—	µg/kg	5.7 U	5.4 U	1.2 J	11	5 U	80	6 U	5 U	6 U	1.6 J	6 U	49 J	5 U	NA
benz(a)anthracene	620[d]	—	—	—	µg/kg	1 J	5.4 UJ	5.7 UJ	62	5 U	220	6 U	5 U	6 U	6 U	6 U	320 J	5 U	NA
benzo(b)fluoranthene	620[d]	—	—	—	µg/kg	1.1 J	5.4 U	5.7 U	130	3.7 J	**920 J**	2.8 J	5 U	6 U	3.4 J	5.4 J	**1,100 J**	4.7 J	NA
benzo(k)fluoranthene	6,200[d]	380[d]	—	—	µg/kg	5.7 U	5.4 U	5.7 U	49	3.6 J	**890 J**	2.7 J	5 U	6 U	5.3 J	5.2 J	**1,100 J**	4.5 J	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	5.7 U	5.4 U	5.7 U	170	5.5	710	3.7 J	5 U	6 U	14	5.9 J	970 J	11	NA
benzo(a)pyrene	62[d]	—	—	—	µg/kg	3.2 J	5.4 U	4 J	**140**	3.4 J	**780**	1.8 J	5 U	6 U	5.3 J	2.9 J	**1,000 J**	3.4 J	NA
chrysene	62,000[d]	3,800[d]	—	—	µg/kg	1.7 J	5.4 U	4.4 J	61	5 U	260	6 U	5 U	6 U	2.6 J	3.6 J	260 J	1.8 J	NA
dibenz(a,h)anthracene	62[d]	—	—	—	µg/kg	5.7 U	5.4 U	5.7 U	20	5 U	**69**	6 U	5 U	6 U	13	4 J	**97 J**	5 U	NA
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	NA	NA	300 U	300 U	400 U	300 U	180 J	1,100	300 U	300 U	140 J	300 U	NA
fluoranthene	2,300,000	—	—	—	µg/kg	2.2 J	5.4 U	5.2 J	130	2 J	530	6 U	5 U	6 U	6 U	4.6 J	620 J	5 U	NA
fluorene	2,700,000	—	—	—	µg/kg	5.7 U	5.4 U	5.7 U	1.9 J	5 U	23	6 U	5 U	6 U	1.5 J	6 U	23 J	5 U	NA
indeno(1,2,3-cd)pyrene	620[d]	—	—	—	µg/kg	5.7 U	5.4 U	5.7 U	110	3.1 J	470	6 U	5 U	6 U	9.2	3.9 J	**660 J**	5	NA
2-methylnaphthalene	—	—	—	—	µg/kg	5.7 U	5.4 U	5.7 U	1.7 J	5 U	17	6 U	5 U	6 U	2.6 J	6 U	22 J	5 U	NA
naphthalene	56,000[d]	1,700[d]	—	—	µg/kg	5.7 U	5.4 U	5.7 U	8.9	5 U	100	6 U	5 U	6 U	1.5 J	6 U	140 J	5 U	NA
phenanthrene	—	—	—	—	µg/kg	0.77 J	5.4 UJ	4.5 J	47	5 U	230	6 U	5 U	6 U	6 U	8.6	150 J	3.8 J	NA
pyrene	2,300,000	—	—	—	µg/kg	3 J	5.4 U	9.3	180	3.5 J	1,500	2.9 J	5 U	6 U	2 J	6	2,200 J	2.6 J	NA
Pesticides/PCBs						NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
Metals																			
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	5,980	4,210	*16,200*[e]	8,690	3,690	5,180	4,710	4,420	*20,700*	5,440	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	**2.6**	**1.8**	**7.4**	**3**	**1.9**	**2**	**1.4**	**3.4**	***9.6***	**4.5**	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	58.5 J	27.7 J	*257 J*	*101 J*	20.5 J	43.1 J	22.7	46.4	*116 UJ*[f]	64.5 J	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	0.13 J	0.063 J	0.4	0.16 J	0.056 J	0.099 J	0.051 J	0.17 J	0.47	0.19 J	NA
cadmium	37	—	—	1.72	mg/kg	NA	NA	NA	0.6 U	0.17 J	0.67	0.099 J	0.16 J	0.6 U	0.6 U	0.048 J	0.52 J	0.076 J	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	2,140	2,200	2,840	5,180	2,110	2,180	2,140	1,940	3,480	2,220	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	32.2 J	30.2 J	*61.3 J*	34.1 J	25.8 J	30 J	32.4	34.8	*76.3 J*	39.3 J	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	5.8	4	10.6	6.6	3.7	4.7	4.4	7.2	13.2	9	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	9.7	5.1	*47.4*	13	4.4	6.3	6.3	8.9	*50*	11	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	12,000	9,400	***27,200***	16,700	8,000	10,100	10,100	9,990	***35,600***	12,600	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	5.9 J	2.1 J	*38.2 J*	3.7 J	2.1 J	2.5 J	1.9	5	*51.6 J*	5.2 J	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	3,180	2,200	*8,560*	3,690	1,980	2,800	2,640	4,340	*10,800*	5,350	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	133 J	89.2 J	277 J	250 J	88.1 J	93.1 J	115	182	361 J	300 J	NA
mercury	23	—	—	0.52	mg/kg	NA	NA	NA	0.082 U	0.025 U	*1.8*	0.055 U	0.021 U	0.03 U	0.06 U	0.12 U	*1*	0.12	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	34.8	25.2	*69.2*	31.1	21.8	31.6	28.5	54.8	*85.6*	*68.1*	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	899 J	650 J	*2,830 J*	891 J	478 J	815 J	706	680	*3,610 J*	828 J	NA
selenium	390	—	—	1.78	mg/kg	NA	NA	NA	0.6 U	0.5 U	0.6 U	0.44 J	0.4 J	0.6 U	0.6 U	0.6 U	0.8 U	0.43 J	NA
silver	390	—	—	2.22	mg/kg	NA	NA	NA	0.088 UJ	0.15 UJ	0.27 UJ	0.18 UJ	0.14 UJ	0.2 UJ	0.31	0.1	0.2 UJ	0.1 UJ	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	353	168 U	*3,840*	274 U	138 U	267 U	65.1 U	139 U	*4,580*	89.9 U	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	22.2	20.8	45.7	28.4	17.5	20.3	21.6	17.9	*60.2*	22.2	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	26.9	15.5	*166*	66.7	13.6	19.3	15.5	20.8	*146*	24.2	NA
Organotins						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-9a
Soil Sampling Results, AOC 23 EBS Parcel 125

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Units	Station ID: A23SB36 / Sample: C077S441 / [a]Depth Interval: 4.5 - 6 / Collection Date: 02-Dec-05	A23SB39 / C077S448 / 0 - 2 / 02-Dec-05	A23SB39 / C077S449 / 2 - 4 / 02-Dec-05	A23SB39 / C077S450 / 4 - 8 / 02-Dec-05	EP125-01 / 030-CAP-235 / 0.5 - 1.5 / 04-May-00	EP125-01 / 030-CAP-236 / 3 - 4 / 04-May-00
VOCs											
benzene	640	—[b]	—	—	µg/kg	6 U	5 U	5 UJ	6 UJ	10 U	10 U
2-butanone	22,000,000	—	—	—	µg/kg	100 U	100 U	100 U	100 U	NA	NA
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	6 U	5 U	5 U	6 U	10 U	10 U
tetrachloroethene	480	—	—	—	µg/kg	6 U	5 U	5 UJ	6 UJ	10 U	10 U
trichloroethene	53	2,900	—	—	µg/kg	6 U	5 U	5 UJ	6 UJ	10 U	10 U
Petroleum Hydrocarbons											
diesel	—	—	100,000	—	µg/kg	8,600	NA	NA	NA	10,000 U	10,000 U
gasoline	—	—	100,000	—	µg/kg	1,000 U	NA	NA	NA	500 U	500 U
motor oil	—	—	500,000	—	µg/kg	6,200 J	NA	NA	NA	250,000 U	250,000 U
SVOCs											
acenaphthene	3,700,000	—	—	—	µg/kg	6 U	NA	NA	NA	NA	NA
acenaphthylene	—	—	—	—	µg/kg	6 U	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	6 U	NA	NA	NA	NA	NA
benz(a)anthracene	620[d]	—	—	—	µg/kg	6 U	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[d]	—	—	—	µg/kg	3.2 J	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[d]	380[d]	—	—	µg/kg	3.1 J	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	4.9 J	NA	NA	NA	NA	NA
benzo(a)pyrene	62[d]	—	—	—	µg/kg	1.9 J	NA	NA	NA	NA	NA
chrysene	62,000[d]	3,800[d]	—	—	µg/kg	6 U	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[d]	—	—	—	µg/kg	6 U	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	400 U	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	6 U	NA	NA	NA	NA	NA
fluorene	2,700,000	—	—	—	µg/kg	6 U	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[d]	—	—	—	µg/kg	2.4 J	NA	NA	NA	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg	6 U	NA	NA	NA	NA	NA
naphthalene	56,000[d]	1,700[d]	—	—	µg/kg	6 U	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg	6 U	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	2.1 J	NA	NA	NA	NA	NA
Pesticides/PCBs						ND	NA	NA	NA	NA	NA
Metals											
aluminum	76,000	—	—	13,960	mg/kg	5,410	5,420	4,510	6,200	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	**3**	**3.1**	**2.2**	**4.4**	NA	NA
barium	5,400	—	—	93.68	mg/kg	66.4 J	38.4 J	28.1 J	84.3 J	NA	NA
beryllium	150	—	—	1.27	mg/kg	0.17 J	0.14 J	0.068 J	0.29	NA	NA
cadmium	37	—	—	1.72	mg/kg	0.061 J	0.5 U	0.5 U	0.039 J	NA	NA
calcium	—	—	—	16,800	mg/kg	3,370	2,760	2,070	4,170	NA	NA
chromium	210	—	—	54.84	mg/kg	47.1 J	31.3 J	33.8 J	*67.8 J*	NA	NA
cobalt	900	—	—	14.30	mg/kg	8.4	6.3	4.2	10.4	NA	NA
copper	3,100	—	—	39.14	mg/kg	11.3	8.8	5.8	12.5	NA	NA
iron	23,000	—	—	22,280	mg/kg	13,000	11,900	9,900	14,800	NA	NA
lead	400	150	—	37.66	mg/kg	8.4 J	6.2 J	2.7 J	17.8 J	11 U	11 U
magnesium	—	—	—	7,304	mg/kg	5,090	3,610	2,430	5,920	NA	NA
manganese	1,800	—	—	383.0	mg/kg	*988 J*	*397 J*	101 J	251 J	NA	NA
mercury	23	—	—	0.52	mg/kg	0.3	0.11	0.1 U	0.075 U	NA	NA
nickel	1,600	—	—	55.72	mg/kg	*61.4*	42.5	27.8	*63.6*	NA	NA
potassium	—	—	—	1,232	mg/kg	811 J	708 J	608 J	728 J	NA	NA
selenium	390	—	—	1.78	mg/kg	0.6 U	0.5	0.5 U	0.6 U	NA	NA
silver	390	—	—	2.22	mg/kg	0.077 UJ	0.16 UJ	0.2 UJ	0.18 UJ	NA	NA
sodium	—	—	—	1,230	mg/kg	146 U	283 U	274 U	199 U	NA	NA
vanadium	78	—	—	47.34	mg/kg	27.8	21.1	21.9	39.7	NA	NA
zinc	23,000	—	—	67.48	mg/kg	30.8	22	16.4	27.3	NA	NA
Organotins						NA	NA	NA	NA	NA	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL
[d] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[e] italicized font indicates result above background
[f] detection limit is above criteria

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
Cal – California
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
ND – not detected
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 4-9b
Groundwater Sampling Results, AOC 23 EBS Parcel 125

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Background	Result Units	Station ID: A23SB33	A23SB33	A23SB34	A23SB34	A23SB35	A23SB36	A23SB36	A23SB39	S21-DGS-DP20
Sample:						C077G143	C077G144 (FD)	C077G145	C077G146 (FD)	C077G147	C077G148	C077G149 (FD)	C077G154	385-S21-080
[a] Depth Interval:						6.5 - 11.5	6.5 - 11.5	7 - 12	7 - 12	6 - 11	7 - 12	7 - 12	7 - 12	7 - 9
Collection Date:						03-Dec-05	03-Dec-05	03-Dec-05	03-Dec-05	02-Dec-05	02-Dec-05	02-Dec-05	02-Dec-05	26-Sep-01
VOCs														
benzene	5	1	—[b]	—	µg/L	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	NA	0.33 J	0.5 U
carbon disulfide	—	—	—	—	µg/L	1.2	NA	2.5	NA	1.3	11	NA	0.73	2
1,3-dichlorobenzene	—	—	—	—	µg/L	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	NA	0.12 J	0.5 U
naphthalene	—	—	—	—	µg/L	0.5 U	NA	0.5 U	NA	0.46 J	0.5 U	NA	0.5 U	0.5 U
toluene	1,000	150	—	—	µg/L	0.36 J	NA	0.18 J	NA	0.26 J	0.5 U	NA	0.69	0.5 U
1,2,4-trimethylbenzene	—	—	—	—	µg/L	0.5 U	NA	0.5 U	NA	0.26 J	0.5 U	NA	0.5 U	0.5 U
vinyl chloride	2	0.5	—	—	µg/L	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	**2.7**[c]
m-, p-xylene	—	—	—	—	µg/L	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	NA	0.33 J	0.5 U
o-xylene	—	—	—	—	µg/L	0.5 U	NA	0.5 U	NA	0.53	0.5 U	NA	0.5 U	0.5 U
Petroleum Hydrocarbons														
diesel	—	—	100	—	µg/L	**120**	NA	**120**	NA	**160**	50 U	50 U	NA	NA
gasoline	—	—	100	—	µg/L	100 U	NA	100 U	NA	100 U	9.7 J	100 U	NA	50 U
SVOCs														
acenaphthene	—	—	—	—	µg/L	0.44	NA	0.88	1	1.4	0.64	NA	NA	NA
acenaphthylene	—	—	—	—	µg/L	0.37	NA	0.28	0.3	0.14 J	0.15 J	NA	NA	NA
anthracene	—	—	—	—	µg/L	0.16 J	NA	0.36	0.45	0.29	0.28	NA	NA	NA
fluoranthene	—	—	—	—	µg/L	0.26	NA	0.91	0.95	0.79	0.73	NA	NA	NA
fluorene	—	—	—	—	µg/L	0.21	NA	0.4	0.44	0.51	0.36	NA	NA	NA
naphthalene	—	—	—	—	µg/L	0.47	NA	0.2 U	0.2 U	0.19 J	0.2 U	NA	NA	NA
phenanthrene	—	—	—	—	µg/L	0.74	NA	2.1	2.2	2.4	2	NA	NA	NA
pyrene	—	—	—	—	µg/L	1.1	NA	2.2	2.4	1.6	1.6	NA	NA	NA
Pesticides/PCBs						ND	ND	ND	NA	ND	ND	NA	NA	NA
Metals														
arsenic	10	50	—	20.72	µg/L	***50 U*** [d,e]	NA	***25 U*** [e]	NA	5 U	3.4 J	NA	5 U	NA
barium	2,000	1,000	—	569.5	µg/L	240	NA	100	NA	68.1	51.8	NA	38.4	NA
beryllium	4	4	—	2.50	µg/L	***20 U*** [e]	NA	***10 U*** [e]	NA	0.29 J	0.24 J	NA	0.26 J	NA
calcium	—	—	—	—	µg/L	63,000	NA	38,900	NA	14,200	8,770	NA	9,390	NA
chromium	100	50	—	12.45	µg/L	*21.2 J*	NA	*14.5 J*	NA	5.2	5.2	NA	3.4 J	NA
iron	—	—	—	6,586	µg/L	2,150	NA	1,290	NA	786	369	NA	385	NA
magnesium	—	—	—	—	µg/L	176,000	NA	85,700	NA	34,300	12,600	NA	15,100	NA
manganese	—	—	—	1,741	µg/L	691	NA	530	NA	254	104	NA	149	NA
potassium	—	—	—	—	µg/L	106,000	NA	80,000	NA	37,600	23,300	NA	23,200	NA
sodium	—	—	—	—	µg/L	2,950,000	NA	2,060,000	NA	1,790,000	817,000	NA	886,000	NA
vanadium	—	—	—	26.27	µg/L	17.2 J	NA	10.5 J	NA	5.5	6.1	NA	3.6 J	NA
Low-Level Mercury														
mercury	2	2	—	—	µg/L	0.00082 J	NA	0.00138 J	NA	0.002 J	0.0024 J	NA	0.0016 J	NA
General Chemistry														
solids, total dissolved	—	—	—	—	µg/L	7,680,000	NA	3,310,000	3,170,000	4,560,000	2,120,000	NA	NA	NA

Notes:
- [a] feet below ground surface
- [b] dash indicates not applicable or not established
- [c] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL
- [d] italicized font indicates result above background
- [e] detection limit is above criteria

Acronyms/Abbreviations:
- AOC – area of concern
- Cal – California
- EBS – environmental baseline survey
- ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
- FD – field duplicate
- Fed – federal
- GW – groundwater
- µg/L – micrograms per liter
- MCL – maximum contaminant level
- NA – not analyzed
- ND – not detected
- PCB – polychlorinated biphenyl
- SVOC – semivolatile organic compound
- TPH – total petroleum hydrocarbons
- VOC – volatile organic compound

Review Qualifiers:
- J – indicates an estimated value
- U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit

Table 4-9c
Groundwater Sampling Results Compared to Surface Water Preliminary Screening Criteria, AOC 23 EBS Parcel 125

Analyte	PRELIMINARY SCREENING CRITERIA: SW TPH ESL	CTR CCC	CTR HHCO	NRWQC CCC	NRWQC HHCO	Background	Result Units	Station ID: A23SB33	A23SB33	A23SB34	A23SB34	A23SB35	A23SB36	A23SB36	A23SB39	S21-DGS-DP20
Sample:								C077G143	C077G144 (FD)	C077G145	C077G146 (FD)	C077G147	C077G148	C077G149 (FD)	C077G154	385-S21-080
[a] Depth Interval:								6.5 - 11.5	6.5 - 11.5	7 - 12	7 - 12	6 - 11	7 - 12	7 - 12	7 - 12	7 - 9
Collection Date:								03-Dec-05	03-Dec-05	03-Dec-05	03-Dec-05	02-Dec-05	02-Dec-05	02-Dec-05	02-Dec-05	26-Sep-01
VOCs																
benzene	—[b]	—	71	—	51	—	µg/L	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	NA	0.33 J	0.5 U
carbon disulfide	—	—	—	—	—	—	µg/L	1.2	NA	2.5	NA	1.3	11	NA	0.73	2
1,3-dichlorobenzene	—	—	2,600	—	960	—	µg/L	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	NA	0.12 J	0.5 U
naphthalene	—	—	—	—	—	—	µg/L	0.5 U	NA	0.5 U	NA	0.46 J	0.5 U	NA	0.5 U	0.5 U
toluene	—	—	200,000	—	15,000	—	µg/L	0.36 J	NA	0.18 J	NA	0.26 J	0.5 U	NA	0.69	0.5 U
1,2,4-trimethylbenzene	—	—	—	—	—	—	µg/L	0.5 U	NA	0.5 U	NA	0.26 J	0.5 U	NA	0.5 U	0.5 U
vinyl chloride	—	—	525	—	2.4	—	µg/L	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	**2.7**[c]
m-, p-xylene	—	—	—	—	—	—	µg/L	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	NA	0.33 J	0.5 U
o-xylene	—	—	—	—	—	—	µg/L	0.5 U	NA	0.5 U	NA	0.53	0.5 U	NA	0.5 U	0.5 U
Petroleum Hydrocarbons																
diesel	640	—	—	—	—	—	µg/L	120	NA	120	NA	160	50 U	50 U	NA	NA
gasoline	3,700	—	—	—	—	—	µg/L	100 U	NA	100 U	NA	100 U	9.7 J	100 U	NA	50 U
SVOCs																
acenaphthene	—	—	2,700	—	990	—	µg/L	0.44	NA	0.88	1	1.4	0.64	NA	NA	NA
acenaphthylene	—	—	—	—	—	—	µg/L	0.37	NA	0.28	0.3	0.14 J	0.15 J	NA	NA	NA
anthracene	—	—	110,000	—	40,000	—	µg/L	0.16 J	NA	0.36	0.45	0.29	0.28	NA	NA	NA
fluoranthene	—	—	370	—	140	—	µg/L	0.26	NA	0.91	0.95	0.79	0.73	NA	NA	NA
fluorene	—	—	14,000	—	5,300	—	µg/L	0.21	NA	0.4	0.44	0.51	0.36	NA	NA	NA
naphthalene	—	—	—	—	—	—	µg/L	0.47	NA	0.2 U	0.2 U	0.19 J	0.2 U	NA	NA	NA
phenanthrene	—	—	—	—	—	—	µg/L	0.74	NA	2.1	2.2	2.4	2	NA	NA	NA
pyrene	—	—	11,000	—	4,000	—	µg/L	1.1	NA	2.2	2.4	1.6	1.6	NA	NA	NA
Pesticides/PCBs								ND	ND	ND	NA	ND	ND	NA	NA	NA
Metals																
arsenic	—	36	—	36	0.14	20.72	µg/L	***50 U***[d,e]	NA	***25 U***[e]	NA	**5 U**[e]	**3.4 J**	NA	**5 U**[e]	NA
barium	—	—	—	—	—	569.5	µg/L	240	NA	100	NA	68.1	51.8	NA	38.4	NA
beryllium	—	—	—	—	—	2.50	µg/L	*20 U*[e]	NA	*10 U*[e]	NA	0.29 J	0.24 J	NA	0.26 J	NA
calcium	—	—	—	—	—	—	µg/L	63,000	NA	38,900	NA	14,200	8,770	NA	9,390	NA
chromium	—	—	—	—	—	12.45	µg/L	*21.2 J*	NA	*14.5 J*	NA	5.2	5.2	NA	3.4 J	NA
iron	—	—	—	—	—	6,586	µg/L	2,150	NA	1,290	NA	786	369	NA	385	NA
magnesium	—	—	—	—	—	—	µg/L	176,000	NA	85,700	NA	34,300	12,600	NA	15,100	NA
manganese	—	—	—	—	—	1,741	µg/L	691	NA	530	NA	254	104	NA	149	NA
potassium	—	—	—	—	—	—	µg/L	106,000	NA	80,000	NA	37,600	23,300	NA	23,200	NA
sodium	—	—	—	—	—	—	µg/L	2,950,000	NA	2,060,000	NA	1,790,000	817,000	NA	886,000	NA
vanadium	—	—	—	—	—	26.27	µg/L	17.2 J	NA	10.5 J	NA	5.5	6.1	NA	3.6 J	NA
Low-Level Mercury																
mercury	—	0.025	0.051	0.94	—	—	µg/L	0.00082 J	NA	0.00138 J	NA	0.002 J	0.0024 J	NA	0.0016 J	NA
General Chemistry																
solids, total dissolved	—	—	—	—	—	—	µg/L	7,680,000	NA	3,310,000	3,170,000	4,560,000	2,120,000	NA	NA	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] bolded font indicates result above one of the following: TPH ESL, CTR CCC, CTR HHCO, NRWQC CCC, NRWQC HHCO
[d] italicized font indicates result above background
[e] detection limit is above criteria

Acronyms/Abbreviations:
AOC – area of concern
CCC – criterion continuous concentration
CTR – California Toxics Rule
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
HHCO – human-health consumption of organisms only
µg/L – micrograms per liter
NA – not analyzed
ND – not detected
NRWQC – National Recommended Water Quality Criteria
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
SW – surface water
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit

Table 4-10a
Soil Sampling Results, AOC 23 EBS Parcel 126

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: 126-001-001 / Sample: 126-0001M / [a] Depth Interval: 0 - 0.5 / Collection Date: 02-Jun-95	126-001-001 / 126-0006M / 3.5 - 4 / 05-Jun-95	126-001-001 / 126-0008M (FD) / 0 - 0.5 / 02-Jun-95	126-001-002 / 126-0002 / 0.5 - 1 / 02-Jun-95	126-001-002 / 126-0002M / 0 - 0.5 / 02-Jun-95	126-001-002 / 126-0007 / 4 - 4.5 / 02-Jun-95	126-001-002 / 126-0007M / 4 - 4.5 / 02-Jun-95	126-002-004 / 126-0004M / 0 - 0.5 / 02-Jun-95	126-002-005 / 126-0005 / 0.5 - 1 / 02-Jun-95	126-002-005 / 126-0005M / 0 - 0.5 / 02-Jun-95
VOCs															
acetone	14,000,000	—[b]	—	—	µg/kg	NA	24 U	NA	NA	NA	11 U	22 U	NA	NA	NA
2-butanone	22,000,000	—	—	—	µg/kg	NA	12 U	NA	NA	NA	11 U	11 U	NA	NA	NA
carbon disulfide	360,000	—	—	—	µg/kg	NA	6 U	NA	NA	NA	11 U	6 U	NA	NA	NA
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	NA	6 U	NA	NA	NA	NA	6 U	NA	NA	NA
isopropylbenzene	570,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-propylbenzene	240,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
toluene	520,000	—	—	—	µg/kg	NA	6 U	NA	NA	NA	11 U	6 U	NA	NA	NA
Petroleum Hydrocarbons															
diesel	—	—	100,000	—	µg/kg	**1,900,000** [c]	1,000 U	**1,300,000**	11,000 U	1,000 U	11,000 U	1,000 U	11,000 U	11,000 U	1,000 U
gasoline	—	—	100,000	—	µg/kg	500 U	600 U	500 U	500 U	600 U	600 J	600 U	500 U	500 U	600 U
motor oil	—	—	500,000	—	µg/kg	**27,000,000**	30,000	**18,000,000**	26,000 J	29,000 U	30,000 J	28,000 U	**560,000**	35,000 J	28,000 U
SVOCs															
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
diethyl phthalate	49,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals															
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	4,230 J	NA
antimony	31	—	—	9.50	mg/kg	NA	NA	NA	NA	NA	NA	NA	3.2 U	1.4 UJ	3.3 U
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	**6.7**	**1.8 U** [d]	**6.3**
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	26.9	19.9	33.7
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	0.49	0.43	0.55
cadmium	37	—	—	1.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	0.93	0.13	0.93
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	2,200	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	3	5.9 J	0.55 U
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	9.4	5.2	8.1
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	*53.2* [e]	13.1	*44.1*
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	7,990	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	3.1	1.6 J	2.5
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	2,300	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	137 J	NA
mercury	23	—	—	0.52	mg/kg	NA	NA	NA	NA	NA	NA	NA	0.11 U	0.17 U	0.11 U
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	2.4	20.6 J	1.7
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	642	NA
selenium	390	—	—	1.78	mg/kg	NA	NA	NA	NA	NA	NA	NA	0.27 U	0.76 J	0.28 U
silver	390	—	—	2.22	mg/kg	NA	NA	NA	NA	NA	NA	NA	0.54 U	0.19 U	0.55 U
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	143	NA
thallium	5.2	—	—	0.50	mg/kg	NA	NA	NA	NA	NA	NA	NA	0.27 U	***6.4 J***	0.28 U
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	26.7	15.5	40
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	61.7	21.5	54

Table 4-10a
Soil Sampling Results, AOC 23 EBS Parcel 126

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: 126-003-006 / Sample: 126-0009 / [a]Depth Interval: 0 - 1 / Collection Date: 31-Oct-95	126-003-006 / 126-0010 / 3 - 4 / 31-Oct-95	126-003-007 / 126-0012 / 7.5 - 8.5 / 06-Nov-95	126-003-008 / 126-0015 / 0.5 - 1.5 / 31-Oct-95	126-003-008 / 126-0016 / 3 - 4 / 31-Oct-95	127-SN-001 / 127S-001 / 3 - 3.5 / 13-Feb-95	127-SN-001 / 127S-001M / 3 - 3.5 / 13-Feb-95	127-SN-001 / 127S-011 (FD) / 3 - 3.5 / 13-Feb-95	127-SN-001 / 127S-011M (FD) / 3 - 3.5 / 13-Feb-95	127-SN-002 / 127S-002 / 6 - 6.5 / 18-Jan-95
VOCs															
acetone	14,000,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-butanone	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	10 U	NA	10 U	NA
carbon disulfide	360,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	10 U	NA	10 U	NA
isopropylbenzene	570,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methyl tert-butyl ether	17,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-propylbenzene	240,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
toluene	520,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	10 U	NA	10 U	NA
Petroleum Hydrocarbons															
diesel	—	—	100,000	—	µg/kg	27,000 U	29,000 U	28,000 U	26,000 U	28,000 U	NA	50,000 U	NA	50,000 U	NA
gasoline	—	—	100,000	—	µg/kg	560 UJ	590 UJ	570 U	530 UJ	570 UJ	NA	50,000 U	NA	50,000 U	NA
motor oil	—	—	500,000	—	µg/kg	27,000 U	29,000 U	28,000 U	26,000 U	28,000 U	NA	NA	NA	NA	NA
SVOCs															
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	370 U	380 U	370 U	340 U	370 U	370 U	NA	370 U	NA	26 J
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	370 U	380 U	370 U	440 U	410 U	79 J	NA	94 J	NA	400 U
diethyl phthalate	49,000,000	—	—	—	µg/kg	370 U	380 U	370 U	340 U	370 U	370 U	NA	370 U	NA	34 J
Pesticides/PCBs						ND	ND	ND	NA	NA	ND	NA	ND	NA	ND
Metals															
aluminum	76,000	—	—	13,960	mg/kg	5,620	*18,400*	7,280	6,460	7,600	NA	NA	NA	NA	NA
antimony	31	—	—	9.50	mg/kg	0.81 UJ	0.85 UJ	0.82 U	0.76 UJ	0.87 J	NA	*25 U*[d]	NA	*25 U*[d]	NA
arsenic	0.39	0.062	—	9.14	mg/kg	***13.2***	***12.8***	**4.5**	**3.5**	**6**	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	*474*	*428*	*135*	39.8	78.5	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	0.83	0.91	0.37 U	0.31	0.42	NA	*25 U*[d]	NA	*25 U*[d]	NA
cadmium	37	—	—	1.72	mg/kg	0.52 U	0.54 U	0.53 U	0.72	0.52 U	NA	*25 U*[d]	NA	*25 U*[d]	NA
calcium	—	—	—	16,800	mg/kg	587	2,800	2,790	2,970	4,060	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	16.8	45	20.5	30.3	49.4	NA	25 U	NA	25 U	NA
cobalt	900	—	—	14.30	mg/kg	*16.9*	*26*	8.5	4.8	9.8	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	*98.5 J*	*107 J*	14.2	11 J	13.4 J	NA	25 U	NA	25 U	NA
iron	23,000	—	—	22,280	mg/kg	***46,300***	***41,500***	13,900	14,500	16,900	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	21.3	14.4	4.6	6.7	14	NA	25 U	NA	25 U	NA
magnesium	—	—	—	7,304	mg/kg	2,080	7,210	4,450	3,680	5,680	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	*589*	*1,460*	261	159	382	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	mg/kg	0.09	0.13	0.06 U	0.05 U	0.1	NA	***25 U***[d]	NA	***25 U***[d]	NA
nickel	1,600	—	—	55.72	mg/kg	14.1	51.8	29.4	23.3	*64.5*	NA	30	NA	30	NA
potassium	—	—	—	1,232	mg/kg	311 U	1,130	544	808	952	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	mg/kg	1.3	0.61 U	0.74 U	0.69	0.59 U	NA	NA	NA	NA	NA
silver	390	—	—	2.22	mg/kg	1.3 U	1.4 U	1.4 U	1.3 U	1.4 U	NA	*25 U*[d]	NA	*25 U*[d]	NA
sodium	—	—	—	1,230	mg/kg	230	379	313	188	314	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	mg/kg	0.11 UJ	0.12 UJ	0.11 UJ	0.11 U	0.11 U	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	*75.4*	*72.7*	22.3	26.4	29.2	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	*84.6 J*	*112 J*	35.4 J	31.3 J	35 J	NA	25	NA	25	NA

Table 4-10a
Soil Sampling Results, AOC 23 EBS Parcel 126

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: 127-SN-002	A23SB37	A23SB37	A23SB37	A23SB38	A23SB38	A23SB38
						Sample: 127S-002M	C077S442	C077S443	C077S444	C077S445	C077S446	C077S447
						[a] Depth Interval: 6 - 6.5	1 - 2	2 - 3.5	5 - 6.5	0 - 2	2 - 4	4 - 8
						Collection Date: 18-Jan-95	08-Dec-05	08-Dec-05	08-Dec-05	02-Dec-05	02-Dec-05	02-Dec-05
VOCs												
acetone	14,000,000	—[b]	—	—	µg/kg	NA	100 U	100 U	140	100 UJ	100 UJ	100 UJ
2-butanone	22,000,000	—	—	—	µg/kg	10 U	100 U	100 U	7 J	100 U	100 U	100 U
carbon disulfide	360,000	—	—	—	µg/kg	NA	1.2 J	100 U	6.3 J	100 U	100 U	100 U
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	10 U	5 U	5 U	2 J	6 U	5 U	7 U
isopropylbenzene	570,000	—	—	—	µg/kg	NA	20 U	20 U	30 UJ	20 U	20 U	2.6 J
methyl tert-butyl ether	17,000	—	—	—	µg/kg	NA	40 U	40 U	1.8 J	40 U	40 U	50 U
n-propylbenzene	240,000	—	—	—	µg/kg	NA	5 U	5 U	6 UJ	6 U	5 U	3.7 J
toluene	520,000	—	—	—	µg/kg	10 U	5 U	5 U	1.3 J	6 U	5 U	7 U
Petroleum Hydrocarbons												
diesel	—	—	100,000	—	µg/kg	50,000 U	NA	NA	NA	NA	NA	NA
gasoline	—	—	100,000	—	µg/kg	50,000 U	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
SVOCs												
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
diethyl phthalate	49,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs						NA	NA	NA	NA	NA	NA	NA
Metals												
aluminum	76,000	—	—	13,960	mg/kg	NA	4,100	4,510	7,540	4,720	6,960	5,330
antimony	31	—	—	9.50	mg/kg	*25 U* [d]	0.5 U	0.5 U	0.6 U	0.6 UJ	0.5 UJ	0.7 UJ
arsenic	0.39	0.062	—	9.14	mg/kg	NA	**1.9**	**1.8**	**4.2**	**2.2**	**4.9**	**5.7**
barium	5,400	—	—	93.68	mg/kg	NA	26.5	20.6	*113*	34.4 J	62.3 J	63.8 J
beryllium	150	—	—	1.27	mg/kg	*25 U* [d]	0.1 J	0.1 J	0.19 J	0.1 J	0.24	0.16 J
cadmium	37	—	—	1.72	mg/kg	*25 U* [d]	0.5 U	0.5 U	0.6 U	0.04 J	0.5 U	0.7 U
calcium	—	—	—	16,800	mg/kg	NA	1,950	1,920	2,320	2,040	2,080	5,430
chromium	210	—	—	54.84	mg/kg	25 U	32.1	30.7	43.3	34.6 J	*74.2 J*	40.7 J
cobalt	900	—	—	14.30	mg/kg	NA	4	4.3	7.6	3.9	9.4	8
copper	3,100	—	—	39.14	mg/kg	28	5.1	5.6	9.9	6.5	12.4	11.8
iron	23,000	—	—	22,280	mg/kg	NA	9,210	9,870	16,200	10,000	16,400	11,900
lead	400	150	—	37.66	mg/kg	25 U	1.5	1.7	4	13.4 J	4.4 J	6.1 J
magnesium	—	—	—	7,304	mg/kg	NA	2,230	2,300	4,220	2,460	7,010	5,160
manganese	1,800	—	—	383.0	mg/kg	NA	91.7	96.4	131	95 J	334 J	263 J
mercury	23	—	—	0.52	mg/kg	***25 U*** [d]	0.1 U	0.1 U	0.17	0.028 U	0.11	0.19
nickel	1,600	—	—	55.72	mg/kg	51	24.2	26.6	50.6	28.5	*82.2*	50.8
potassium	—	—	—	1,232	mg/kg	NA	643	645	*1,330*	712 J	669 J	759 J
selenium	390	—	—	1.78	mg/kg	NA	0.5 U	0.42 U	0.6 U	0.6 U	0.5 U	0.44 J
silver	390	—	—	2.22	mg/kg	*25 U* [d]	0.19	0.11	0.23	0.13 UJ	0.07 UJ	0.13 UJ
sodium	—	—	—	1,230	mg/kg	NA	154	165	486	101 U	77.4 U	120 U
thallium	5.2	—	—	0.50	mg/kg	NA	*2 U* [d]	*2 U* [d]	*3 U* [d]	*2 U* [d]	*2 U* [d]	*3 U* [d]
vanadium	78	—	—	47.34	mg/kg	NA	20.2	20.7	29.5	18.8	26.9	24.7
zinc	23,000	—	—	67.48	mg/kg	31	15.1	16.4	30	17.8	25.5	21.7

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL
[d] detection limit is above criteria
[e] italicized font indicates result above background

Acronyms/Abbreviations:
AOC – area of concern
Cal – California
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
ND – not detected
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 4-10b
Groundwater Sampling Results, AOC 23 EBS Parcel 126

Analyte	PRELIMINARY SCREENING CRITERIA: Fed MCL	Cal MCL	GW TPH ESL	Background	Result Units	Station ID: 126-003-006	126-003-008	398-MW1	A23398-MW1	A23SB37	A23SB38	A23SB38
						Sample: 126-0011	126-0017	385-S21-024	C077G153	C077G150	C077G151	C077G152 (FD)
						[a] Depth Interval: 11 - 12	8 - 9	2.41 - 12.41	7 - 12	5 - 10	7 - 12	7 - 12
						Collection Date: 01-Nov-95	31-Oct-95	26-Jun-01	19-Dec-05	08-Dec-05	02-Dec-05	02-Dec-05
VOCs												
benzene	5	1	—[b]	—	µg/L	NA	NA	0.5 U	0.5 U	0.38 J	0.5 U	0.5 U
carbon disulfide	—	—	—	—	µg/L	NA	NA	2 U	0.5 U	0.5 U	0.39 J	0.32 J
1,2-dichloroethane	5	0.5	—	—	µg/L	NA	NA	0.5 U	**2.4**[c]	**0.91**	0.5 U	0.5 U
cis-1,2-dichloroethene	70	6	—	—	µg/L	NA	NA	NA	0.5 U	1	0.5 U	0.5 U
tetrachloroethene	5	5	—	—	µg/L	NA	NA	0.3 J	0.47 J	0.5 U	0.5 U	0.5 U
toluene	1,000	150	—	—	µg/L	NA	NA	2 U	0.5 U	0.5 U	0.23 J	0.19 J
1,2,4-trichlorobenzene	70	5	—	—	µg/L	NA	NA	**10 U**[d]	0.5 U	0.29 J	0.5 U	0.5 U
trichloroethene	5	5	—	—	µg/L	NA	NA	0.5 J	0.94	0.5 U	0.5 U	0.5 U
Petroleum Hydrocarbons												
diesel	—	—	100	—	µg/L	NA	**940 J**	100 U	NA	NA	NA	NA
SVOCs												
butylbenzyl phthalate	—	—	—	—	µg/L	NA	1 J	10 U	NA	NA	NA	NA
pyrene	—	—	—	—	µg/L	NA	1 J	0.2 U	NA	NA	NA	NA
Metals												
barium	2,000	1,000	—	569.5	µg/L	NA	NA	NA	11.7	275 J	44	43.4
beryllium	4	4	—	2.50	µg/L	NA	NA	NA	2 U	0.24 J	0.28 J	2 U
calcium	—	—	—	—	µg/L	NA	NA	NA	21,000	40,600 J	20,300	21,100
chromium	100	50	—	12.45	µg/L	NA	NA	NA	4.3 J	4.3 UJ	3.1 J	3.2 J
iron	—	—	—	6,586	µg/L	NA	NA	NA	50 U	2,290 J	73.7	64
magnesium	—	—	—	—	µg/L	NA	NA	NA	13,200	41,100 J	17,500	18,300
manganese	—	—	—	1,741	µg/L	NA	NA	NA	5 U	413 J	84.9	89
potassium	—	—	—	—	µg/L	NA	NA	NA	876 J	37,900	19,800	19,800
selenium	50	50	—	8.58	µg/L	NA	NA	NA	6	5 U	4 J	5 U
sodium	—	—	—	—	µg/L	NA	NA	NA	88,900	742,000	476,000	406,000
vanadium	—	—	—	26.27	µg/L	NA	NA	NA	7.2	3.3 J	4.3 J	4.6 J
Low-Level Mercury												
mercury	2	2	—	—	µg/L	NA	NA	NA	0.00128	0.00086	0.002 J	0.0021 J
General Chemistry												
solids, total dissolved	—	—	—	—	µg/L	NA	NA	NA	371,000	2,280,000	1,250,000	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL
[d] detection limit is above criteria

Acronyms/Abbreviations:
AOC – area of concern
Cal – California
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
GW – groundwater
µg/L – micrograms per liter
MCL – maximum contaminant level
NA – not analyzed
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 4-10c
Groundwater Sampling Results Compared to Surface Water Preliminary Screening Criteria, AOC 23 EBS Parcel 126

Analyte	PRELIMINARY SCREENING CRITERIA: SW TPH ESL	CTR CCC	CTR HHCO	NRWQC CCC	NRWQC HHCO	Background	Result Units	Station ID: 126-003-006 / Sample: 126-0011 / [a] Depth Interval: 11 - 12 / Collection Date: 01-Nov-95	126-003-008 / 126-0017 / 8 - 9 / 31-Oct-95	398-MW1 / 385-S21-024 / 2.41 - 12.41 / 26-Jun-01	A23398-MW1 / C077G153 / 7 - 12 / 19-Dec-05	A23SB37 / C077G150 / 5 - 10 / 08-Dec-05	A23SB38 / C077G151 / 7 - 12 / 02-Dec-05	A23SB38 / C077G152 (FD) / 7 - 12 / 02-Dec-05
VOCs														
benzene	—[b]	—	71	—	51	—	µg/L	NA	NA	0.5 U	0.5 U	0.38 J	0.5 U	0.5 U
carbon disulfide	—	—	—	—	—	—	µg/L	NA	NA	2 U	0.5 U	0.5 U	0.39 J	0.32 J
1,2-dichloroethane	—	—	99	—	37	—	µg/L	NA	NA	0.5 U	2.4	0.91	0.5 U	0.5 U
cis-1,2-dichloroethene	—	—	—	—	—	—	µg/L	NA	NA	NA	0.5 U	1	0.5 U	0.5 U
tetrachloroethene	—	—	8.85	—	3.3	—	µg/L	NA	NA	0.3 J	0.47 J	0.5 U	0.5 U	0.5 U
toluene	—	—	200,000	—	15,000	—	µg/L	NA	NA	2 U	0.5 U	0.5 U	0.23 J	0.19 J
1,2,4-trichlorobenzene	—	—	—	—	70	—	µg/L	NA	NA	10 U	0.5 U	0.29 J	0.5 U	0.5 U
trichloroethene	—	—	81	—	30	—	µg/L	NA	NA	0.5 J	0.94	0.5 U	0.5 U	0.5 U
Petroleum Hydrocarbons														
diesel	640	—	—	—	—	—	µg/L	NA	**940 J**[c]	100 U	NA	NA	NA	NA
SVOCs														
butylbenzyl phthalate	—	—	5,200	—	1,900	—	µg/L	NA	1 J	10 U	NA	NA	NA	NA
pyrene	—	—	11,000	—	4,000	—	µg/L	NA	1 J	0.2 U	NA	NA	NA	NA
Metals														
barium	—	—	—	—	—	569.5	µg/L	NA	NA	NA	11.7	275 J	44	43.4
beryllium	—	—	—	—	—	2.50	µg/L	NA	NA	NA	2 U	0.24 J	0.28 J	2 U
calcium	—	—	—	—	—	—	µg/L	NA	NA	NA	21,000	40,600 J	20,300	21,100
chromium	—	—	—	—	—	12.45	µg/L	NA	NA	NA	4.3 J	4.3 UJ	3.1 J	3.2 J
iron	—	—	—	—	—	6,586	µg/L	NA	NA	NA	50 U	2,290 J	73.7	64
magnesium	—	—	—	—	—	—	µg/L	NA	NA	NA	13,200	41,100 J	17,500	18,300
manganese	—	—	—	—	—	1,741	µg/L	NA	NA	NA	5 U	413 J	84.9	89
potassium	—	—	—	—	—	—	µg/L	NA	NA	NA	876 J	37,900	19,800	19,800
selenium	—	71	—	71	4,200	8.58	µg/L	NA	NA	NA	6	5 U	4 J	5 U
sodium	—	—	—	—	—	—	µg/L	NA	NA	NA	88,900	742,000	476,000	406,000
vanadium	—	—	—	—	—	26.27	µg/L	NA	NA	NA	7.2	3.3 J	4.3 J	4.6 J
Low-Level Mercury														
mercury	—	0.025	0.051	0.94	—	—	µg/L	NA	NA	NA	0.00128	0.00086	0.002 J	0.0021 J
General Chemistry														
solids, total dissolved	—	—	—	—	—	—	µg/L	NA	NA	NA	371,000	2,280,000	1,250,000	NA

Notes:
- [a] feet below ground surface
- [b] dash indicates not applicable or not established
- [c] bolded font indicates result above one of the following: TPH ESL, CTR CCC, CTR HHCO, NRWQC CCC, NRWQC HHCO

Acronyms/Abbreviations:
- AOC – area of concern
- CCC – criterion continuous concentration
- CTR – California Toxics Rule
- EBS – environmental baseline survey
- ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
- FD – field duplicate
- HHCO – human-health consumption of organisms only
- µg/L – micrograms per liter
- NA – not analyzed
- NRWQC – National Recommended Water Quality Criteria
- SVOC – semivolatile organic compound
- SW – surface water
- TPH – total petroleum hydrocarbons
- VOC – volatile organic compound

Review Qualifiers:
- J – indicates an estimated value
- U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
- UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 5-1
Estimates of Mobility and Persistence for Contaminants, AOC 23

Analyte	K_{oc} (L/kg)	f_{oc}	Percent Sorbed [a]	Half-Life in Soil (years) [b]
Volatile Organic Compounds				
1,2-dichloroethane	17.5	0.005	8	—[c]
benzene	58	0.005	23	1.1
naphthalene	2,010	0.005	91	0.71
tetrachloroethene	40	0.005	17	—
trichloroethene	82–150	0.005	29–43	0.98
vinyl chloride	19	0.005	8	0.96
Semivolatile Organic Compounds				
benz(a)anthracene	1.38E+06	0.005	100	1.86
benzo(a)pyrene	5.50E+06	0.005	100	1.45
benzo(b)fluoranthene	5.50E+05	0.005	100	1.67
carbazole	3,380	0.005	94.4	—
chrysene	2.0E+05	0.005	100	2.72
indeno(1,2,3-cd)pyrene	1.58E+06	0.005	100	2.0
Polychlorinated Biphenyls				
Aroclor 1016	2.71E+04	0.005	99	2.6[d]
Aroclor 1254	3.47E+05	0.005	100	2.6[d]
Aroclor 1260	3.47E+05	0.005	100	2.6[d]

Notes:

[a] percent sorbed = $[K_{oc}f_{oc} / (1+K_{oc}f_{oc})] \times 100$

[b] for microbially mediated degradation in soil (Howard et al. 1991)

[c] dash indicates not available

[d] for polychlorinated biphenyls in soil (Hsieh et al. 1994)

Acronyms/Abbreviations:

AOC – area of concern

f_{oc} – fraction organic carbon; average value for poorly graded silty sands at AOC 23

K_{oc} – organic carbon partition coefficient

L/kg – liters per kilogram

Table 6-1
HHRA Results by Exposure Group, AOC 23

Exposure Group	CANCER RISK		Hazard Index
	U.S. EPA	Cal/EPA	
1. All soil and groundwater exposure pathways			
Total*	2E-02	3E-02	408
Without metals below background	2E-02	3E-02	401
2. Exposure pathways for soil and vapors from VOCs in groundwater			
Total*	3E-05	2E-04	3
Without metals below background	2E-05	5E-05	2
Without metals below background and PAHs in soil	1E-05	3E-05	2
3. Exposure pathways for residential use of groundwater			
Total*	2E-02	3E-02	405
Without metals below background	2E-02	3E-02	399

Note:
* includes all COPCs

Acronyms/Abbreviations:
AOC – area of concern
Cal/EPA – California Environmental Protection Agency
COPC – chemical of potential concern
HHRA – human-health risk assessment
PAH – polynuclear aromatic hydrocarbon
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Table 6-2
HHRA Results by Risk Driver, AOC 23

Study Area	Analyte Name	TOTAL			WITHOUT BACKGROUND		
		Hazard Quotient	U.S. EPA Cancer Risk	Cal/EPA Cancer Risk	Hazard Quotient	U.S. EPA Cancer Risk	Cal/EPA Cancer Risk
AOC 23							
Soil							
	vinyl chloride	—*	—	2E-06	—	—	2E-06
	benz(a)anthracene	—	—	1E-06	—	—	1E-06
	benzo(b)fluoranthene	—	—	1E-06	—	—	1E-06
	benzo(k)fluoranthene	—	—	1E-06	—	—	1E-06
	benzo(a)pyrene	—	5E-06	1E-05	—	5E-06	1E-05
	carbazole	—	2E-06	—	—	2E-06	—
	dibenz(a,h)anthracene	—	1E-06	—	—	1E-06	—
	Aroclor 1254	0.3	6E-06	1E-05	0.3	6E-06	1E-05
	Aroclor 1260	0.3	4E-06	1E-05	0.3	4E-06	1E-05
	aluminum	0.1	—	—	—	—	—
	arsenic	0.2	2E-05	1E-04	—	—	—
	cadmium	0.1	—	7E-06	—	—	—
	chromium	0.2	—	—	—	—	—
	iron	0.8	—	—	0.8	—	—
	manganese	0.2	—	—	—	—	—
	thallium	0.2	—	—	0.2	—	—
	vanadium	0.4	—	—	—	—	—
	Total for soil	**3**	**3E-05**	**2E-04**	**2**	**2E-05**	**5E-05**
Groundwater							
	benzene	—	—	1E-06	—	—	1E-06
	benzo(g,h,i)perylene	0.3	—	—	0.3	—	—
	naphthalene	—	—	7E-06	—	—	7E-06
	tetrachloroethene	—	6E-06	6E-06	—	6E-06	6E-06
	trichloroethene	0.1	6E-06	—	0.1	6E-06	—
	vinyl chloride	—	1E-05	1E-05	—	1E-05	1E-05
	benz(a)anthracene	—	6E-04	9E-04	—	6E-04	9E-04
	benzo(b)fluoranthene	—	6E-04	1E-03	—	6E-04	1E-03
	benzo(a)pyrene	0.2	1E-02	2E-02	0.2	1E-02	2E-02

Table 6-2
HHRA Results by Risk Driver, AOC 23

Study Area	Analyte Name	TOTAL Hazard Quotient	TOTAL U.S. EPA Cancer Risk	TOTAL Cal/EPA Cancer Risk	WITHOUT BACKGROUND Hazard Quotient	WITHOUT BACKGROUND U.S. EPA Cancer Risk	WITHOUT BACKGROUND Cal/EPA Cancer Risk
Groundwater (continued)							
	chrysene	—	6E-06	1E-04	—	6E-06	1E-04
	indeno(1,2,3-cd)pyrene	0.3	2E-03	3E-03	0.3	2E-03	3E-03
	Aroclor 1016	4	4E-06	3E-04	4	4E-06	3E-04
	Aroclor 1260	391	4E-03	9E-03	391	4E-03	9E-03
	arsenic	3	3E-04	2E-03	—	—	—
	cadmium	—	—	1E-06	—	—	1E-06
	chromium	0.2	—	—	0.2	—	—
	iron	0.5	—	—	0.5	—	—
	manganese	1	—	—	1	—	—
	molybdenum	0.1	—	—	0.1	—	—
	selenium	0.1	—	—	0.1	—	—
	thallium	3	—	—	—	—	—
	vanadium	0.4	—	—	0.4	—	—
	Total for groundwater	**405**	**2E-02**	**3E-02**	**399**	**2E-02**	**3E-02**
	Total for soil and groundwater	**408**	**2E-02**	**3E-02**	**401**	**2E-02**	**3E-02**

Note:
* dash indicates not applicable

Acronyms/Abbreviations:
AOC – area of concern
Cal/EPA – California Environmental Protection Agency
HHRA – human-health risk assessment
U.S. EPA – United States Environmental Protection Agency

Table 7-1
Summary of RI Results and Recommendations, AOC 23

DQO Problem	DQO Decision Questions	Nature and Extent	Risk Assessment	Recommendation
AOC 23 was established to complete characterization of the nature and extent of contamination associated with areas previously used for chemical storage or handling at eight EBS parcels (EBS Parcels 71, 72, 110, 121, 123, 124, 125, and 126). Additionally, the regulatory agencies requested further evaluation of NAS GAP 29 and NADEP GAP 43, OWS 067, and SWMU AOC 098.	Have the nature and extent of contamination been defined?	Yes. Definition is adequate. 1. Vinyl chloride in soil and groundwater appears to be limited in extent. 2. TPH concentrations in soil and groundwater samples were scattered across AOC 23; most were diesel- and motor oil–range TPH with some gasoline-range TPH. The most notable concentration was motor oil–range TPH reported in the upper foot beneath Building 399, which is adjacent to CAA-3A. 3. Previously reported benzene contamination in soil could not be confirmed and is likely no longer present. 4. Benzene and 1,2-DCA were reported above the PSCs (MCLs) at isolated locations. Benzene was reported above the PSC at one location. Two detections of 1,2-DCA in groundwater reported in the eastern portion of AOC 23 are limited in extent and are likely associated with the adjacent CAA-3A. 5. PCBs and B(a)P were reported in groundwater samples at concentrations below PSCs (MCLs); however, these chemicals are primary risk drivers. These detections are likely an artifact of sampling (associated with suspended material due to turbidity) rather than representing dissolved concentrations. 6. Samples from previous investigations and the RI defined the possible exceedance of Aroclor 1260 in soil both laterally and vertically. 7. Metals in soil and groundwater are believed to be naturally occurring. 8. B(a)P equivalent concentrations in soil were identified above the PSC.	See below.	1. An FS is recommended for vinyl chloride in groundwater. The FS will also address the presence of vinyl chloride in soil and include sampling to verify that concentrations are above MCLs. 2. It is recommended that TPH results at AOC 23 be reviewed under the Alameda Point TPH Program to determine whether the data meet the Water Board's criteria for closure of low-risk fuel sites. 3. No further action is recommended for benzene in soil. This sampling location is within CAA-B, and soil associated with this sample was probably removed as part of fuel pipeline removal activities. 4. No further action is recommended for benzene and 1,2-DCA reported in groundwater above PSCs (MCLs). Benzene was reported in one grab groundwater sample at 1.1 µg/L, slightly above the PSC (MCL of 1 µg/L). Two concentrations of 1,2,-DCA in groundwater were reported in the eastern portion of AOC 23, and are likely associated with the adjacent IR Site 3 and CAA-3A. 5. No further action is recommended for PCBs and PAHs in groundwater. PCBs and PAHs reported in three groundwater samples are the primary risk drivers at AOC 23, and are likely an artifact of sampling (associated with suspended material due to turbidity) rather than representing dissolved concentrations. Because of low solubility and tendency to sorb to organic matter and clay-size particles in soil, PCBs and the heavier-molecular-weight PAHs are rarely found dissolved in groundwater. 6. No further action is recommended for PCBs in soil. They are limited in extent. The cancer risk contributed by PCBs in soil is within the risk management range and the contribution to the HI is less than 1. 7. No further action is recommended for metals in soil or groundwater. Metals at concentrations above background that contribute to HI values above 1 are largely due to iron in soil, and iron, manganese, and vanadium in groundwater. These metals have an HQ of 1 or less, and their health effects are not considered additive with other chemicals. Metals in soil and groundwater are believed to be naturally occurring. 8. The B(a)P equivalent concentrations in soil were incorporated into the PAH Areas discussed in Attachment W.
	Are contaminants present in soil or groundwater at concentrations that pose unacceptable risk to potential future residents?	See above.	Results of the baseline HHRA show a U.S. EPA and Cal/EPA total cancer risk of 2×10^{-2} and 3×10^{-2}, respectively (above the risk management range), with an HI of 408 and 404 (without metals below background). The cancer risk and HI are largely due to a single report of Aroclor 1260 in groundwater at a concentration below its MCL; Aroclor 1016 also contributes to the HI (4), but to a much lesser extent. The PCBs are likely artifacts of sampling (associated with suspended material due to turbidity) rather than representing dissolved concentrations. Because of their low solubility and tendency to sorb to organic matter and clay-size particles in soil, PCBs are rarely found dissolved in groundwater. Without the PCBs and metals below background, the HI is 6; there are no	See above.

Table 7-1 (continued)

DQO Problem	DQO Decision Questions	Nature and Extent	Risk Assessment	Recommendation
			chemicals with a hazard value greater than 1, and the health effects of iron, manganese, and vanadium are not considered additive with other chemicals. Without PCBs, iron, and manganese in groundwater, and iron in soil, the HI is below 3.2. Without metals below Alameda Point background 95th percentile concentrations, PAHs in soil and groundwater, and PCBs in groundwater, the U.S. EPA and Cal/EPA risks are 1×10^{-5} and 3×10^{-5}, respectively, with an HI of 2. The HI above 1 is mostly due to iron in soil (0.8) and PCBs.	
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?	Vinyl chloride, diesel-range TPH, motor oil–range TPH, and arsenic were all present in one groundwater sample collected in the southern portion of AOC 23 at concentrations above surface water PSCs. However, the arsenic concentration was below the Alameda Point background 95th percentile.	See above.	No further action is recommended because it is unlikely that vinyl chloride (2.7 µg/L) would migrate 150 feet to Seaplane Lagoon and result in concentrations above the PSC (2.4 µg/L) in surface water. It is recommended that TPH results at AOC 23 be reviewed under the Alameda Point TPH Program to determine whether the data meet the Water Board's criteria for closure of low-risk fuel sites.
The RI addressed a request by regulatory agencies to further assess soil and groundwater quality at one oil/water separator located within AOC 23: OWS 067.	Are contaminants present in soil that indicate releases have occurred from the OWS?	Diesel-range TPH was the only analyte present in soil samples collected in the vicinity of OWS 067 at concentrations above a PSC. The TPH contamination was present in a surface soil sample but not in two deeper samples collected at the same location.	NA	It is recommended that TPH results at AOC 23 be reviewed under the Alameda Point TPH Program to determine whether the data meet the Water Board's criteria for closure of low-risk fuel sites.
	Have the nature and extent of contamination been defined?	The vertical extent of diesel-range organics was defined. The lateral extent is defined to the north.	NA	No further action.
	Are contaminants present at concentrations that contribute to an unacceptable risk to potential future residents?	See above.	See above. Data associated with OWS 067 were included in the baseline HHRA.	No further action.

Acronyms/Abbreviations:

AOC – area of concern
B(a)P – benzo(a)pyrene
CAA – corrective action area
Cal/EPA – California Environmental Protection Agency
DCA – dichloroethane
DQO – data quality objective
EBS – environmental baseline survey
FS – feasibility study
GAP – generator accumulation point
HHRA – human-health risk assessment
HI – hazard index
HQ – hazard quotient
IR – Installation Restoration (Program)
µg/L – micrograms per liter
MCL – maximum contaminant level
NA – not applicable
NADEP – Naval Aviation Depot
NAS – Naval Air Station
OWS – oil/water separator
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PSC – preliminary screening criterion
RI – remedial investigation
SWMU – solid waste management unit
TPH – total petroleum hydrocarbons
U.S. EPA – United States Environmental Protection Agency
Water Board – San Francisco Bay Regional Water Quality Control Board

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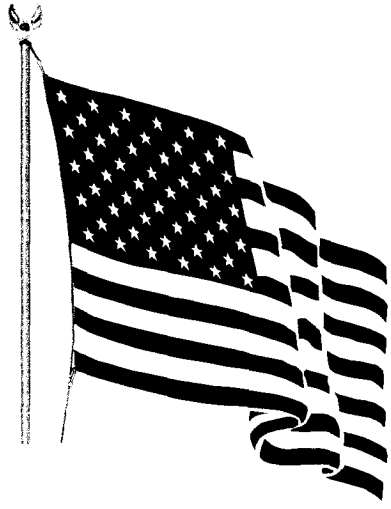

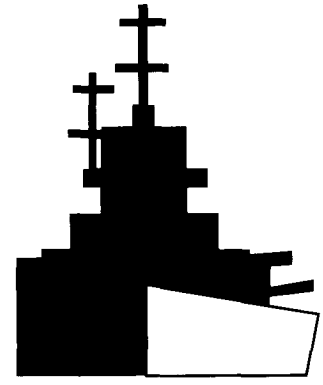

FINAL
REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT IR SITE 35, AREAS OF CONCERN IN TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105-1
April 2007

Volume V of V

Submitted to:

Department of the Navy
Base Realignment and Closure
Program Management Office West

1455 Frazee Road, Suite 900
San Diego, California 92108-4310

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Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

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CTO-0077/0105-1
April 2007
Volume V of V

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ATTACHMENT S

AREA OF CONCERN 24

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL
REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT
ATTACHMENT S, AREA OF CONCERN 24
IR SITE 35, TRANSFER PARCEL EDC-5
ALAMEDA POINT
ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 24. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station Alameda), Alameda, California.

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

AOC 24 is an approximately 0.1-acre area in the southeastern portion of Transfer Parcel Economic Development Conveyance 5, along West Trident Avenue between Orion and Hancock Streets (Figure 1-1), and is in Environmental Baseline Survey (EBS) Parcel 197. The portion of the parcel covered by AOC 24 includes paved open space along the southeastern edge of Building 118 and Oil/Water Separator (OWS) 118. OWS 118 was reported to be in the center of AOC 24, although there was no evidence of an OWS during the 2005 RI sampling.

The railroad tracks that run east-west across the open space to the west of AOC 24 are being evaluated with IR Site 3. IR Site 3 is immediately west and southwest of AOC 24 and is part of a larger area characterized by groundwater and soil contamination.

The boundaries of AOC 24 have been changed from those presented in the Work Plan (BEI 2006). The metals contamination identified within the former boundaries of AOC 24 is being addressed as part of IR Site 3.

1.2 HISTORICAL USE

EBS Parcel 197 was historically used as the location of a Navy exchange (Building 118) and the open space was used for storage. Building 118 borders AOC 24 to the north. The northwestern areas of Building 118 are being evaluated as part of the adjacent IR Site 3. During the EBS inspection, storage of heavy-duty corrosive cleaners, liquid detergent, liquefied petroleum camping fuel, propane containers, toner, floor cleaner, and floor wax was observed inside the exchange. Minor quantities of gas, antifreeze, motor oil, and aerosol paint were stored in a metal box outside Building 118. OWS 118 was present near the southeast corner of the building (Figure 1-1, Photograph 1-1). Old refrigeration equipment, wood pallets, and packaging materials were stored in the open space.

1.3 PRELIMINARY SCREENING CRITERIA AND BACKGROUND METALS

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this AOC are the following:

Photograph 1-1
AOC 24, Approximate Location of Former OWS 118, View to North

- Soil
  - residential preliminary remediation goals (PRGs) (U.S. EPA 2004b), except for polynuclear aromatic hydrocarbons (PAHs) classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene equivalent concentration screening level of 620 micrograms per kilogram (DON 2001a)
  - environmental screening levels (ESLs) for total petroleum hydrocarbons (TPH) (RWQCB 2005) – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)
- Groundwater
  - maximum contaminant levels (MCLs) and advisory level for lead (U.S. EPA 2002, DHS 2006)
  - ESLs for TPH (RWQCB 2005)

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being assessed. For example, groundwater concentrations from all study areas were compared to MCLs, whether or not the groundwater was considered a potential drinking water source in that area. Chemicals of potential concern (COPCs) identified in the health risk evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs.

In addition to the above-listed PSCs, metals concentrations in soil and groundwater at AOC 24 were compared to the following Alameda Point background concentrations to help discriminate between site-related and naturally occurring metals:

- Alameda Point background soil concentrations (95th percentile of the data set; Appendix E of the final RI Report of Operable Unit [OU]-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)
- Alameda Point background groundwater concentrations (95th percentile; Appendix E of the final RI Report of OU-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)

For ease of discussion in this report, the Alameda Point 95th percentile concentrations for metals in soil (pink background data set) and groundwater are referred to as "background."

Section 4.3 of the main RI/FS Report provides further discussion on the occurrence and interpretation of metals concentrations in soil and groundwater at IR Site 35.

1.4 PREVIOUS INVESTIGATIONS

During one previous investigation at AOC 24, the EBS, a soil sample was collected, and results of this investigation are summarized below. Locations sampled during the previous investigation in AOC 24 are shown on Figure 1-1. Analytical results for soil samples collected within AOC 24 are provided in Appendix B.

The OWS was identified as a target area during the EBS (IT 2001a). One subsurface soil sample (197-0002M) was collected and analyzed for volatile organic compounds (VOCs), semivolatile organic compound (SVOCs), metals, and TPH. None of these analytes were reported above their respective EBS screening criteria.

1.5 ADJACENT SITE

AOC 24 is located northeast of IR Site 3 and east of AOC 23. IR Site 3 is part of a larger area characterized by groundwater contamination (chlorinated hydrocarbons, TPH, and benzene) and soil contamination (metals, PAHs, and TPH). Based on 2004 groundwater elevations, it appears that AOC 24 is generally crossgradient of IR Site 3.

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Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, geology, and potential groundwater beneficial use at AOC 24.

Topography at AOC 24 is relatively flat, although the elevation increases slightly against the side of Building 118. The average ground elevation at AOC 24, based on elevation data from the one boring (A24SB01) advanced during the RI, is 12 feet above mean sea level (MSL). The depth to water in the RI boring was approximately 4 feet below ground surface (bgs). Groundwater depth was measured in temporary casings prior to groundwater sample collection. The total dissolved solids (TDS) concentration measured in the groundwater sample from boring A24SB01 was 1,670 milligrams per liter. AOC 24 is located east of Saratoga Street, and based on TDS, groundwater does not meet United States Environmental Protection Agency's (U.S. EPA's) or the California State Water Resources Control Board's exemption criteria for municipal and domestic water use. Although it is unlikely that groundwater beneath AOC 24 would be used as a drinking water source, U.S. EPA has classified first water-bearing zone groundwater in this area as a Class II aquifer.

The nearest groundwater monitoring well to AOC 24 is M07A-03, located approximately 400 feet north of AOC 24. A review of groundwater depths in this well over time (June 1991 through April 2004) shows depth to water from approximately 2 to 9 feet bgs. The deepest historical groundwater measured in this well is approximately 8 feet above MSL. This value, if subtracted from the ground elevation at AOC 24, would suggest groundwater in the vicinity of this AOC may have been present at 4 feet bgs.

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Groundwater flow direction in the vicinity of AOC 24 is influenced by a groundwater elevation low east of this area and appears to be towards the east. Based on tidal studies performed at other Alameda Point sites, tidal influence would not be expected at AOC 24, located approximately 2,000 feet from Seaplane Lagoon.

Soil encountered in the RI boring consisted of silt, poorly graded sand, and lean clay. Fill material exists to a depth of 4 to 5 feet bgs. Fine-grained bay sediment (Young Bay Mud) was encountered in boring A24SB01 at a depth of 5.5 feet bgs; (see cross section E-E' on Figure 2-8 of the main RI/FS Report). As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust may be located beneath AOC 24; however, it was not encountered in the boring advanced to 6 feet bgs during the RI. RI boring logs for the study area are included in Appendix D.

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Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for AOC 24. Sitewide data quality objectives (DQOs) for the evaluation of AOCs and OWSs (OWS 118 was formerly present at AOC 24) are presented in Table 3-2 of the main RI/FS Report.

3.1 APPROACH

One EBS soil sample targeted OWS 118 at AOC 24; VOCs, SVOCs, TPH, and metals in this sample were reported below EBS screening criteria. However, a groundwater sample was not collected near the OWS. Regulatory agencies requested additional soil and groundwater sampling to confirm previous soil data and to assess whether groundwater has been impacted by possible releases from the OWS. The RI addressed soil and groundwater constituents near the OWS.

3.2 SCOPE

Three soil samples were collected from a boring (at depth intervals of 1 to 2, 3 to 4, and 5.5 to 6 feet bgs) near the OWS. The OWS location was approximated by surveying in its reported location. Grab groundwater samples were collected from temporary well casings screened in the first water-bearing zone placed inside the boring. Soil and groundwater samples from this boring were analyzed for VOCs, extractable-range TPH, and metals. Groundwater was also analyzed for TDS. Table 3-1 summarizes samples collected during the RI and the previous investigation. Figure 1-1 shows sampling locations from all investigations.

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Section 4
NATURE AND EXTENT OF CONTAMINATION

This section discusses sampling and analysis from previous investigations and from the RI and presents the concentration ranges and spatial distributions of the analytes identified at AOC 24. Soil and groundwater samples were collected at two locations during the EBS (IT 2001a) and the RI (Table 3-1). Results are illustrated on Figures 4-1 and 4-2. Metals concentrations reported in soil and groundwater at concentrations above background are discussed in detail in Section 4.3.3 of the main RI/FS Report. Regardless of concentration, all reported metals (except required human trace nutrients) were included in the risk evaluation (Section 6).

Statistical summaries of soil and groundwater results are presented in Tables 4-1 and 4-2, and soil and groundwater analytical results are summarized in Tables 4-3 and 4-4. Complete analytical results for historical and RI samples from AOC 24 are included in Appendices B and G, respectively.

4.1 SOIL SAMPLING RESULTS

Analytical soil sampling results are discussed for each class of chemicals investigated at AOC 24.

4.1.1 Volatile Organic Compounds

Six VOCs (acetone, 2-butanone, carbon disulfide, cis-1,2-dichloroethene, methylene chloride, and naphthalene) were reported in soil samples from boring A24SB01. VOC concentrations were below PSCs.

4.1.2 Semivolatile Organic Compounds

SVOCs were not reported above laboratory detection limits in the soil sample analyzed for SVOCs (197-0002M).

4.1.3 Total Petroleum Hydrocarbons

Diesel-range TPH and motor oil–range TPH were reported at concentrations below PSCs in soil samples from boring A24SB01.

4.1.4 Metals

Arsenic and iron were the only two metals reported at concentrations above PSCs at AOC 24. Arsenic was reported at 11.2 milligrams per kilogram (mg/kg), above the PSC (California residential PRG of 0.062 mg/kg) and above the background concentration (9.14 mg/kg) in the 5- to 6-foot-bgs sample from boring A24SB01 but below the maximum background concentration of 15.6 mg/kg. Iron was reported at concentrations above the PSC (residential PRG of 23,000 mg/kg) and background concentration (22,280 mg/kg) in two samples from this same boring (34,200 J and 34,500 J mg/kg, from depths of 3 to 4 and 5 to 6 feet bgs, respectively). Based on the evaluation in Section 4.3 of the main RI/FS Report, these metals are believed to be naturally occurring. The soil sample with arsenic and iron concentrations, while above background, was collected at a depth

of 5 to 6 feet bgs in the native Bay Sediment Unit (BSU) (Bay Mud) and also had concentrations of aluminum, barium, chromium, copper, lead, magnesium, mercury, nickel, potassium, sodium, vanadium, and zinc at concentrations above background. The depth of this sample, the type of sample material (i.e., clay), and the number of metals with concentrations above background support the conclusion that metals concentrations present in this sample are naturally occurring.

4.2 GROUNDWATER SAMPLING RESULTS

Analytical groundwater sampling results are discussed for each class of chemicals investigated at AOC 24.

4.2.1 Volatile Organic Compounds

Carbon disulfide was the only VOC reported in a groundwater sample from boring A24SB01 at AOC 24. There is no PSC (MCL) established for carbon disulfide.

4.2.2 Total Petroleum Hydrocarbons

Diesel-range TPH was reported in the groundwater sample from boring A24SB01 at a concentration of 110 micrograms per liter (µg/L), which was slightly above the PSC (ESL of 100 µg/L). The laboratory noted that the result represented a wide range of hydrocarbons not indicative of diesel.

4.2.3 Metals

Eleven metals were reported in the groundwater sample from A24SSB01 at AOC 24. Metals concentrations were below PSCs. MCLs have not been established for iron or manganese. They each contribute to a hazard index (HI) above 1 (discussed in Section 6). Iron was reported at a concentration of 36,700 µg/L. This concentration was above the background concentration (6,856 µg/L). For the same groundwater sample, manganese was reported at a concentration of 3,060 µg/L. This concentration was above the background concentration (1,741 µg/L).

As discussed in Section 4.3.2 of the main RI/FS Report, high concentrations of iron in groundwater are indicative of reducing subsurface conditions. The reducing conditions in groundwater may be caused by either natural or anthropogenic organic material in the subsurface. AOC 24 was investigated because of reports of an OWS. However, there was no evidence of an OWS, and only low levels of TPH in soil and groundwater (diesel at 110 µg/L) were reported. The source of organic material in soil or groundwater that could have resulted in reducing subsurface conditions has not been identified. Natural conditions and non-Navy sources that could possibly result in reducing groundwater at AOC 24 include the presence of BSU sediment in the interval from which groundwater was collected and the likely presence of the Marsh Crust beneath the study area. As discussed in Section 4.3.2.2 of the main RI/FS Report, the color of the BSU was logged as dark gray, suggesting a reduced form of iron.

Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for AOC 24. It discusses the conceptual model, the physical and chemical changes that might occur to contaminants present at AOC 24, and the mechanisms that could potentially transfer the contaminants from the study area. The conceptual site model facilitates understanding of the present AOC conditions by integrating AOC-specific physical characteristics with the nature and extent of contaminants in the physical systems. Section 5.2 includes an evaluation of the mobility and persistence of compounds above PSCs not attributable to background and of risk drivers at AOC 24. Section 5.3 discusses potential migration pathways.

5.1 AOC 24 CONCEPTUAL SITE MODEL

AOC 24 is located east of Saratoga Street in the southeastern portion of IR Site 35. Topography at AOC 24 is relatively flat and slopes from the building to the south. The entire AOC is currently paved. The surface water nearest to AOC 24 is Seaplane Lagoon, located approximately 2,000 feet to the southwest.

Based on a review of borings logs for AOC 24, the subsurface lithology at AOC 24 consists of approximately 5 feet of coarse-grained artificial fill material (comprised of silty sand and poorly graded sand) overlying Young Bay Mud. Shallow groundwater of the first water-bearing zone beneath AOC 24 occurs in the fill material. The underlying Young Bay Mud would be expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. The Marsh Crust may be present beneath AOC 24 (SWDIV 2001). Groundwater flow direction is approximately east, and depth to groundwater based on historical data from a nearby well suggests that groundwater in the vicinity of AOC 24 may have been as deep as 4 feet bgs. Negligible tidal influence is expected at AOC 24 because of its distance from Oakland Inner Harbor and Seaplane Lagoon.

In the OWS 118 area, diesel-range TPH was reported in one groundwater sample at a concentration slightly above the drinking water ESL (110 µg/L). However, the laboratory noted that the result of 110 µg/L represents a wide range of hydrocarbons that are not indicative of diesel. Arsenic and iron were reported in soil at concentrations above PSCs. Additionally, vanadium was reported in soil at A24SB01 at 5 to 6 feet bgs and contributed to noncancer risk. These metals are believed to be naturally occurring in soil at IR Site 35. Metals were not reported above PSCs in groundwater; however, iron and manganese were reported in the one groundwater sample and contributed to noncancer risk. These metals are believed to be naturally occurring in the groundwater at IR Site 35 as a result of dissolution from soil due to reducing conditions in the subsurface. A source of organic material that could cause these conditions was not identified; however, reducing conditions could be related to the presence of BSU sediment in the interval from which groundwater was collected and the likely presence of the Marsh Crust beneath the study area.

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in the environment tends to remain in place. The tendency toward immobility and persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Section 5 of the main RI/FS Report discusses the physical and chemical properties of contaminants, and their chemical class (e.g., TPH), that affect their transport and persistence in the environment. Section 5 of the main RI/FS Report also discusses mobility and persistence of naturally occurring metals.

TPH is generally composed of a spectrum of hydrocarbon molecule sizes, from short-chain volatiles (e.g., benzene, toluene, ethylbenzene, and xylenes [BTEX], and naphthalene) to long-chain oils. TPH is subject to biodegradation in the subsurface, with constituents that comprise the lighter end of fuels (gasoline and BTEX) being more readily biodegradable under aerobic conditions. These constituents also tend to be more volatile, more soluble, more mobile, and generally more toxic than the longer-chain hydrocarbons. Heavier fuels (motor oil and heavier end of diesel spectrum) do not typically have appreciable amounts of soluble constituents and tend to adhere to soil particles or other substrate in the subsurface, thus being less mobile. Weathering of TPH will remove the light-end hydrocarbons first. The lack of appreciable fuel-related volatile constituents (BTEX) reported in soil and groundwater indicates that the TPH present in the subsurface at AOC 24 has been subject to weathering and is not a significant source of soluble or volatile constituents to groundwater or air. This is also supported by the laboratory note that the diesel-range TPH reported in the sample represented a wide range of hydrocarbons that were not indicative of diesel.

5.3 CONTAMINANT MIGRATION

The migration pathways evaluated for relevance to AOC 24 include atmospheric transport (vapors and airborne fugitive dust), transport via surface water runoff, and groundwater transport from AOC 24. Diesel-range TPH is the contaminant identified at AOC 24 whose source may be Navy activities. Metals reported in soil and groundwater at concentrations above PSCs or background are believed to be naturally occurring. Diesel-range TPH is at the heavier range of the TPH spectrum and is not very volatile, thus eliminating from consideration atmospheric transport by vapors. TPH was not reported in soil at concentrations above PSCs. Additionally, because the study area is paved, significant transport by airborne dust or by surface water runoff is unlikely.

The most likely migration pathway for contaminants at AOC 24 is groundwater transport. It is suspected that the diesel-range TPH reported above the PSC in groundwater is not representative of dissolved diesel in groundwater, as the laboratory noted that it is composed of a wide range of hydrocarbons and not indicative of diesel. However, if the concentration does represent dissolved TPH, it would migrate more slowly than the flow of groundwater because diesel-range TPH is more likely to be adsorbed to soil particles than dissolved in groundwater.

Section 6
TIER 1 EVALUATION

This section summarizes the Tier 1 risk evaluation results for AOC 24. In a Tier 1 evaluation, risk for a residential exposure scenario is assessed with the assumption that no remedial action would take place at the study area. This section also presents a qualitative uncertainty evaluation that identifies and characterizes the effects of uncertainties on the risk results.

A Tier 1 evaluation is a screening level approach that calculates total cumulative risk values using published risk-based guidelines from the U.S. EPA, California Environmental Protection Agency (Cal/EPA), and San Francisco Bay Regional Water Quality Control Board. The Tier 1 evaluations include all chemicals identified in at least one sample except for PAHs in soil. PAHs in soil are not included because site-specific remediation goals for PAHs are being developed. The approach used to estimate risk is described in Section 6 of the main RI/FS Report. Tier 1 information is provided in Attachment J.

Cancer risk and noncancer values for AOC 24 are shown in Table 6-1. Risk drivers for cancer and noncancer risk are presented in Table 6-2.

6.1 COPC IDENTIFICATION

The data selection and identification of COPCs are based on a compilation of all usable data for soil and groundwater. All chemicals reported in at least one sample collected during the RI and/or included in the historical data were included as Tier I COPCs, except calcium, magnesium, potassium, and sodium, which are known to be required human trace nutrients.

There are 21 Tier 1 COPCs in soil at AOC 24: 15 metals and 6 VOCs based on four samples.

There are 8 Tier 1 COPCs in groundwater at AOC 24: 7 metals and 1 VOC (carbon disulfide) based on one sample.

6.2 RISK CHARACTERIZATION

The cancer risk and noncancer hazard values were calculated using the Tier 1 protocol from Cal/EPA (2005). The maximum concentration of each COPC in soil and groundwater was compared with a risk-based guideline to estimate cancer and noncancer risks. Two results are presented for three exposure groups, the total risk and a second value that does not include risk associated with metals concentrations that are below background.

For soil and groundwater data for the three exposure groups at AOC 24, the calculated cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 9×10^{-4} and 11

  Without metals below background: 2×10^{-4} and 10

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 2×10^{-4} and 4

  Without metals below background: 2×10^{-4} and 3

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 7×10^{-4} and 7

  Without metals below background: 1×10^{-9} and 7

For reasonable future use, the Exposure Group 2 cancer risk without metals below background is due to arsenic in soil. The maximum concentration of arsenic of 11.2 mg/kg is slightly above the background 95th percentile concentration of 9.14 mg/kg but below the maximum background concentration of 15.6 mg/kg. Without arsenic, the cancer risk is below 10^{-6}. The HI for soil is below 1 without iron and not considering the effects of aluminum, manganese, and vanadium as additive.

For residential use of groundwater, the Exposure Group 3 noncancer hazard without metals below background is largely due to iron (hazard quotient [HQ] of 3) and manganese (HQ of 3).

6.3 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation represent any potential health concerns at AOC 24. The results are consistent with the site history and previous investigations. This approximately 0.1-acre site is adequately characterized with two investigations.

The potential impact of vapors to indoor air for the one VOC reported in groundwater is negligible. The noncancer HI based on the tap water PRGs is well below 1, and the PRG is higher than the ESL for protection of indoor air. The uncertainty associated with the omission of the dermal pathway for groundwater is low because exposure from the dermal pathway for the Tier 1 COPCs would not result in an increase in the cancer risk or HI for residential use of groundwater (Exposure Groups 1 and 3). Cancer risk and hazard values are reported in one significant figure, so small changes will not necessarily result in an overall increase. This finding is based on the ratio of dermal exposure to ingestion for each Tier 1 COPC.

6.4 CONCLUSIONS

For all three exposure groups, the total cancer risk for soil and groundwater and for soil alone are above the risk management range and noncancer hazard values are above 1.

In soil, the maximum concentration of arsenic of 11.2 mg/kg is slightly above the background 95th percentile concentration of 9.14 mg/kg but below the maximum concentration of 15.6 mg/kg; the other three arsenic concentrations are below background. Therefore, it is likely that arsenic concentrations overall are consistent with background.

The HI of 3 in soil is largely due to iron with an HQ of 1 and the addition of HQ values for aluminum (0.3), manganese (0.2), and vanadium (0.8). The health effects of iron are not considered additive with other chemicals, as discussed in Section J1 of Appendix J. The HI of 7 for residential use of groundwater is due to the addition of individual HQ values for iron (3) and manganese (3).

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Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at AOC 24, including the nature and extent of contamination and results of the Tier 1 risk evaluation. Results form the basis of responses to the DQO decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendations presented below.

7.1 SUMMARY

Previous sampling at AOC 24 identified no chemicals in soil with concentrations above PSCs. Groundwater samples had not been collected at this AOC prior to the RI. Three soil samples and one groundwater sample were collected from AOC 24 during the RI and were analyzed for VOCs, extractable-range TPH, and metals.

Metals (arsenic and iron) and TPH were reported at concentrations above PSCs at AOC 24. Arsenic and iron in soil were reported at concentrations above PSCs and background; however, these metals are believed to be naturally occurring rather than resulting from Navy activities. The soil sample with arsenic and iron concentrations, while above background, was collected at a depth of 5 to 6 feet bgs in the native BSU and also had aluminum, barium, chromium, copper, lead, magnesium, mercury, nickel, potassium, sodium, vanadium, and zinc at concentrations above background. The depth of this sample, the type of sample material (i.e., clay), and the number of metals with concentrations above background support the conclusion that metals concentrations in this sample are naturally occurring. Additionally, arsenic was reported at 11.2 mg/kg, slightly above the background 95th percentile concentration (9.14 mg/kg), but below the maximum background concentration (15.6 mg/kg).

Arsenic concentrations in groundwater are below background, and diesel-range TPH was reported in groundwater at the same location at a concentration of 110 µg/L, which is above the PSC. The laboratory qualified this result as being representative of a wide range of hydrocarbons, not indicative of diesel. Consequently, the result reported by the laboratory should not be compared to the PSC for diesel-range TPH. Neither jet propellant grade 5–range TPH nor motor oil–range TPH was reported in the groundwater sample. Although not at concentrations above PSCs, iron and manganese in groundwater contributed to noncancer risk at AOC 24. The presence of these metals in groundwater is likely due to reducing groundwater conditions in the vicinity of the grab groundwater sample.

Results of the Tier 1 risk evaluation show a total cancer risk without metals below background of 2×10^{-4} and an HI of 10. Most of the cancer risk is from arsenic (2×10^{-4}) in soil and most of the noncancer hazard is from iron (HQ of 1) and vanadium (HQ of 0.8) in soil, and iron (HQ of 3) and manganese (HQ of 3) in groundwater. Based on statistical analysis (Section 4.3 of the main RI/FS Report), arsenic, iron, and vanadium identified in soil are believed to be naturally occurring rather than the result of releases from Navy activities. As discussed in Section 4.3 of the main RI/FS Report, the concentrations of iron and manganese in groundwater result from dissolution of iron in soil due to reducing conditions. A source of organic material that could cause these conditions was not

identified, but could be related to the presence of BSU sediment within the interval from which groundwater was collected and likely presence of the Marsh Crust beneath AOC 24. Additionally, health effects for iron, manganese, and vanadium are not additive.

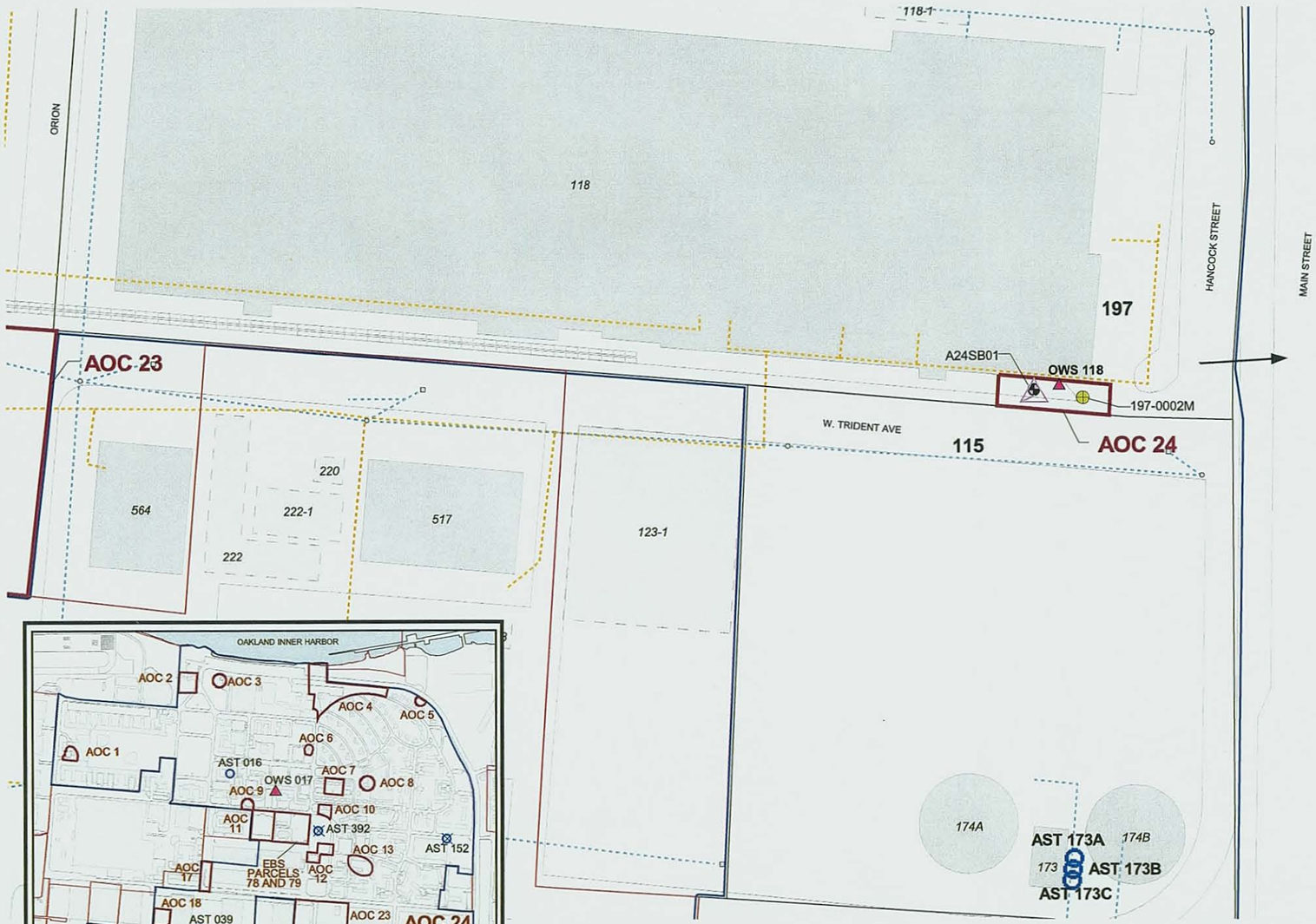
7.2 AOC 24 CONCLUSIONS AND RECOMMENDATIONS

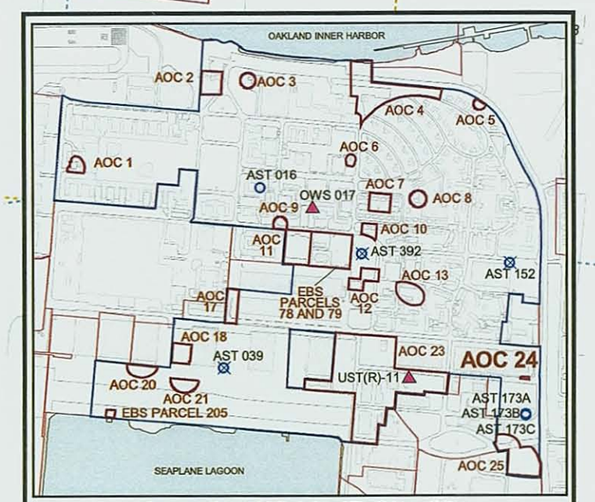
Data from previous investigations sufficiently characterized the nature and extent of contamination to perform a Tier 1 risk evaluation and support decisions on the necessity for remedial action at AOC 24.

No further action is recommended for AOC 24. Further evaluation of the extent of TPH in groundwater and metals in soil and groundwater is not recommended at AOC 24 for the following reasons.

- Diesel-range TPH was reported at a concentration only slightly above the PSC, and the laboratory noted that the TPH reported in the sample represents a wide range of hydrocarbons and is not indicative of diesel.
- Arsenic in soil is believed to be naturally occurring. Without arsenic in soil or groundwater, the total cancer risk is 1×10^{-9} and the HI is 10. The HI of 10 is due primarily to iron and vanadium in soil and iron and manganese in groundwater. The concentrations of iron and vanadium in soil are considered naturally occurring. In groundwater, concentrations of these metals are indicative of reducing conditions and are considered to result from dissolution of metals in soil; however, a source of organic material was not identified. The health effects of these metals are not additive.

FIGURES





Location Within IR Site 35

1500 0 1500 Feet

LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- ABOVEGROUND STORAGE TANK (PRESENT)
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

N

EBS SOIL SAMPLING LOCATION WITH SAMPLE ID
- VOCs, SVOCs, FUELS, AND METALS ANALYSES ONLY

RI SOIL SAMPLING LOCATION WITH STATION ID
- VOCs, FUELS, AND METALS ANALYSES ONLY

RI GROUNDWATER SAMPLING LOCATION WITH STATION ID
- VOCs, FUELS, AND METALS ANALYSES ONLY

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
OWS – OIL/WATER SEPARATOR
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOCs – VOLATILE ORGANIC COMPOUNDS

100 0 100 Feet

RI/FS Report for IR Site 35

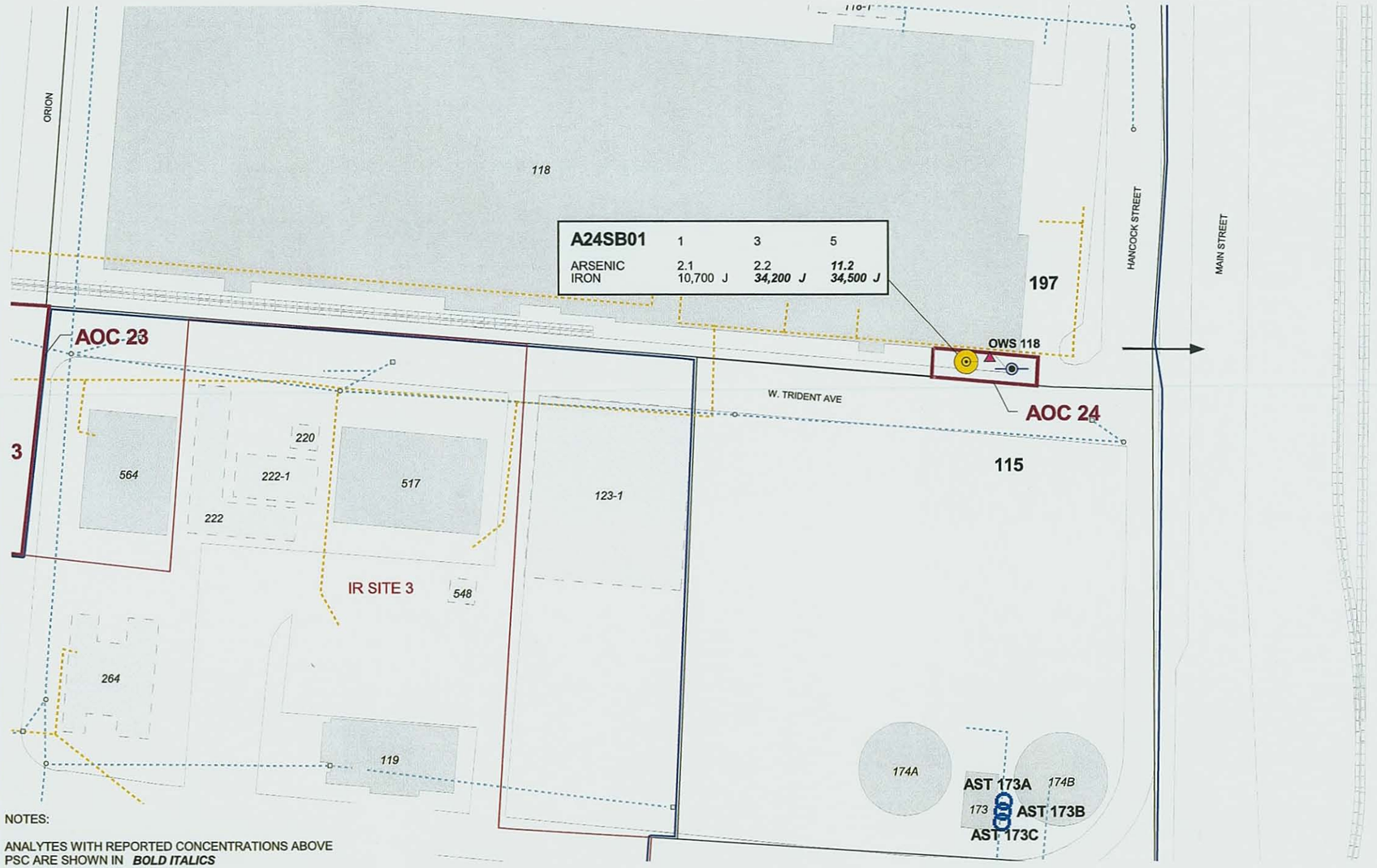
Figure 1-1

Study Area and Sampling Locations
Area of Concern 24

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 7/3/06
File No.: 077L14461
Job No.: 23818-077
Rev No.: C



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- ABOVEGROUND STORAGE TANK (PRESENT)
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL SOIL SAMPLING LOCATION
- RI SOIL SAMPLING LOCATION

SOIL SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC AND GREATER THAN BACKGROUND FOR :

- METALS

SOIL SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :

- METALS

N

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

A24SB01	1	3	5
ARSENIC	2.1	2.2	*11.2*
IRON	10,700 J	*34,200 J*	*34,500 J*

ANALYTE — CONCENTRATION in mg/kg — REVIEW QUALIFIER

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
mg/kg – MILLIGRAMS PER KILOGRAM
OWS – OIL/WATER SEPARATOR
PRG – PRELIMINARY REMEDIATION GOAL
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT

Analyte	PSC
IRON	23,000 mg/kg (Federal Residential PRG)
Analyte	**Other Comparsion Criteria**
ARSENIC	9.14 mg/kg (Background 95th Percentile)

RI/FS Report for IR Site 35

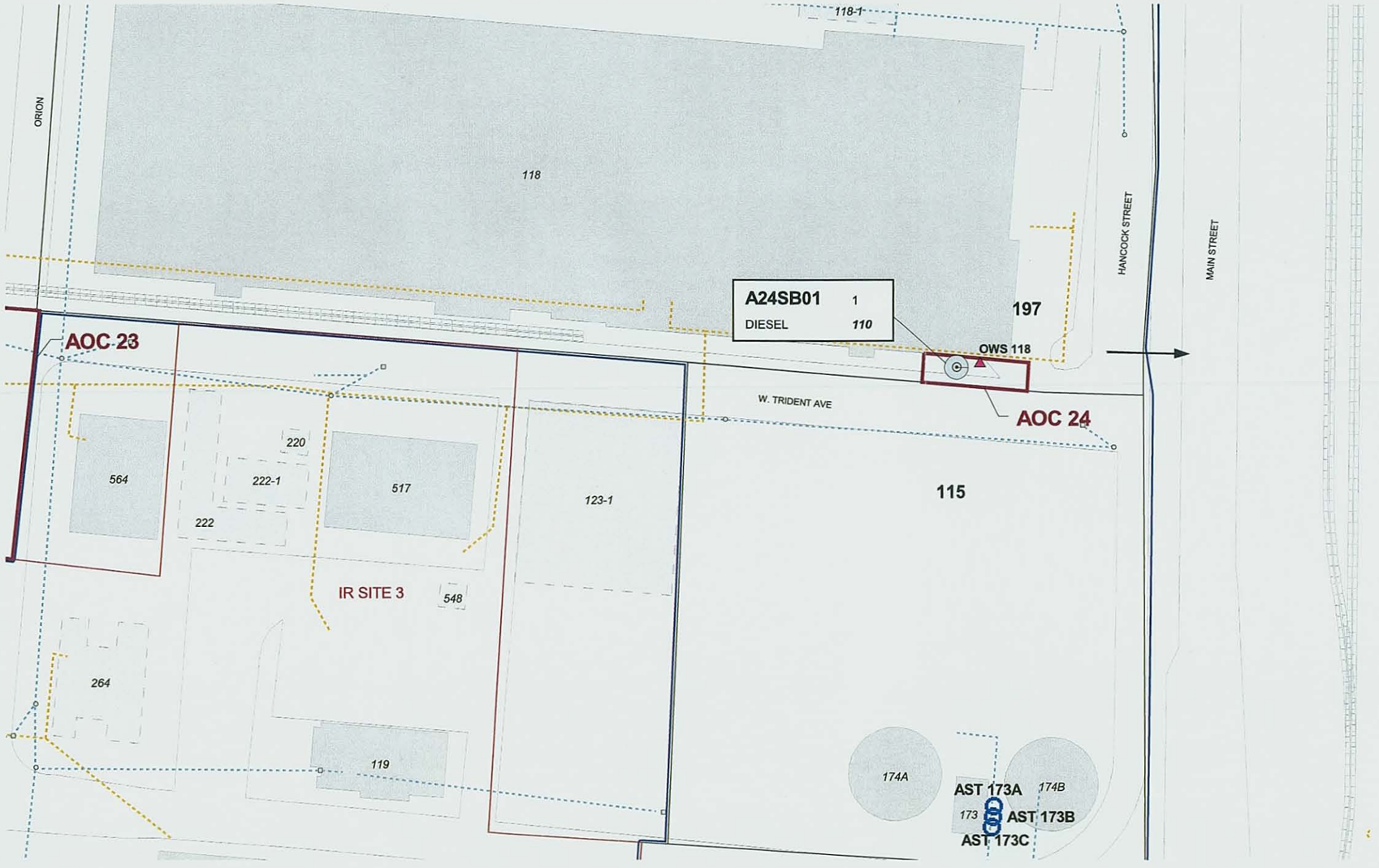
Figure 4-1

Soil Sampling Results for Analytes Above PSC – Area of Concern 24

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/26/07
File No.: 077L14505
Job No.: 23818-077
Rev No.: D



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- ABOVEGROUND STORAGE TANK (PRESENT)
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL GROUNDWATER SAMPLING LOCATION
- RI GROUNDWATER SAMPLING LOCATION

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC FOR :

- FUELS

N

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

A24SB01 1
DIESEL ***110***

ANALYTE — CONCENTRATION in µg/L

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
ESL – ENVIRONMENTAL SCREENING LEVEL
IR – INSTALLATION RESTORATION (PROGRAM)
µg/L – MICROGRAMS PER LITER
OWS – OIL/WATER SEPARATOR
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
TPH – TOTAL PETROLEUM HYDROCARBONS

Analyte	PSC
DIESEL	100 µg/L (TPH Groundwater ESL)

100 0 100 Feet

RI/FS Report for IR Site 35

Figure 4-2

Groundwater Sampling Results for Analytes Above PSC – Area of Concern 24

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 7/3/06
File No.: 077L14506
Job No.: 23818-077
Rev No.: C

TABLES

Table 3-1
Sample Analysis Summary, AOC 24

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE				
				VOCs	SVOCs	TPH	Metals	TDS
Soil								
197-001-002	197-0002M	EBS	3–3.5	X	X	X[a]	X	
A24SB01	C077S461	Site 35 RI	1–2	X		X[b]	X	
A24SB01	C077S462	Site 35 RI	3–4	X		X[b]	X	
A24SB01	C077S463	Site 35 RI	5.5–6	X		X[b]	X	
Groundwater								
A24SB01	C077G161	Site 35 RI	1–6	X		X[b]	X	X

Reference: EBS (IT 2001a)

Notes:
[a] analyzed for gasoline-, diesel-, and motor oil–range TPH
[b] analyzed for diesel-, JP-5–, and motor oil–range TPH

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
EBS – environmental baseline survey
JP-5 – jet propellant grade 5
RI – remedial investigation
SVOC – semivolatile organic compound
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

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Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 24

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background	Minimum[a]	Average[a]	Maximum[a]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
Volatile Organic Compounds (µg/kg)										
acetone	4	1	25	0	96	96	96	14,000,000	—[b]	—
2-butanone	4	1	25	0	9.2	9.2	9.2	22,000,000	—	—
carbon disulfide	4	1	25	0	4.2	4.2	4.2	360,000	—	—
cis-1,2-dichloroethene	4	1	25	0	0.29	0.29	0.29	43,000	—	—
methylene chloride	4	3	75	0	15	16	18	9,100	—	—
naphthalene	3	2	67	0	0.96	2.4	3.9	1,700[c]	—	—
Fuels (µg/kg)										
diesel	4	2	50	0	8,200	24,000	39,000	—	100,000	—
motor oil	4	2	50	0	18,000	48,000	78,000	—	500,000	—
Metals (mg/kg)										
aluminum	3	3	100	0	5,300	14,000	22,900	76,000	—	13,960
arsenic	4	4	100	1	0.98	4.1	11.2	0.062[c]	—	9.14
barium	4	4	100	0	23.1	56	142	5,400	—	93.68
beryllium	4	4	100	0	0.14	0.33	0.6	150	—	1.27
cadmium	4	2	50	0	0.2	0.28	0.35	37	—	1.72
calcium	3	3	100	No PSC	1,040	2,000	2,780	—	—	16,800
chromium	4	4	100	0	6.1	38	83.5	210	—	54.84
cobalt	4	4	100	0	4.1	7.4	13.6	900	—	14.30
copper	4	4	100	0	8.5	27	62.2	3,100	—	39.14
iron	3	3	100	2	10,700	26,000	34,500	23,000	—	22,280
lead	4	4	100	0	2.1	23	79	150[c]	—	37.66
magnesium	3	3	100	No PSC	2,580	6,000	9,310	—	—	7,304
manganese	3	3	100	0	161	280	439	1,800	—	383.0
mercury	4	3	75	0	0.2	0.59	1.3	23	—	0.52
nickel	4	4	100	0	5.5	37	93.1	1,600	—	55.72
potassium	3	3	100	No PSC	337	1,400	3,120	—	—	1,232
sodium	3	2	67	No PSC	138	800	1,460	—	—	1,230
vanadium	4	4	100	0	19	33	58.8	78	—	47.34
zinc	4	4	100	0	22.2	63	157	23,000	—	67.48

Notes:
[a] data review qualifiers are not included in this table
[b] dash indicates not applicable or not established
[c] California PRG

Acronyms/Abbreviations:
AOC – area of concern
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
TPH – total petroleum hydrocarbons

Table 4-2
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, AOC 24

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background	Minimum [a]	Average [a]	Maximum [a]	California MCL	TPH ESL	Background (95th Percentile)
Volatile Organic Compounds (µg/L)										
carbon disulfide	1	1	100	No PSC	0.26	0.26	0.26	—[b]	—	—
Fuels (µg/L)										
diesel	1	1	100	1	110	110	110	—	100	—
Metals (µg/L)										
arsenic	1	1	100	0	5.1	5.1	5.1	10[c]	—	20.72
barium	1	1	100	0	429	429	429	1,000	—	569.5
calcium	1	1	100	No PSC	113,000	110,000	113,000	—	—	—
chromium	1	1	100	0	6.6	6.6	6.6	50	—	12.45
cobalt	1	1	100	No PSC	0.79	0.79	0.79	—	—	—
iron	1	1	100	No PSC	36,700	37,000	36,700	—	—	6,586
magnesium	1	1	100	No PSC	59,700	60,000	59,700	—	—	—
manganese	1	1	100	No PSC	3,060	3,100	3,060	—	—	1,741
potassium	1	1	100	No PSC	24,300	24,000	24,300	—	—	—
sodium	1	1	100	No PSC	435,000	440,000	435,000	—	—	—
vanadium	1	1	100	No PSC	1.6	1.6	1.6	—	—	26.27
General Chemistry (µg/L)										
solids, total dissolved	1	1	100	No PSC	1,670,000	1,700,000	1,670,000	—	—	—

Notes:
[a] data review qualifiers are not included in this table
[b] dash indicates not applicable or not established
[c] Federal MCL

Acronyms/Abbreviations:
AOC – area of concern
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/L – micrograms per liter
MCL – maximum contaminant level
PSC – preliminary screening criteria (MCL and ESL)
TPH – total petroleum hydrocarbons

Table 4-3
Soil Sampling Results, AOC 24

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: 197-001-002 Sample: 197-0002M [a] Depth Interval: 3 - 3.5 Collection Date: 07-Jul-95	A24SB01 C077S461 1 - 2 14-Dec-05	A24SB01 C077S462 3 - 4 14-Dec-05	A24SB01 C077S463 5 - 6 14-Dec-05
VOCs									
acetone	14,000,000	—[b]	—	—	µg/kg	25 U	100 U	100 U	96 J
2-butanone	22,000,000	—	—	—	µg/kg	13 U	100 U	100 U	9.2 J
carbon disulfide	360,000	—	—	—	µg/kg	6.3 U	4.2 J	100 U	300 U
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	6.3 U	0.29 J	6 U	10 U
methylene chloride	9,100	—	—	—	µg/kg	25 U	15 J	15 J	18 J
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	3.9 J	0.96 J	50 U
Petroleum Hydrocarbons									
diesel	—	—	100,000	—	µg/kg	1,300 U	1,100 U	8,200	39,000
motor oil	—	—	500,000	—	µg/kg	31,000 U	11,000 U	18,000	78,000
SVOCs						ND	NA	NA	NA
Metals									
aluminum	76,000	—	—	13,960	mg/kg	NA	5,300	*14,000*[d]	*22,900*
arsenic	0.39	0.062	—	9.14	mg/kg	**0.98**[e]	**2.1**	**2.2**	***11.2***
barium	5,400	—	—	93.68	mg/kg	30	28.1	23.1	*142*
beryllium	150	—	—	1.27	mg/kg	0.26	0.14 J	0.33	0.6
cadmium	37	—	—	1.72	mg/kg	0.2	0.5 U	0.6 U	0.35 J
calcium	—	—	—	16,800	mg/kg	NA	2,200 J	1,040 J	2,780 J
chromium	210	—	—	54.84	mg/kg	29	34	6.1	*83.5*
cobalt	900	—	—	14.30	mg/kg	4.1	4.7	7	13.6
copper	3,100	—	—	39.14	mg/kg	15	8.5 J	20.9 J	*62.2 J*
iron	23,000	—	—	22,280	mg/kg	NA	10,700 J	***34,200 J***	***34,500 J***
lead	400	150	—	37.66	mg/kg	2.7	7.2 J	2.1 J	*79 J*
magnesium	—	—	—	7,304	mg/kg	NA	2,580 J	6,230 J	*9,310 J*
manganese	1,800	—	—	383.0	mg/kg	NA	161 J	*439 J*	230 J
mercury	23	—	—	0.52	mg/kg	0.13 U	0.28 J	0.2 J	*1.3 J*
nickel	1,600	—	—	55.72	mg/kg	22	27.1	5.5	*93.1*
potassium	—	—	—	1,232	mg/kg	NA	619	337	*3,120*
sodium	—	—	—	1,230	mg/kg	NA	102 U	138	*1,460*
vanadium	78	—	—	47.34	mg/kg	19	23.2	29.8	*58.8*
zinc	23,000	—	—	67.48	mg/kg	24	22.2 J	46.9 J	*157 J*

Table 4-3
Soil Sampling Results, AOC 24

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[d] italicized font indicates result above background

[e] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL

Acronyms/Abbreviations:

AOC – area of concern
B(a)P – benzo(a)pyrene
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
ND – not detected
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:

J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit

Table 4-4
Groundwater Sampling Results, AOC 24

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Background	Result Units	Station ID: A24SB01 / Sample: C077G161 / [a] Depth Interval: 1 - 6 / Collection Date: 14-Dec-05
VOCs						
carbon disulfide	—[b]	—	—	—	µg/L	0.26 J
Petroleum Hydrocarbons						
diesel	—	—	100	—	µg/L	**110**[c]
Metals						
arsenic	10	50	—	20.72	µg/L	5.1
barium	2,000	1,000	—	569.5	µg/L	429
calcium	—	—	—	—	µg/L	113,000
chromium	100	50	—	12.45	µg/L	6.6
cobalt	—	—	—	—	µg/L	0.79 J
iron	—	—	—	6,586	µg/L	*36,700*[d]
magnesium	—	—	—	—	µg/L	59,700 J
manganese	—	—	—	1,741	µg/L	*3,060*
potassium	—	—	—	—	µg/L	24,300
sodium	—	—	—	—	µg/L	435,000
vanadium	—	—	—	26.27	µg/L	1.6 J
General Chemistry						
solids, total dissolved	—	—	—	—	µg/L	1,670,000

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

[c] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL

[d] italicized font indicates result above background

Acronyms/Abbreviations:

AOC – area of concern
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
GW – groundwater
µg/L – micrograms per liter
MCL – maximum contaminant level
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifier:

J – indicates an estimated value

Table 6-1
Tier 1 Evaluation Results by Exposure Group, AOC 24

Exposure Group [a]	Cancer Risk	Hazard Index
1. All soil and groundwater exposure pathways		
Total [b]	9E-04	11
Without metals below background	2E-04	10
2. Exposure pathways for soil and vapors from VOCs in groundwater		
Total [b]	2E-04	4
Without metals below background	2E-04	3
3. Exposure pathways for residential use of groundwater		
Total [b]	7E-04	7
Without metals below background	1E-09	7

Notes:
[a] PAHs are not included
[b] includes all COPCs

Acronyms/Abbreviations:
AOC – area of concern
COPC – chemical of potential concern
PAH – polynuclear aromatic hydrocarbon
VOC – volatile organic compound

Table 6-2
Tier 1 Evaluation Results by Risk Driver, AOC 24

Study Area	Analyte Name	TOTAL		WITHOUT BACKGROUND	
		Hazard Quotient	Cancer Risk	Hazard Quotient	Cancer Risk
AOC 24					
Soil					
	aluminum	0.3	—*	0.3	—
	arsenic	—	2E-04	—	2E-04
	cadmium	0.2	—	—	—
	iron	1	—	1	—
	lead	0.5	—	—	—
	manganese	0.2	—	0.2	—
	vanadium	0.8	—	0.8	—
	Total for soil	**4**	**2E-04**	**3**	**2E-04**
Groundwater					
	arsenic	—	7E-04	—	—
	iron	3	—	3	—
	manganese	3	—	3	—
	Total for groundwater	**7**	**7E-04**	**7**	**1E-09**
	Total for soil and groundwater	**11**	**9E-04**	**10**	**2E-04**

Note:
* dash indicates not applicable

Acronym/Abbreviation:
AOC -- area of concern

Table 7-1
Summary of RI Results and Recommendations, AOC 24

DQO Problem	DQO Decision Questions	Nature and Extent	Tier 1 Evaluation	Recommendation
One EBS soil sample targeted the OWS at AOC 24, and VOCs, SVOCs, TPH, and metals in this sample were reported below screening criteria. However, a groundwater sample was not collected near the OWS. Regulatory agencies have requested additional soil and groundwater sampling at this OWS to confirm previous soil data and to assess whether groundwater has been impacted by possible releases.	Are contaminants present in soil or groundwater that indicate releases have occurred from the OWSs?	No. Diesel-range TPH was the only analyte reported in groundwater slightly above the PSC. The laboratory noted that the concentration was not indicative of diesel. Analytes reported in soil above PSCs are arsenic and iron. These metals are believed to be naturally occurring.	NA	No further action.
	Are contaminants present at concentrations that contribute to an unacceptable risk to potential future residents?	NA	No. Total risk without background metals is 2×10^{-4}. Essentially all of the cancer risk is from arsenic, believed to be naturally occurring at IR Site 35. Total HI is 10 with the hazard due to iron and vanadium in soil and iron and manganese in groundwater. The metals in soil are also believed to be naturally occurring. The metals in groundwater are believed to result from dissolution of naturally occurring metals in soil.	No further action.

Acronyms/Abbreviations:
AOC – area of concern
DQO – data quality objective
EBS – environmental baseline survey
HI – hazard index
IR – Installation Restoration (Program)
NA – not applicable
OWS – oil/water separator
PSC – preliminary screening criterion
RI – remedial investigation
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

ATTACHMENT T

AREA OF CONCERN 25

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL
REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT
ATTACHMENT T, AREA OF CONCERN 25
IR SITE 35, TRANSFER PARCEL EDC-5
ALAMEDA POINT
ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Area of Concern (AOC) 25. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station Alameda), Alameda, California.

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

AOC 25 is an approximate 2.7-acre area in the southeastern corner of Transfer Parcel Economic Development Conveyance (EDC)-5 (Figure 1-1) and includes the southwestern portion of Environmental Baseline Survey (EBS) Parcel 130 and all of EBS Parcel 132. The southern end of Building 90 and all of Building 503 are in AOC 25 in EBS Parcel 130. The southern portion of AOC 25 (EBS Parcel 132) consists of open space that is either paved for vehicle parking or landscaped.

IR Site 3 and Corrective Action Area (CAA)-3C are immediately northwest and west of AOC 25 and are part of a larger area characterized by and metals, polynuclear aromatic hydrocarbon (PAH), and total petroleum hydrocarbons (TPH) contamination in soil and chlorinated hydrocarbon, TPH, and benzene contamination in groundwater. IR Site 4 is located immediately west and south of AOC 25 and is part of an area of known metals, TPH, and PAH contamination in soil and chlorinated hydrocarbon, PAH, benzene, and TPH contamination in groundwater.

1.2 HISTORICAL USE

EBS Parcel 130 was historically used as the location of gate houses (Building 503 and former Buildings 70A, 70B, and 504), guard shacks, and an administration office (Building 90). The following chemicals were stored at the administration office: furniture polish, latex paint, bleach, joint compound, insecticide, detergent, toilet soap, stainless steel polish/cleaner, and ammonia. Cleaning solvents were also stored on asphalt under the outdoor stairs of the administration building. A 3-by-3-foot oily stain was observed inside one of the gate houses during the EBS. Minor stains associated with vehicle parking were also observed.

EBS Parcel 132 was historically used for agriculture. One temporary structure used as a police office trailer was present on the parcel during the EBS inspection. No stains were observed; however, the EBS reported that a large stained area approximately 120 by 40 feet in the southern portion of the parcel was observed on aerial photographs. The source of the stains is unknown. Photographs 1-1, 1-2, and 1-3 show various views of AOC 25.

1.3 PRELIMINARY SCREENING CRITERIA AND BACKGROUND METALS

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this AOC are the following:

Photograph 1-1
AOC 25, View to the West

Photograph 1-2
AOC 25, View to the Southwest

Photograph 1-3
AOC 25, Parking Lot, View to the West

- Soil
  - residential preliminary remediation goals (PRGs) (U.S. EPA 2004b), except PAHs classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (DON 2001a)
  - environmental screening levels (ESLs) for TPH – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)
- Groundwater
  - maximum contaminant levels (MCLs) and advisory level for lead (U.S. EPA 2002, DHS 2006)
  - ESLs for TPH (current or potential source of drinking water) (RWQCB 2005)

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being assessed. For example, groundwater concentrations from all study areas were compared to MCLs, whether or not the groundwater was considered a potential drinking water source in that area. Chemicals of potential concern (COPCs) identified in the health risk evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs.

In addition to the above PSCs, metals concentrations in soil and groundwater at AOC 25 were compared to the following Alameda Point background concentrations to help discriminate between site-related and naturally occurring metals:

- Alameda Point background soil concentrations (95th percentile of the data set; Appendix E of the final RI Report of Operable Unit [OU]-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)
- Alameda Point background groundwater concentrations (95th percentile; Appendix E of the final RI Report of OU-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)

For ease of discussion in this report, the Alameda Point 95th percentile concentrations for metals in soil (pink background data set) and groundwater are referred to as "background."

Section 4.3 of the main RI/FS report provides further discussion on the occurrence and interpretation of metals concentrations in soil and groundwater at IR Site 35.

1.4 PREVIOUS INVESTIGATIONS

During five previous investigations at AOC 25, soil and groundwater samples were collected, and results of these investigations are summarized below. Locations sampled in AOC 25 are shown on Figure 1-1. Analytical results for soil and groundwater samples collected previously within AOC 25 are provided Appendix B.

1.4.1 Environmental Baseline Survey

During the EBS, samples collected at AOC 25 included 17 soil samples (132-0001, -0001M, -0002, -0002M, -0003, -0003M, -0004, -0004M, -0005M, -0006M, -0007, -0007M, -0008, -0008M, and -0009M; and 132S-001 and 132S-001M) collected at EBS Parcel 132 and two soil samples (130M-001 and 130M-001M) collected at EBS Parcel 130 (IT 2001a). The purposes, depths, and analytes for the samples collected during the EBS were as follows.

- Samples 132-0001, -0001M, -0002, -0002M, -0003, -0003M, -0004, and -0004M addressed possible contamination in the area of the historical stain (at the administration office). Soil samples were collected from 0 to 1 foot below ground surface (bgs) and analyzed for TPH, pesticides, and metals.
- Samples 132-0005M, -0006M, -0007, -0007M, and -0009M addressed the possibility of contamination related to emissions from nearby Building 360 (a building located in EBS Parcel 143, formerly used for painting, blasting, heat-treating, welding, and plating). Soil samples were collected from 0 to 1 foot bgs and analyzed for metals.
- Samples 132-0008 and 132-0008M addressed contamination potentially associated with the railroad tracks. Soil samples were collected from 0 to 0.5 foot bgs and analyzed for volatile organic compounds (VOCs), TPH, semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and lead.

- Samples 132S-001 and 132S-001M addressed contamination potentially associated with the sanitary sewer line. Soil samples were collected from 5.5 to 6.5 feet bgs and analyzed for volatile organic compounds VOCs, SVOCs, and metals.
- Samples 130M-001 and 130M-001M addressed contamination potentially associated with the sanitary sewer line. Soil samples were collected from 8 to 9 feet bgs and analyzed for VOCs, TPH, SVOCs, pesticides/PCBs, organotins, and metals.

Reported motor oil–range TPH concentrations in soil sample 132-0004M were above the PSC; however, TPH was below the PSC in a duplicate sample. Reported arsenic concentrations in soil samples 130M-001M and 132-0006M were also above the PSC; however, the concentrations of arsenic in these samples were similar to the background concentrations used to evaluate metals in the EBS. Other reported analyte concentrations in soil were below PSCs.

1.4.2 Remedial Investigation/Feasibility Study Data Transmittal Memorandum for Sites 4, 5, 8, 10A, 12, and 14

One direct-push groundwater sample (DHP-S03-03) was collected in the northern portion of AOC 25 as part of the OU-1 RI follow-on sampling conducted in 1994 (PRC Environmental and Montgomery 1996). Groundwater from DHP-S03-03 was analyzed for VOCs and metals. Concentrations of cadmium and thallium reported in the groundwater sample were above PSCs.

1.4.3 Operable Units 1 and 2 Data Gap Investigation

The OUs 1 and 2 data gap investigation specifically targeting Transfer Parcel EDC-5 had three objectives: 1) delineation of contaminant plumes in groundwater, 2) characterization of inorganic constituents in soil and groundwater, and 3) investigation of a storm sewer exposure pathway (TtEMI 2002c). Samples collected in AOC 25 were associated with the second objective.

Three soil borings (S03-DGS-DP04, -DP05, and -DP07) were advanced in the northern portion of AOC 25 as part of the OUs 1 and 2 data gap investigation targeting Transfer Parcel EDC-5 (TtEMI 2002c). One to three soil samples were collected from each boring between 0 and 5 feet bgs, and one grab groundwater sample was collected from each boring. Soil and groundwater samples from S03-DGS-DP04 and S03-DGS-DP05 were analyzed for VOCs, SVOCs, and TPH; motor oil–range TPH above the PSC was reported in soil and groundwater samples from S03-DGS-DP05. Samples from S03-DGS-DP07 were analyzed only for organic lead and lead. Other reported analyte concentrations in soil and groundwater were below PSCs.

1.4.4 Basewide Groundwater Monitoring Program

Two wells located in AOC 25 are part of the basewide groundwater monitoring program: wells MBG-3 and M03-11 (Shaw 2004b).

Well MBG-3 is located in the southeastern portion of AOC 25. Four soil samples were collected from this location at four depth intervals between 0 and 8 feet bgs during well installation. Additionally, six groundwater samples were collected from this well in 1998, 2002, 2003, and 2004 and analyzed for VOCs, TPH, SVOCs, pesticides, PCBs, and/or metals. Well M03-11 is located in the southwestern portion of AOC 25. Five groundwater samples were collected from this well in 2002, 2003, and 2004 and were analyzed for VOCs, TPH, SVOCs, and/or metals. TPH and arsenic were reported in groundwater at concentrations above PSCs in both wells. No other analytes in soil were reported at concentrations above PSCs.

1.4.5 2002 Polynuclear Aromatic Hydrocarbon Study

One soil boring (32EDC-5-128) was advanced in the southwestern portion of AOC 25 during the 2002 PAH study (BEI 2005a). Samples were collected from four depth intervals between 0 and 8 feet bgs and analyzed for PAHs. B(a)P equivalent concentrations in soil samples from this boring were below the PSC.

1.5 ADJACENT SITES

AOC 25 is located directly north and east of IR Site 4, south and east of IR Site 3 and CAA-3C, and approximately 300 feet south of aboveground storage tanks (ASTs) 173A, 173B, and 173C (Figure 1-1). Each AST site contained one 100-gallon steel diesel AST (associated with backup generators) in the area located east of Building 173 in EBS Parcel 115. During the RI, soil and groundwater samples from adjacent to the middle of AST 173B were analyzed for VOCs and TPH. Diesel- and motor oil–range TPH concentrations above PSCs were reported in groundwater at ASTs 173A, 173B, and 173C. ASTs 173A, 173B, and 173C were recommended for closure in place in the AST assessment report.

IR Site 3 is part of a larger area characterized by groundwater contamination (chlorinated hydrocarbons, TPH, and benzene) and soil contamination (metals, PAHs, and TPH). CAA-3C overlaps the western boundary of AOC 25 and is characterized by soil and groundwater contaminated with benzene, gasoline-range TPH, and lead. Chlorinated VOCs are also present in groundwater (TtEMI 2003a).

Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, geology, and potential groundwater beneficial use at AOC 25.

AOC 25 is located east of Saratoga Street. Topography at AOC 25 is relatively flat, and most of the study area is currently paved over for use as a parking lot. The average ground elevation at AOC 25, based on elevation data from the four borings (A25SB01 through A25SB04) advanced during the RI, is approximately 11 feet above mean sea level. The average depth to water in the four RI borings was approximately 5 feet bgs. Groundwater depth was measured in temporary casings prior to groundwater sample collection. Total dissolved solids (TDS) concentrations measured in groundwater samples from the three borings ranged from 374 to 20,400 milligrams per liter (mg/L), and the average TDS concentration was 6,067 mg/L.

Groundwater monitoring well MBG-3 is located in the southern portion of AOC 25. A review of groundwater depths in this well over time (March 1995 through September 2003) shows a range in depth to water from approximately 2.6 to 4.9 feet bgs, which is consistent with depth to water measured during the RI.

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is north-northeast at AOC 25. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Tidal influence at AOC 25, located approximately 1,700 feet from Seaplane Lagoon, is expected to be negligible based on tidal studies performed at other Alameda Point sites.

Soil encountered in the four RI soil borings consisted of poorly graded sand with silt and gravel, poorly graded sand with clay, silty sand, and silt and lean clay to the total boring depths of 10 feet bgs. AOC 25 is located in the vicinity of the former Alameda Island. Since this area likely represents nearshore conditions, fill material is minimal and ranges from 1 to 4 feet bgs. Underlying the fill material is both coarse-grained and fine-grained bay sediment (Young Bay Mud). The coarse-grained unit consists of clayey sand and poorly graded sand with clay. The Young Bay Mud consists of lean clay and is from 2 to 6 feet thick or greater (see cross section I-I' on Figure 2-9 of the main RI/FS Report). RI boring logs are presented in Appendix D. According to regional geology maps, the northwest area of AOC 25 is underlain by artificial fill. As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust may be present in the northwest portion of AOC 25, although it was not encountered in the RI soil borings

AOC 25 is located in the southeastern groundwater region of Alameda Point. The groundwater in the southeastern region is currently or has the potential to be a drinking water source because of wells in the residential community immediately adjacent to Alameda Point (TtEMI 2000b). However, because of the TDS measurements in groundwater from AOC 25, groundwater may generally meet the state exemption criteria of 3,000 mg/L TDS for the municipal and domestic water supply designation in the California State Water Resources Control Board source of drinking water policy Resolution (Res.) 88-63 (SWRCB 1988) and California Regional Water Quality Control Board Res. 89-39 (RWQCB 2003).

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Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for AOC 25. The RI was conducted in accordance with the sitewide data quality objectives (DQOs) for the evaluation of AOCs presented in Table 3-1 of the main RI/FS Report.

3.1 APPROACH

Previous investigations identified metals in soil (arsenic) and groundwater (thallium and cadmium) north of Building 503 at concentrations above PSCs, and arsenic in groundwater above the PSC in the southern portion of AOC 25. Diesel-range and motor oil–range TPH were also reported in soil and groundwater samples from AOC 25 at concentrations above PSCs. A stained area was identified in the EBS in the southern portion of AOC 25; no groundwater sampling had been performed to evaluate potential groundwater impacts.

3.2 SCOPE

Soil and groundwater samples were collected during the 2005 RI sampling from three borings north of Building 503 and one boring in the southern portion of AOC 25 to evaluate the distribution of metals in soil and groundwater. Three soil samples (with depths of between 1 to 2, 2 to 4, and 6 to 8 feet bgs) and one grab groundwater sample were collected from each of the three borings, A25SB01 through A25SB03. Additionally, a grab groundwater sample was collected from boring A25SB04. The grab groundwater samples were collected from temporary well casings placed inside the borings screened from 5 to 10 feet bgs in borings A25SB01 and SB02, from 2 to 7 feet bgs in boring A25SB03, and from 3 to 8 feet bgs in boring A25SB04. Table 3-1 summarizes samples collected during the RI and previous investigations. Figure 1-1 shows sampling locations from all investigations.

All soil and grab groundwater samples were analyzed for metals. Groundwater samples were also analyzed for TDS. The groundwater sample collected from A25SB04 was also analyzed for gasoline-range, diesel-range and motor oil–range TPH.

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Section 4
NATURE AND EXTENT OF CONTAMINATION

This section discusses sampling and analysis from previous investigations and from the RI and presents the concentration ranges and spatial distributions of the analytes identified at AOC 25. Soil and/or groundwater samples were collected at 21 locations during the EBS (IT 2001a), the RI/FS for Sites 4, 5, 8, 10A, 12, and 14 (PRC Environmental and Montgomery 1996), the OUs 1 and 2 data gap investigation (TtEMI 2002c), the basewide groundwater monitoring program (Shaw 2004b), the 2002 PAH study (BEI 2005a), and the RI (Table 3-1 and Figure 1-1). Metals reported in soil and groundwater at concentrations above background are discussed in detail in Section 4.3.3 of the main RI/FS Report. Metals discussion in this section focuses primarily on concentrations above PSCs. Regardless of concentration, all reported metals (except required human trace nutrients) were included in the risk evaluation (Section 6).

Concentration ranges for soil and groundwater results are presented in Tables 4-1 and 4-2, and soil and groundwater analytical results are summarized in Tables 4-3 and 4-4. Distribution of analytes reported at concentrations above PSCs are illustrated on Figures 4-1 and 4-2 for soil and groundwater, respectively. Complete analytical results for historical and RI samples from AOC 25 are included in Appendices B and G, respectively.

4.1 SOIL SAMPLING RESULTS

Analytical soil sampling results are discussed for each class of chemicals investigated at AOC 25.

4.1.1 Volatile Organic Compounds

Acetone, toluene, ethylbenzene, naphthalene, and total xylenes were the only VOCs reported in soil from borings 130M-001M, 32EDC-5-128, and S03-DGS-DP04. VOC concentrations were below PSCs.

4.1.2 Semivolatile Organic Compounds

Eighteen SVOCs were reported in soil from borings 130M-001, 132S-001, 132-0008, 32EDC-5-128, and S03-DGS-DP04. Two non-PAH SVOCs (bis[2-ethylhexyl]phthalate and di-n-butyl phthalate) and 16 PAHs were reported. SVOC concentrations were below PSCs.

4.1.3 Total Petroleum Hydrocarbons

Diesel-range, gasoline-range, and motor oil–range TPH and total recoverable petroleum hydrocarbons (TRPH) were reported in soil from eight borings. Concentrations of gasoline-range TPH were below the PSC. TRPH does not have an established PSC.

Diesel-range TPH was reported at a concentration of 210 milligrams per kilogram (mg/kg) from boring 130M-001M at a depth of 8 to 9 feet bgs. This concentration was above the PSC (ESL of 100 mg/kg). Motor oil–range TPH was reported in borings 130M-001M (1,100 mg/kg at 8 to 9 feet bgs), 132-0004M (12,000 mg/kg at 0 to 0.5 foot bgs), and S03-DGS-DP05 (1,800 mg/kg at 0 to 5 feet bgs). Reported concentrations of

motor oil–range TPH were above the PSC (ESL of 500 mg/kg). Motor oil–range TPH was not reported in the duplicate soil sample collected from boring 132-0004M.

4.1.4 Pesticides and Polychlorinated Biphenyls

One pesticide (dieldrin) and one PCB (Aroclor 1260) were reported in soil from borings 132-0004 and 132-0008, respectively, at concentrations below PSCs. Other pesticides and PCBs were not above the laboratory reporting limits.

4.1.5 Metals

Nineteen metals were reported in soil at concentrations below PSCs. Seventeen of these metals (aluminum, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, magnesium, mercury, nickel, potassium, sodium, thallium, vanadium, and zinc) were reported in soil at concentrations above background.

Arsenic, iron, and lead were the only metals reported at concentrations above PSCs. Arsenic was reported above the PSC (residential PRG of 0.062 mg/kg) in 23 soil samples from 12 sampling locations. However, only the concentration of 9.6 mg/kg reported for the sample 130M-001M (collected from 8 to 9 feet bgs) was slightly above the background 95th percentile concentration of 9.14 mg/kg, but was below the maximum background arsenic concentration of 15.6 mg/kg.

Iron was reported above the PSC (residential PRG of 23,000 mg/kg) and the background concentration of 22,280 mg/kg in three samples from two locations: one sample in boring A25SB01 at 1 to 1.5 feet bgs (35,900 mg/kg), and two samples from boring A25SB03 at 3.5 to 4 feet bgs (25,100 mg/kg) and 6.5 to 7 feet bgs (27,600 mg/kg).

As discussed in Section 4.3 of the main RI/FS Report, the concentrations of arsenic and iron in soil at AOC 25 are believed to be naturally occurring and not associated with Navy activities.

Lead was reported at a concentration of 157 mg/kg in boring A25SB03 at a depth of 3.5 to 4 feet bgs. This concentration was slightly above the PSC (residential PRG of 150 mg/kg) and the background concentration of 37.66 mg/kg, but was below the site-specific lead PRG of 184 mg/kg (Section 6).

Zinc and copper at concentrations above background were identified as outliers in the sitewide statistical evaluation (Section 4.3.1.2 the main RI/FS Report). Zinc was present at 316 mg/kg in a sample collected from boring MBG-3. There are seven sampling locations in the surface in the vicinity of this boring, and only one sample had a concentration of zinc above background. There is no indication of a widespread release of zinc. Copper was reported at a concentration of 230 mg/kg in sample 135-0009M.

4.1.6 Organotins

Organotins were not reported in soil above the laboratory reporting limits.

4.2 GROUNDWATER SAMPLING RESULTS

Analytical groundwater sampling results are presented for each class of chemicals investigated at AOC 25.

4.2.1 Volatile Organic Compounds

Nine VOCs (acetone, carbon disulfide, chloromethane, total xylenes, methylene chloride, tert-butyl alcohol, toluene, trichloroethene, and trichlorofluoromethane) were reported in groundwater from AOC 25. Reported VOC concentrations were below PSCs.

4.2.2 Semivolatile Organic Compounds

SVOCs were not reported in groundwater above the laboratory reporting limits.

4.2.3 Total Petroleum Hydrocarbons

Gasoline-range TPH was reported in groundwater samples from well MBG-3 at a concentration below the PSC. TRPH was reported in a groundwater sample from well M03-11; TRPH does not have an established PSC.

Diesel- and motor oil–range TPH were reported in groundwater from monitoring wells and one exploratory boring at concentrations above PSCs. Diesel-range TPH was reported in groundwater at concentrations of 220, 380, and 760 micrograms per liter (µg/L) from two wells (M03-11 and MBG-3) and one boring (S03-DGS-DP05), respectively. These concentrations were above the PSC (ESL of 100 µg/L). Motor oil–range TPH at a concentration of 270 J µg/L was reported in groundwater from well MBG-3. (The "J" qualifier indicates the value is estimated.) This concentration was above the PSC (ESL of 100 µg/L). Motor oil–range TPH was also reported at well M03-11, but at a concentration below the PSC.

Historical groundwater samples analyzed for TPH probably did not undergo silica gel cleanup prior to analysis, and concentrations reported in these samples are likely to include some contribution from nonpetroleum organic matter in the sample.

4.2.4 Pesticides and Polychlorinated Biphenyls

Pesticides and PCBs were not reported in groundwater above the laboratory reporting limits.

4.2.5 Metals

Twenty-two metals were reported in groundwater samples at AOC 25. Three of these metals (arsenic, cadmium, and thallium) were reported at concentrations above PSCs. Arsenic was reported in 9 of 15 groundwater samples from wells MBG-3 and M03-11 at concentrations above the PSC (MCL of 10 µg/L). Only one groundwater sample (collected from well M03-11 in June 2003) had a reported arsenic concentration (21.7 J µg/L) that was also slightly above the background concentration of 20.72 µg/L.

This well has been sampled three times since the June 2003 sampling event, and arsenic concentrations in the groundwater samples were below background.

Cadmium and thallium were reported at concentrations of 17.2 J and 51.8 J µg/L, respectively, in a grab groundwater sample from DHP-S03-03. These concentrations were above PSCs (MCLs of 5 and 2 µg/L, respectively). No background concentration has been developed for cadmium. The reported thallium concentration was above the background concentration of 16.15 µg/L. This sample was collected from the second water-bearing zone at a depth between 26 and 36 feet bgs. Because this was a grab groundwater sample, it is likely that the sample was turbid. It is unknown whether the groundwater sample was filtered before it was analyzed by the laboratory. None of the other samples collected at AOC 25 had reported concentrations of cadmium or thallium. It is likely that the cadmium and thallium results are either representative of second water-bearing zone groundwater or represent both dissolved and suspended metals in a turbid sample.

Eight metals (arsenic, chromium, iron, manganese, selenium, thallium, vanadium, and zinc) were reported above background. MCLs have not been established for iron or manganese; however, they contribute to a hazard index (HI) above 1 (Section 6). Iron was reported in all of the groundwater samples collected at AOC 25 at concentrations up to 38,100 µg/L; six of the concentrations were above the background concentration of 6,586 µg/L. Two samples were from RI soil borings (A25SB01 and A25SB02) and the other four samples were from a well (MBG-3). Manganese was reported at a concentration of 1,820 µg/L from boring A25SB02. This concentration was above the background concentration of 1,741 µg/L.

As discussed in Section 4.3 of the main RI/FS Report, the concentrations of iron, manganese, and vanadium in groundwater result from dissolution of naturally occurring concentrations in soil due to reducing conditions. Potential sources of organic material include TPH from CAA-3C and natural conditions associated with the presence of Bay Sediment Unit (BSU) sediment in the interval from which groundwater was collected. AOC 25 is in the vicinity of the former estuary (Figure 2-10 of the main RI/FS Report) and has approximately 5 feet of sand located above the native BSU sediments. The Marsh Crust, although not encountered in the borings, is likely to be present. Either the BSU layer or the Marsh Crust could be associated with reducing conditions.

Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for AOC 25. It discusses the conceptual model, the physical and chemical changes that might occur to contaminants present at AOC 25, and the mechanisms that could potentially transfer the contaminants from the study area. The conceptual site model facilitates understanding of the present AOC conditions by integrating AOC-specific physical characteristics with the nature and extent of contaminants in the physical systems. Section 5.2 includes an evaluation of the mobility and persistence of compounds above PSCs not attributable to background and of risk drivers at AOC 25. Section 5.3 discusses potential migration pathways.

5.1 AOC 25 CONCEPTUAL SITE MODEL

AOC 25 is located east of Saratoga Street. Topography at the study area is flat, and approximately three-quarters of the AOC is paved. The remainder is well-maintained grass and trees. The nearest surface water to AOC 25 is Seaplane Lagoon, located approximately 1,700 feet to the west.

Based on a review of borings logs for AOC 25, the subsurface lithology at AOC 25 consists of generally homogeneous artificial fill material comprising poorly graded silty gravel, clays, sands, and clayey sands, and underlain by silty clay of the Young Bay Mud. Shallow groundwater of the first water-bearing zone beneath AOC 25 occurs in the fill material; the underlying Young Bay Mud would be expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. The Marsh Crust was not encountered in the four RI borings, although it is likely to be present at greater depth under AOC 25. Groundwater flow direction is approximately to the north-northeast and average depth to water is approximately 5 feet bgs, which is consistent with historical depth to water measurements. Negligible tidal influence is expected at AOC 25 because of its distance from Oakland Inner Harbor. AOC 25 is within the southeastern groundwater region of Alameda Point (TtEMI 2000b); groundwater in this region has the potential to be a drinking water source because of wells in the residential community immediately adjacent to the base.

Petroleum hydrocarbons (diesel-range and motor oil–range) were reported in soil and groundwater at concentrations above PSCs. Motor oil–range TPH was reported above the PSC in soil from the upper 1 foot bgs at only one location (132-0004) in the southern portion of AOC 25. This sample was collected adjacent to Main Street. Additionally, motor oil–range TPH and diesel-range TPH were reported above PSCs in groundwater from well MBG-3, approximately downgradient of 132-0004. However, motor oil–range and diesel-range TPH are not consistently reported in samples from this well at concentrations above the PSC. Diesel-range TPH was reported at a concentration above the PSC in a groundwater sample from well M03-11, also located in the southern portion of AOC 25. Concentrations above the PSC, however, are not consistently reported at this location. Furthermore, it is likely that the groundwater samples from these wells did not undergo silica gel cleanup prior to analysis and that the TPH concentrations result from positive interference from nonpetroleum organic matter in the sample. Motor oil–range and diesel-range TPH were also reported in soil at concentrations above PSCs in the

northern portion of AOC 25 at S03-DGS-DP05 and 130M-001. Diesel-range TPH in groundwater at S03-DGS-DP05 was also reported at a concentration above the PSC. These locations are close to CAA-3C, and the TPH reported in these samples is most likely associated with that corrective action area.

Three metals (arsenic, iron, and lead) were reported in soil at concentrations above PSCs. The concentrations above PSCs also were above background. Diesel-range TPH, motor oil–range TPH, and metals were reported in the northern AOC 25 area in soil and, less frequently, in groundwater. Arsenic was reported above the PSC in soil but not in groundwater in the northwest area of AOC 25. Cadmium and thallium were reported above PSCs in groundwater once in the northwest area of AOC 25 at boring DHP-S03-03. This sample was collected from the second water-bearing zone and, based on the sampling technique, is likely to have been turbid. None of the filtered samples collected from the three RI groundwater samples located around DHP-S03-03 had reported thallium and cadmium concentrations above PSCs. Arsenic was also reported at concentrations above the PSC in groundwater; one of the concentrations was also slightly above background. There are no PSCs for iron or manganese in groundwater, but six concentrations of iron from three locations and one of manganese were above background.

As discussed in Section 4.3 of the main RI/FS Report, the concentrations of arsenic and iron in soil at AOC 25 are believed to be naturally occurring rather than resulting from Navy activities. Cadmium and thallium in groundwater are believed to have resulted from the sampling technique and represent cadmium and thallium in particulates in the sample, rather than dissolved concentrations. Scattered samples with a few trace metals present at concentrations above background cannot be correlated with iron or aluminum. However, there is no pattern that indicates a specific release of metals at AOC 25. The concentrations of arsenic, iron, manganese and vanadium in groundwater are believed to result from dissolution of naturally occurring metals in soil due to reducing conditions. Potential sources of organic material that could result in reducing conditions include TPH from CAA-3C and native BSU sediments.

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in the environment tends to remain in place. The tendency toward immobility and persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Section 5 of the main RI/FS Report discusses the physical and chemical properties of contaminants, and their chemical class (e.g., TPH), that affect their transport and persistence in the environment. Also discussed in Section 5 of the main RI/FS Report are mobility and persistence of naturally occurring metals.

TPH is generally composed of a spectrum of hydrocarbon molecule sizes, from the short-chain volatiles (e.g., benzene, toluene, ethylbenzene, and xylenes [BTEX], and naphthalene) to long-chain oils. TPH is subject to biodegradation in the subsurface, with

constituents that comprise the lighter end of fuels (gasoline, BTEX) being more readily biodegradable under aerobic conditions. These constituents also tend to be more volatile, more soluble, more mobile, and generally more toxic than the longer-chain hydrocarbons. Heavier fuels (motor oil and the heavier end of the diesel spectrum) do not typically have appreciable amounts of soluble constituents and tend to adhere to soil particles or other substrate in the subsurface, thus being less mobile. Aging or weathering of TPH will remove the light-end hydrocarbons, including volatiles, first. The lack of appreciable fuel-related volatile constituents (BTEX) reported in soil and groundwater indicates that the TPH present in the subsurface at AOC 25 has been subject to weathering and is not a significant source of soluble or volatile constituents to groundwater or air.

5.3 CONTAMINANT MIGRATION

The migration pathways evaluated for relevance to AOC 25 include atmospheric transport (vapors and airborne fugitive dust), transport via surface water runoff, and groundwater transport from AOC 25. Motor oil–range and diesel-range TPH are the contaminants identified at AOC 25 whose source may be Navy activities. Metals reported in soil and groundwater at concentrations above PSCs or background are believed to be naturally occurring. Motor oil–range and diesel-range TPH are at the heavier range of the TPH spectrum and are not very volatile or soluble, thus eliminating atmospheric transport by vapors from consideration and making significant transport from soil to groundwater unlikely. Additionally, most of the site is paved or covered with well-maintained landscaping. Therefore, significant transport by airborne dust or surface water runoff is unlikely.

The most likely migration pathway for contaminants at AOC 25 is groundwater transport. It is suspected that the TPH concentrations reported above PSCs in groundwater in the southern portion of AOC 25 are a result of positive interferences in the analytical method. The concentrations in the southern area are not reported consistently in samples from the monitoring wells and are not significantly higher than their PSCs. Additionally, the groundwater sample collected during the RI did not have reported concentrations of TPH. The same is suspected of the diesel-range TPH reported in the groundwater sample in the northern area. However, if the concentrations do represent dissolved TPH, it would migrate more slowly than the flow of groundwater because both motor oil–range TPH and diesel-range TPH are more likely to be adsorbed to soil particles than dissolved in groundwater. The lack of motor oil–range and diesel-range TPH in the RI groundwater sample indicates that if dissolved concentrations are present, they are not widespread.

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Section 6
TIER 1 EVALUATION

This section summarizes the Tier 1 risk evaluation results for AOC 25. In a Tier 1 evaluation, risk for a residential exposure scenario is assessed with the assumption that no remedial action would take place at the study area. This section also presents a qualitative uncertainty evaluation that identifies and characterizes the effects of uncertainties on the risk results.

A Tier 1 evaluation is a screening level approach that calculates total cumulative risk values using published risk-based guidelines from the United States Environmental Protection Agency (U.S. EPA), California Environmental Protection Agency (Cal/EPA), and San Francisco Bay Regional Water Quality Control Board. The Tier 1 evaluations include all chemicals identified in at least one sample except for PAHs in soil. PAHs in soil are not included because site-specific remediation goals for PAHs are being developed. The approach used to estimate risk is described in Section 6 of the main RI/FS Report. Tier 1 information is provided in Appendix J.

Cancer risk and noncancer values for AOC 25 are shown in Table 6-1. Risk drivers for cancer and noncancer risk are presented in Table 6-2.

6.1 DATA EVALUATION

The data selection and identification of COPCs are based on a compilation of all usable data for soil and groundwater. All chemicals reported in at least one sample collected during the RI and/or included in the historical data were included as Tier I COPCs, except calcium, magnesium, potassium, and sodium, which are known to be required human trace nutrients.

There are 27 Tier 1 COPCs in soil at AOC 25: 18 metals based on 15 to 30 samples, 1 PCB based on 9 samples, 1 pesticide based on 11 samples, 2 SVOCs based on 7 samples, and 5 VOCs based on 6 to 8 samples.

There are 27 Tier 1 COPCs in groundwater: 18 metals based on 15 samples and 9 VOCs based on 11 to 14 samples.

6.2 RISK CHARACTERIZATION

The cancer risk and noncancer hazard values were calculated using the Tier 1 protocol from Cal/EPA (2005). The maximum concentration of each COPC in soil and groundwater was compared with a risk-based guideline to estimate cancer and noncancer risks. Two results are presented for three exposure groups, the total risk and a second value that does not include risk associated with metals concentrations that are below background.

For soil and groundwater data for the three exposure groups at AOC 25, the calculated cancer risks and noncancer hazard values, respectively, are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 3×10^{-3} and 35

  Without metals below background: 3×10^{-3} and 34

- **Exposure Group 2** (exposure pathways for soil and vapors from VOCs in groundwater):

  Total: 2×10^{-4} and 6

  Without metals below background: 1×10^{-6} and 5

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 3×10^{-3} and 29

  Without metals below background: 3×10^{-3} and 29

For reasonable future use, the Exposure Group 2 noncancer hazard without metals below background is below 1 without iron and without adding the health effects of metals with hazard quotient (HQ) values below 1 (aluminum, mercury, thallium, and vanadium). Cadmium is considered consistent with background because the maximum concentration of 1.8 mg/kg is only slightly above the background concentration of 1.72 mg/kg.

For residential use of groundwater, the Exposure Group 3 cancer risk without metals below background is due to arsenic in groundwater, which is only marginally (1 µg/L) above the 95th percentile concentration and well below the maximum background concentration. Without arsenic, the cancer risk is below 10^{-6}.

The noncancer hazard value in groundwater is primarily due to thallium in a single sample (HI of 22) collected in 1994 and two metals, iron (HQ of 3) and manganese (HQ of 2). Thallium was not reported in any of the 2005 groundwater samples and the highest concentrations of iron and manganese were reported in the same sample as thallium; the 1994 sample was likely not filtered.

6.3 UNCERTAINTY ANALYSIS

There is a high level of confidence that the results of this Tier 1 evaluation represent any potential health concerns at AOC 25. The results are consistent with the site history and previous investigations. This approximately 2.7-acre site is adequately characterized with six investigations and multiple samples for a full suite of analytes.

The potential impact of vapors to indoor air for the nine VOCs reported in groundwater is negligible. The cancer risk and noncancer HI based on the tap water PRGs or ESLs are well below 10^{-6} and 1, respectively, and the PRG is higher than the ESL for protection of indoor air. The uncertainty associated with the omission of the dermal pathway for groundwater is low because exposure from the dermal pathway for the Tier 1 COPCs would not result in an increase in the cancer risk or HI for residential use of groundwater (Exposure Groups 1 and 3). Cancer risk and hazard values are reported in one significant figure, so small changes will not necessarily result in an overall increase. This finding is based on the ratio of dermal exposure to ingestion for each Tier 1 COPC.

6.4 CONCLUSIONS

The total cancer risk and noncancer hazard values for soil and groundwater are above the risk management range. However, the following information suggests the risk for groundwater is actually much lower.

- The majority of the cancer risk is associated with arsenic in groundwater at a maximum concentration of 27.1 µg/L, which is only slightly above the background concentration of 20.72 µg/L and well below the maximum concentration in groundwater of 40.7 µg/L. Without arsenic, the cancer risk due to residential use of groundwater is less than 10^{-6}.
- The majority of the noncancer risk in groundwater is due to thallium with an HI of 22, based on the only detection of thallium in 14 samples. Thallium was reported as not detected in the other 13 samples and the highest detection limit was 5.8 µg/L. A sample collected during the EBS in 1995 reported thallium at 51.8 µg/L. There is a strong probability that this sample was an unfiltered grab sample; therefore, the concentrations of metals may be an artifact of the sampling.

For exposures associated with soil and vapors from VOCs in groundwater (Exposure Group 2), the cancer risk without background is 1×10^{-6}. The noncancer HI is 2 without iron and cadmium. The health effects of iron are not considered additive with other metals. Cadmium, with an HI of 1, is probably not present at concentrations above background. The maximum concentration of 1.8 mg/kg is only slightly above the background concentration of 1.7 mg/kg. The residual HI of 2 is based on the assumption that the health effects for aluminum (0.3), mercury (0.3), thallium (0.4), and vanadium (0.8) are additive; however, the health effects of iron, mercury, thallium, and vanadium are not additive.

The maximum concentration of lead of 157 mg/kg is above the background concentration but below the site-specific PRG of 184 mg/kg including ingestion of homegrown produce and 322 mg/kg without ingestion of homegrown produce.

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Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at AOC 25, including the nature and extent of contamination and results of the Tier 1 risk evaluation. These results form the basis of responses to the DQO decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendation presented below.

7.1 SUMMARY

Previous investigations identified metals in groundwater, notably thallium, cadmium, and arsenic, north of Building 503 at concentrations above PSCs and arsenic above the PSC in the southern portion of AOC 25. TPH was also reported above PSCs in soil and groundwater in the northern portion of AOC 25, near CAA-3C, and motor oil–range TPH was reported above the PSC in soil in the southern portion of AOC 25.

RI sampling was performed at AOC 25 to assess the distribution of metals in groundwater and soil (specifically thallium, cadmium, and arsenic) north of Building 503, and to assess arsenic in groundwater in the southern portion of AOC 25. In addition, a groundwater sample in the southern portion of AOC 25 was analyzed for TPH (extractable-range and purgeable-range) to assess concentrations downgradient of an identified soil TPH exceedance and to evaluate impacts to groundwater from a stained area reported in the EBS.

The concentrations of arsenic and iron in soil at AOC 25 are not believed to be associated with Navy activities, based on the evaluation in Section 4.3 of the main RI/FS Report. Zinc and copper at concentrations above background were identified as outliers in Section 4.3.1.2 of the main RI/FS Report. Zinc was present at 316 mg/kg in a sample collected from boring MBG-3. There are seven sampling locations in the surface in the vicinity of this boring, and only one sample had a concentration of zinc above background. There is no indication of a widespread release of zinc. Copper was reported at a concentration of 230 mg/kg in sample 135-0009M. This sample was considered an outlier during the review of the metals data without iron or aluminum analysis.

Groundwater north of Building 503 has not been impacted significantly by metals as indicated by RI groundwater sample results The three groundwater samples collected to the north of Building 503 did not have reported dissolved concentrations of metals above PSCs. Cadmium and thallium in groundwater are believed to have resulted from the sampling technique (likely unfiltered HydroPunch or equivalent samples) and represent cadmium and thallium in particulates in the samples, rather than dissolved concentrations. As discussed in Section 4.3 of the main RI/FS Report, the concentrations of arsenic, iron, and manganese in groundwater are believed to result from dissolution of naturally occurring metals in soil due to reducing conditions. Potential sources of organic material that could result in reducing conditions include TPH from CAA-3C and native BSU sediments.

Diesel-range TPH and motor oil–range TPH in soil and groundwater in the northern portion of AOC 25 are likely to be associated with the corrective action area located to the west. The diesel-range TPH and motor oil–range TPH reported in the groundwater in

the southern area of AOC 25 are likely to be the result of positive interferences in the analytical method because the samples probably did not undergo silica gel cleanup, the concentrations were slightly above PSCs, and the concentrations were not consistently reported in the samples. Thus, TPH in soil in the southern portion of AOC 25 does not appear to be providing a source of soluble constituents to groundwater. The motor oil–range TPH reported in the soil sample collected from surface soils in the southern portion appears to be limited in extent and has not significantly impacted groundwater.

Results of the Tier 1 risk evaluation show a cancer risk of 3×10^{-3} and an HI of 35, considering both soil and residential use of groundwater. Cancer risk is 1×10^{-6} and the HI is 34 without metals below background and without arsenic in groundwater. Most of the HI is due to thallium in groundwater. The thallium result is not representative of conditions at the study area and was reported in only 1 of 14 samples. Without thallium, the HI is 12 for soil and groundwater with the majority (HQ of 9) from iron and manganese. Without groundwater use and without metals below background, the cancer risk is 1×10^{-6} and the HI is 5, due largely to cadmium, iron and vanadium; however the maximum concentration of cadmium is only marginally above the background concentration. The hazard effects of iron and vanadium are not considered additive.

As discussed in Section 4.3 of the main RI/FS Report, the concentrations of iron and vanadium in soil are likely naturally occurring. Arsenic in soil is considered consistent with background and manganese in soil is below background. In groundwater, the arsenic, iron, manganese and vanadium result from dissolution of these metals in soil due to reducing conditions. Potential sources of organic material include TPH from CAA-3C, and natural conditions associated with the presence of BSU sediment in the interval from which groundwater was collected.

7.2 AOC 25 CONCLUSIONS AND RECOMMENDATIONS

The RI was conducted using the seven-step U.S. EPA DQO process (U.S. EPA 2000); DQOs were developed for AOC 25 in the Work Plan (BEI 2006). The RI has addressed these DQOs, as summarized in Table 7-1.

The data collected during the RI were sufficient to perform a Tier 1 risk evaluation and support decisions on the necessity for remedial action at AOC 25.

Based on study area conditions and results of the Tier 1 risk evaluation, no further action is recommended for AOC 25. Further evaluation of the extent of TPH in soil and groundwater and of metals in soil and groundwater is not recommended for the following reasons.

- Motor oil–range TPH was reported in the upper 0.5 foot of soil near Main Street and has not significantly impacted groundwater. Groundwater samples from two downgradient monitoring wells had TPH concentrations that exceeded PSCs during one sampling event (December 2004), but TPH was not reported above laboratory detection limits in any other samples collected from these wells. The downgradient groundwater sample collected during the RI did not have reported concentrations of TPH in the sample.

- Historical TPH soil and groundwater samples were probably not analyzed using silica gel cleanup, and the results may include a contribution from nonpetroleum chemicals present in the samples.
- The two locations in the northern portion of AOC 25 with TPH exceedances in both soil and groundwater are likely associated with adjacent CAA-3C and should be assessed under the TPH Program.
- Iron and vanadium in soil are likely naturally occurring. Arsenic in soil is considered consistent with background. Lead in soil above background and above the PSC was reported in only 1 of 30 samples and does not represent a widespread concern. Additionally, the maximum concentration of lead in soil is greater than the background concentration but is below the site-specific PRG for lead.
- Cadmium and thallium were reported in only one older grab groundwater sample from the second water-bearing zone collected prior to the 2005 RI sampling. Their presence is believed to be due to suspended soil particles in the sample rather than to dissolved concentrations. Neither cadmium nor thallium was reported in the filtered groundwater samples collected during the 2005 RI.
- Concentrations of arsenic, iron, manganese, and vanadium in groundwater result from dissolution of these metals under reducing conditions. Potential sources of organic material include TPH from CAA-3C and natural conditions associated with the presence of BSU sediment in the interval from which groundwater was collected.

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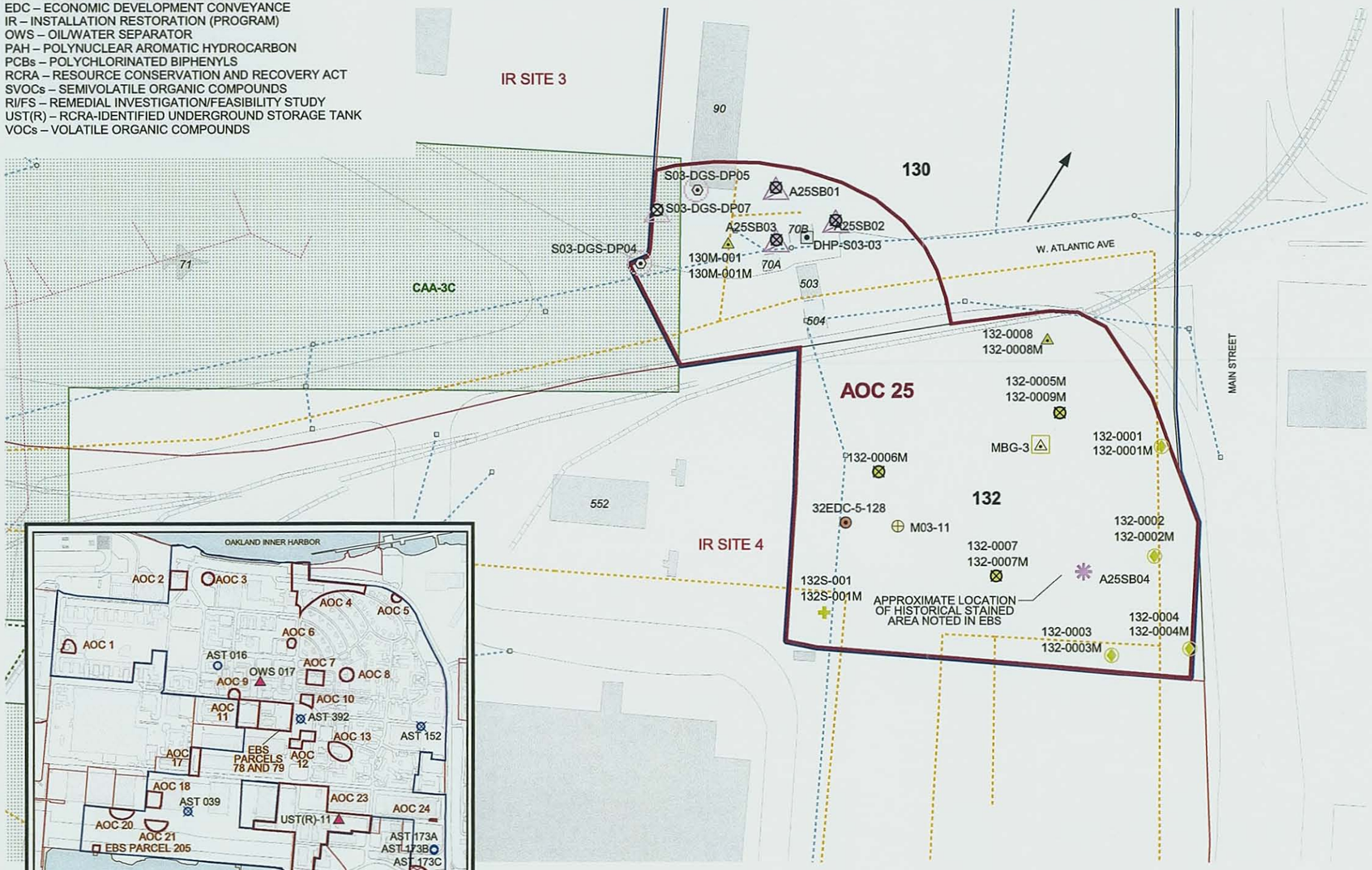
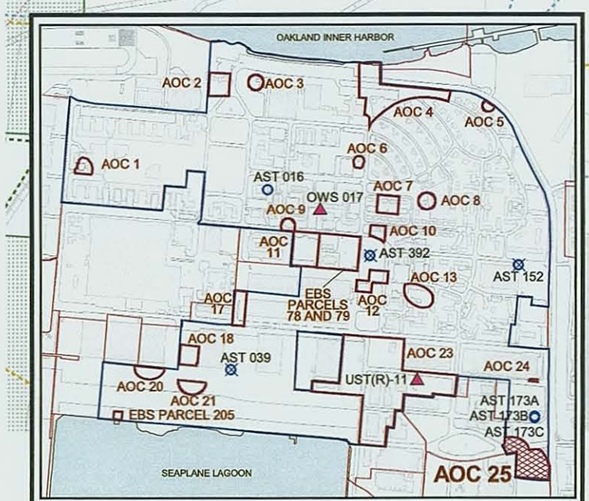
FIGURES

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOCs – VOLATILE ORGANIC COMPOUNDS





Location Within IR Site 35

1500 0 1500 Feet

LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- CORRECTIVE ACTION AREA (CAA)
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

EBS SOIL SAMPLING LOCATION WITH SAMPLE ID
- FUELS, PESTICIDES/PCBs, AND METALS ANALYSES ONLY
- METALS ANALYSIS ONLY
- VOCs, SVOCs, AND METALS ANALYSES ONLY
- VOCs, SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY

PAH STUDY SOIL SAMPLING LOCATION WITH STATION ID
- SVOCs ANALYSIS ONLY

BACKGROUND SOIL SAMPLING LOCATION WITH STATION ID
- VOCs, SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY

BASEWIDE GROUNDWATER MONITORING PROGRAM GROUNDWATER SAMPLING LOCATION WITH STATION ID
- VOCs, SVOCs, FUELS, AND METALS ANALYSES ONLY
- VOCs, SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY

DATA GAP INVESTIGATION SOIL SAMPLING LOCATION WITH STATION ID
- METALS ANALYSIS ONLY
- VOCs AND FUELS ANALYSES ONLY

DATA GAP INVESTIGATION GROUNDWATER SAMPLING LOCATION WITH STATION ID
- METALS ANALYSIS ONLY
- VOCs AND FUELS ANALYSES ONLY

RI SOIL SAMPLING LOCATION WITH STATION ID
- METALS ANALYSIS ONLY

RI GROUNDWATER SAMPLING LOCATION WITH STATION ID
- FUELS AND METALS ANALYSES ONLY
- METALS ANALYSIS ONLY

FOLLOW ON RI GROUNDWATER SAMPLING LOCATION WITH STATION ID
- VOCs AND METALS ANALYSES ONLY

N

100 0 100 Feet

RI/FS Report for IR Site 35

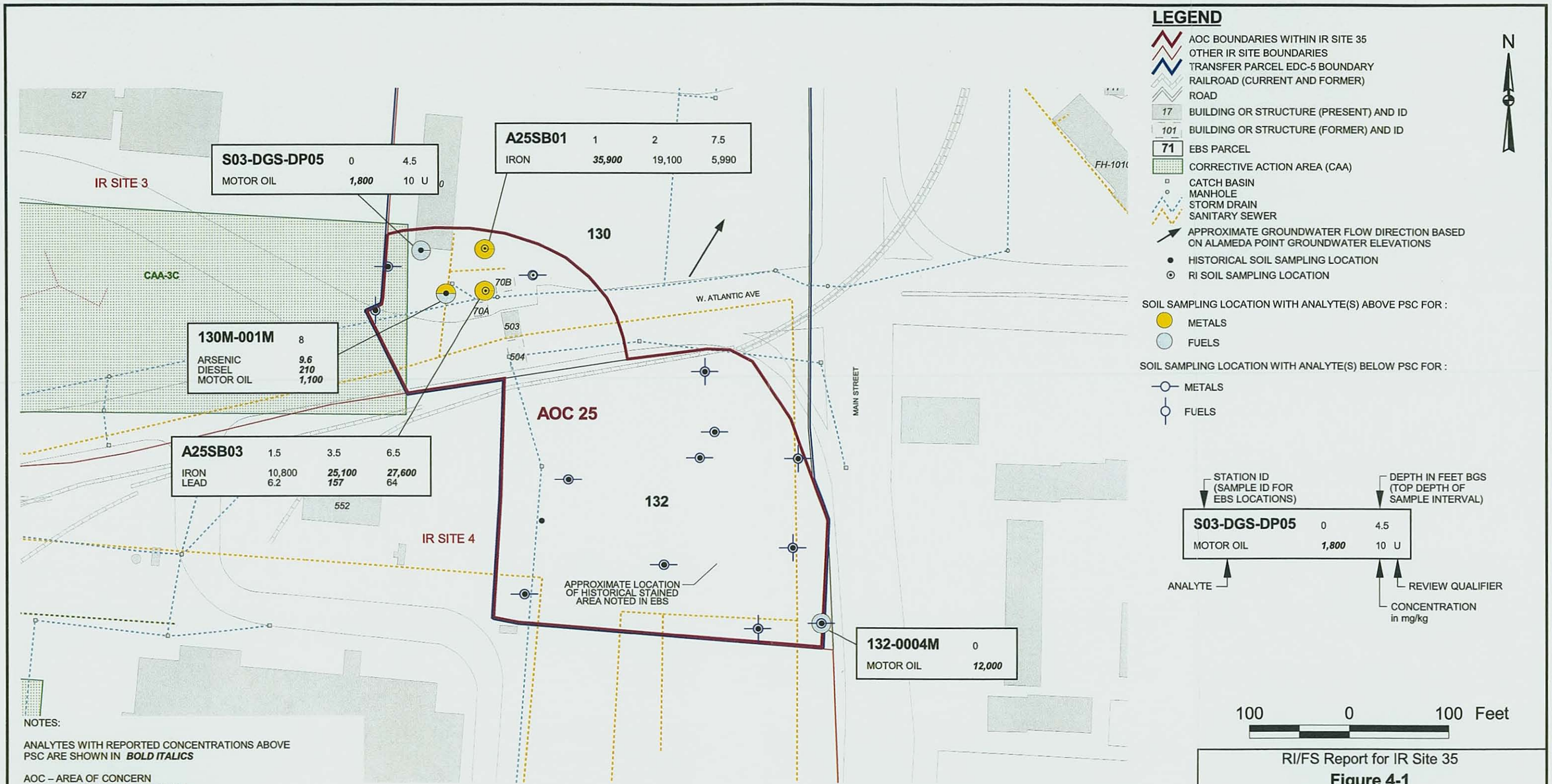
Figure 1-1

Study Area and Sampling Locations
Area of Concern 25

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 7/3/06
File No.: 077L14462
Job No.: 23818-077
Rev No.: C



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- CORRECTIVE ACTION AREA (CAA)
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL SOIL SAMPLING LOCATION
- RI SOIL SAMPLING LOCATION

SOIL SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC FOR :
- METALS
- FUELS

SOIL SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :
- METALS
- FUELS

N

STATION ID (SAMPLE ID FOR EBS LOCATIONS) — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

S03-DGS-DP05 0 4.5
MOTOR OIL *1,800* 10 U

ANALYTE — REVIEW QUALIFIER — CONCENTRATION in mg/kg

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
ESL – ENVIRONMENTAL SCREENING LEVEL
IR – INSTALLATION RESTORATION (PROGRAM)
mg/kg – MILLIGRAMS PER KILOGRAM
PRG – PRELIMINARY REMEDIATION GOAL
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
TPH – TOTAL PETROLEUM HYDROCARBONS
U – THE ANALYTE WAS NOT REPORTED ABOVE THE DETECTION LIMIT. THE ASSOCIATED NUMERICAL VALUE IS THE REPORTING LIMIT

Analyte	PSC
DIESEL	100 mg/kg (TPH Residential Soil ESL)
IRON	23,000 mg/kg (Federal Residential PRG)
LEAD	150 mg/kg (California Residential PRG)
MOTOR OIL	500 mg/kg (TPH Residential Soil ESL)
Analyte	**Other Comparsion Criteria**
ARSENIC	9.14 mg/kg (Background 95th Percentile)

RI/FS Report for IR Site 35

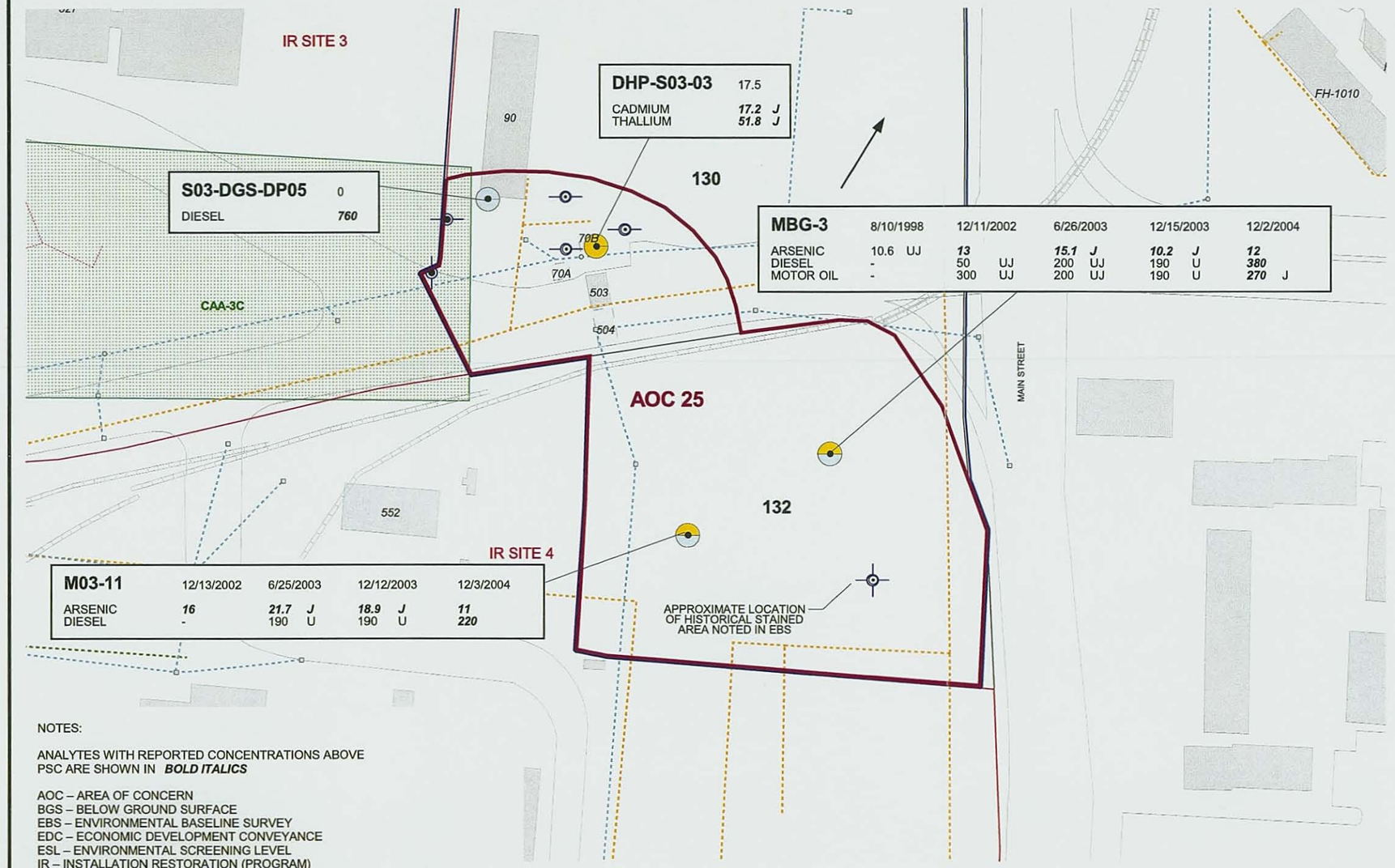
Figure 4-1

Soil Sampling Results for Analytes Above PSC – Area of Concern 25

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/26/07
File No.: 077L14508
Job No.: 23818-077
Rev No.: D



LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- 71 EBS PARCEL
- CORRECTIVE ACTION AREA (CAA)
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- SANITARY SEWER
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL GROUNDWATER SAMPLING LOCATION
- RI GROUNDWATER SAMPLING LOCATION

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC FOR :

- FUELS

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC AND GREATER THAN BACKGROUND FOR :

- METALS

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :

- FUELS
- METALS

N

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

DHP-S03-03 17.5
CADMIUM 17.2 J
THALLIUM 51.8 J

ANALYTE — REVIEW QUALIFIER — CONCENTRATION in µg/L

100 0 100 Feet

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
ESL – ENVIRONMENTAL SCREENING LEVEL
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
MCL – MAXIMUM CONTAMINANT LEVEL
µg/L – MICROGRAMS PER LITER
NA – NOT APPLICABLE
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
TPH – TOTAL PETROLEUM HYDROCARBONS
U – THE ANALYTE WAS NOT REPORTED ABOVE THE DETECTION LIMIT. THE ASSOCIATED NUMERICAL VALUE IS THE REPORTING LIMIT
UJ – THE ANALYTE WAS NOT REPORTED ABOVE THE DETECTION LIMIT. THE SAMPLE QUANTITATION LIMIT IS AN ESTIMATED QUANTITY

Analyte	PSC	Background 95th Percentile
ARSENIC	10 µg/L (Federal MCL)	20.72 µg/L
CADMIUM	5 µg/L (California MCL)	NA
DIESEL	100 µg/L (TPH Groundwater ESL)	NA
MOTOR OIL	100 µg/L (TPH Groundwater ESL)	NA
THALLIUM	2 µg/L (California MCL)	16.15 µg/L

RI/FS Report for IR Site 35

Figure 4-2

Groundwater Sampling Results for Analytes Above PSC – Area of Concern 25

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/26/07
File No.: 077L14509
Job No.: 23818-077
Rev No.: D

TABLES

Table 3-1
Sample Analysis Summary, AOC 25

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE							
				VOCs	SVOCs	TPH	Pest/PCBs	Metals	Organotins	Dissolved Gases	TDS
Soil											
32EDC-5-128	C032CD17	PAH Study	0–0.5		X						
32EDC-5-128	C032CD18	PAH Study	0.5–2		X						
32EDC-5-128	C032CD19 (FD)	PAH Study	0.5–2		X						
32EDC-5-128	C032CD20	PAH Study	2–4		X						
32EDC-5-128	C032CD21	PAH Study	4–8		X						
130-SS-001	130M-001[a]	EBS	8–9	X	X		X		X		
130-SS-001	130M-001M[a]	EBS	8–9	X		X[b]		X			
132-001-001	132-0001[a]	EBS	0–0.5				X				
132-001-001	132-0001M[a]	EBS	0–0.5			X[b]		X			
132-001-002	132-0002[a]	EBS	0.5–1				X				
132-001-002	132-0002M[a]	EBS	0.5–1			X[b]		X			
132-001-003	132-0003[a]	EBS	0.5–1				X				
132-001-003	132-0003M[a]	EBS	0.5–1			X[b]		X			
132-001-004	132-0004[a]	EBS	0–0.5			X[b]	X	X			
132-001-004	132-0004M[a]	EBS	0–0.5			X[b]		X			
132-002-005	132-0005M	EBS	0–0.5					X			
132-002-005	132-0009M	EBS	0–0.5					X			
132-002-006	132-0006M	EBS	0–0.5					X			
132-002-007	132-0007[a]	EBS	0.5–1					X			
132-002-007	132-0007M[a]	EBS	0.5–1					X			
132-SN-001	132S-001[a]	EBS	5.5–6.5	X	X						
132-SN-001	132S-001M[a]	EBS	5.5–6.5					X			
132-Z22-008	132-0008[a]	EBS	0–0.5	X	X	X[b]	X[c]	X[d]			
132-Z22-008	132-0008M[a]	EBS	0–0.5			X[b]	X[c]	X[d]			
MBG-3	M-BG3-000	Basewide GW Mon. Program	0.3–0.5	X	X	X[e]	X	X			
MBG-3	M-BG3-002	Basewide GW Mon. Program	2–2.5	X	X	X[e]	X	X			
MBG-3	M-BG3-004	Basewide GW Mon. Program	4–4.5	X	X	X[e]	X	X			

Table 3-1
Sample Analysis Summary, AOC 25

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE							
				VOCs	SVOCs	TPH	Pest/PCBs	Metals	Organotins	Dissolved Gases	TDS
MBG-3	M-BG3-006	Basewide GW Mon. Program	5.5–6	X	X	X[e]	X	X			
S03-DGS-DP04	385-S03-007	OUs 1 & 2 Data Gap Inv.	4–4.5	X	X[f]	X[b]					
S03-DGS-DP05	385-S03-009A	OUs 1 & 2 Data Gap Inv.	0–5	X		X[g]					
S03-DGS-DP05	385-S03-009	OUs 1 & 2 Data Gap Inv.	4.5–5	X	X[f]	X[b]					
S03-DGS-DP07	385-S03-015	OUs 1 & 2 Data Gap Inv.	0.5–1					X[h]			
S03-DGS-DP07	385-S03-016	OUs 1 & 2 Data Gap Inv.	2.5–3					X[h]			
S03-DGS-DP07	385-S03-017	OUs 1 & 2 Data Gap Inv.	4.5–5					X[h]			
A25SB01	C077S481	Site 35 RI	1–1.5					X			
A25SB01	C077S482	Site 35 RI	2–2.5					X			
A25SB01	C077S483	Site 35 RI	7.5–8					X			
A25SB02	C077S484	Site 35 RI	1.5–2					X			
A25SB02	C077S485	Site 35 RI	3.5–4					X			
A25SB02	C077S486	Site 35 RI	7.5–8					X			
A25SB03	C077S487	Site 35 RI	1.5–2					X			
A25SB03	C077S488	Site 35 RI	3.5–4					X			
A25SB03	C077S489	Site 35 RI	6.5–7					X			
Groundwater											
M03-11	M03-11-B2237	Basewide GW Mon. Program	26–36	X		X[e]		X			
M03-11	M03-11-B2516	Basewide GW Mon. Program	26–36	X		X[i]					
M03-11	M03-11-B2804	Basewide GW Mon. Program	26–36	X		X[e]		X			

Table 3-1
Sample Analysis Summary, AOC 25

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE							
				VOCs	SVOCs	TPH	Pest/PCBs	Metals	Organotins	Dissolved Gases	TDS
M03-11	M03-11-B2805 (FD)	Basewide GW Mon. Program	26–36	X		X[e]		X			
M03-11	M03-11-C3069	Basewide GW Mon. Program	26–36	X		X[i]					
M03-11	M03-11-C4101	Basewide GW Mon. Program	26–36	X		X[e]		X			
M03-11	M03-11-A1735	Basewide GW Mon. Program	26–36					X			
M03-11	M03-11-A1956	Basewide GW Mon. Program	26–36	X	X	X[i]					
MBG-3	MBG-3-B2248	Basewide GW Mon. Program	5–15	X		X[e]		X		X	X
MBG-3	MBG-3-B2815	Basewide GW Mon. Program	5–15	X		X[e]		X		X	X
MBG-3	MBG-3-C4116	Basewide GW Mon. Program	5–15	X		X[e]		X		X	X
MBG-3	108-SBG-015	Basewide GW Mon. Program	5–15				X	X			
MBG-3	MBG-3-A1606	Basewide GW Mon. Program	5–15	X	X	X[e]		X			
DHP-S03-03	280-S03-075	Basewide GW Mon. Program	17.5–21	X				X			
S03-DGS-DP04	385-S03-008	OUs 1 & 2 Data Gap Inv.	0–4	X	X	X[b]					
S03-DGS-DP05	385-S03-010	OUs 1 & 2 Data Gap Inv.	0–10		X	X[b]					
S03-DGS-DP05	385-S03-010A	OUs 1 & 2 Data Gap Inv.	0–10	X		X[e]					
S03-DGS-DP07	385-S03-018	OUs 1 & 2 Data Gap Inv.	5–5.5					X[h]			
A25SB01	C077G171	Site 35 RI	5–10					X			X

Table 3-1
Sample Analysis Summary, AOC 25

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE							
				VOCs	SVOCs	TPH	Pest/PCBs	Metals	Organotins	Dissolved Gases	TDS
A25SB02	C077G172	Site 35 RI	5–10					X			X
A25SB03	C077G173	Site 35 RI	2–7					X			X
A25SB04	C077G174	Site 35 RI	3–8			X[b]		X			X

References:

Basewide GW Mon. Program (Shaw 2004b)
EBS (IT 2001a)
OUs 1 & 2 Data Gap Inv. (TtEMI 2002c)
PAH Study (BEI 2005a)

Notes:

[a] samples 130M-001, 132-0001, -0002, -0003, -0004, -0007, 132S-001, and 132-0008 were analyzed by a fixed-base laboratory; samples 130M-001M, 132-0001M, -0002M, -0003M, -0004M, -0007M, 132S-001M, and 132-0008M were analyzed by a mobile or screening laboratory; samples 130M-001/-001M, 132-0001/-0001M, -0002/-0002M, -0003/-0003M, -0004/-0004M, -0007/-0007M, 132S-001/-001M, and 132-0008/-0008M were collected from the same respective locations
[b] analyzed for gasoline-, diesel-, and motor oil–range TPH
[c] analyzed for PCBs only
[d] analyzed for lead only
[e] analyzed for TRPH
[f] analyzed for naphthalene only
[g] analyzed for gasoline-, diesel-, JP-5–, and motor oil–range TPH
[h] analyzed for lead and organic lead only
[i] analyzed for gasoline- range TPH

Acronyms/Abbreviations:

AOC – area of concern
bgs – below ground surface
EBS – environmental baseline survey
FD – field duplicate
GW – groundwater
Inv. – investigation
JP-5 – jet propellant grade 5
Mon. – monitoring
OU – operable unit
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
Pest – pesticides
RI – remedial investigation
SVOC – semivolatile organic compound
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
TRPH – total recoverable petroleum hydrocarbons
VOC – volatile organic compound

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 25

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
Volatile Organic Compounds (µg/kg)										
acetone	6	1	17	0	36	36	36	14,000,000	—[c]	—
ethylbenzene	8	1	13	0	10	10	10	400,000	—	—
toluene	8	1	13	0	8.1	8.1	8.1	520,000	—	—
xylenes, total	8	1	13	0	85	85	85	270,000	—	—
Fuels (µg/kg)										
diesel	11	5	45	1	7,500	63,000	210,000	—	100,000	—
gasoline	11	1	9.1	0	530	530	530	—	100,000	—
motor oil	11	9	82	3	33,000	1,800,000	12,000,000	—	500,000	—
petroleum hydrocarbons, total recoverable	4	3	75	No PSC	37,600	270,000	529,000	—	—	—
Semivolatile Organic Compounds (µg/kg)										
acenaphthene	9	2	22	0	2.1	3.5	4.9	3,700,000	—	—
acenaphthylene	9	3	33	No PSC	1.7	3.3	6.1	—	—	—
anthracene	9	4	44	0	2.3	9.5	24	22,000,000	—	—
benz(a)anthracene	9	4	44	0	11	46	110	620	—	—
benzo(b)fluoranthene	9	4	44	0	14	66	150	620	—	—
benzo(k)fluoranthene	9	4	44	0	3.8	22	52	380 [d]	—	—
benzo(g,h,i)perylene	9	4	44	No PSC	6.4	30	65	—	—	—
benzo(a)pyrene	9	4	44	0	14	60	130	62	—	—
bis(2-ethylhexyl)phthalate	7	2	29	0	31	120	200	35,000	—	—
chrysene	9	4	44	0	12	54	130	3,800 [d]	—	—
dibenz(a,h)anthracene	9	3	33	0	2.7	8	15	62	—	—
di-n-butyl phthalate	7	2	29	0	83	87	90	6,100,000	—	—
fluoranthene	9	4	44	0	22	100	270	2,300,000	—	—
fluorene	9	3	33	0	1.7	4.1	7.4	2,700,000	—	—
indeno(1,2,3-cd)pyrene	9	4	44	0	8.4	39	87	620	—	—
naphthalene	11	3	27	0	2.1	4.2	6.6	1,700 [d]	—	—
phenanthrene	9	4	44	No PSC	10	62	170	—	—	—
pyrene	9	4	44	0	27	110	270	2,300,000	—	—
Pesticides and Polychlorinated Biphenyls (µg/kg)										
Aroclor 1260	11	2	18	0	28	29	30	220	—	—
dieldrin	9	1	11	0	4.2	4.2	4.2	30	—	—
Metals (mg/kg)										
aluminum	15	15	100	0	3,960	9,500	22,500	76,000	—	13,960
arsenic	24	23	96	1	1.5	3.9	9.6	0.062 [d]	—	9.14
barium	24	24	100	0	20	69	155	5,400	—	93.68
beryllium	25	19	76	0	0.12	0.37	1.1	150	—	1.27
cadmium	25	10	40	0	0.072	0.53	1.8	37	—	1.72
calcium	15	15	100	No PSC	1,480	3,200	6,780	—	—	16,800
chromium	25	24	96	0	22.9	51	150	210	—	54.84
cobalt	24	22	92	0	1.9	6.5	16.4	900	—	14.30
copper	25	25	100	0	4.5	43	230	3,100	—	39.14
iron	15	15	100	3	5,990	15,000	35,900	23,000	—	22,280
lead	30	29	97	1	2.5	40	157	150 [d]	—	37.66

Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AOC 25

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
magnesium	15	15	100	No PSC	1,520	3,900	9,080	—	—	7,304
manganese	15	15	100	0	50	140	241	1,800	—	383.0
mercury	25	15	60	0	0.14	0.79	4.7	23	—	0.52
molybdenum	11	1	9.1	0	3.7	3.7	3.7	390	—	5.20
nickel	25	25	100	0	13.6	47	120	1,600	—	55.72
potassium	15	15	100	No PSC	503	1,400	3,350	—	—	1,232
silver	25	5	20	0	0.11	0.46	0.92	390	—	2.22
sodium	15	14	93	No PSC	200	580	1,470	—	—	1,230
thallium	24	4	17	0	0.32	1.1	1.8	5.2	—	0.50
vanadium	24	24	100	0	17.4	32	66.1	78	—	47.34
zinc	25	25	100	0	14.7	74	316	23,000	—	67.48

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

Acronyms/Abbreviations:

AOC – area of concern
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
TPH – total petroleum hydrocarbons

Table 4-2
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, AOC 25

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background	Minimum [a]	Average [a]	Maximum [a]	California MCL	TPH ESL	Background (95th Percentile)
Volatile Organic Compounds (µg/L)										
acetone	13	3	23	No PSC	4.1	23	50	—[b]	—	—
tert-butyl alcohol	11	3	27	No PSC	4.7	14	22	—	—	—
carbon disulfide	13	3	23	No PSC	0.5	0.9	1.5	—	—	—
chloromethane	14	1	7.1	No PSC	1	1	1	—	—	—
methylene chloride	14	1	7.1	0	0.77	0.77	0.77	5	—	—
toluene	14	3	21	0	0.1	0.9	2.2	150	—	—
trichloroethene	14	1	7.1	0	0.3	0.3	0.3	5	—	—
trichlorofluoromethane	11	1	9.1	0	0.7	0.7	0.7	150	—	—
xylenes, total	14	1	7.1	0	2.8	2.8	2.8	1,800	—	—
Dissolved Gas (µg/L)										—
methane	3	3	100	No PSC	2,000	4,400	6,100	—	—	—
Fuels (µg/L)										
diesel	12	3	25	3	220	450	760	—	100	—
gasoline	15	1	6.7	0	63	63	63	—	100	—
motor oil	12	2	17	1	98	180	270	—	100	—
hydrocarbons, unknown	7	1	14	No PSC	98	98	98	—	—	—
Metals (µg/L)										
aluminum	15	3	20	0	76.7	110	150	1,000	—	1,070
antimony	15	3	20	0	0.18	0.2	0.23	6	—	37.50
arsenic	15	9	60	1	10.2	15	21.7	10[c]	—	20.72
barium	15	14	93	0	41.1	110	421	1,000	—	569.5
beryllium	15	4	27	0	0.24	0.66	1.8	4	—	2.50
cadmium	15	1	6.7	1	17.2	17	17.2	5	—	—
calcium	15	15	100	No PSC	3,520	53,000	237,000	—	—	—
chromium	15	9	60	0	1.6	7.6	27.5	50	—	12.45
cobalt	15	6	40	No PSC	0.088	3.2	15.6	—	—	—
copper	15	3	20	No PSC	0.1	1.5	3.9	—	—	24.03
iron	15	15	100	No PSC	237	8,500	38,100	—	—	6,586
lead	16	1	6.3	0	0.33	0.33	0.33	15[c]	—	11.45
magnesium	15	15	100	No PSC	4,230	100,000	700,000	—	—	—
manganese	15	15	100	No PSC	202	550	1,820	—	—	1,741
molybdenum	11	2	18	No PSC	1.3	2.5	3.7	—	—	—
nickel	15	6	40	0	1.2	9.4	41.3	100	—	—
potassium	15	15	100	No PSC	8,950	49,000	235,000	—	—	—
selenium	15	6	40	0	0.64	8.3	16.6	50	—	8.58
sodium	15	15	100	No PSC	47,400	1,100,000	6,500,000	—	—	—
thallium	14	1	7.1	1	51.8	52	51.8	2	—	16.15
vanadium	15	9	60	No PSC	2.1	6.8	29.8	—	—	26.27
zinc	15	6	40	No PSC	1.4	120	677	—	—	36.39
General Chemistry (µg/L)										
alkalinity (as $CaCO_3$)	3	3	100	No PSC	565,000	650,000	820,000	—	—	—
bicarbonate	2	2	100	No PSC	572,000	700,000	820,000	—	—	—
chloride	3	3	100	No PSC	22,000	25,000	28,600	—	—	—
solids, total dissolved	5	5	100	No PSC	374,000	6,100,000	20,400,000	—	—	—
sulfate	3	3	100	No PSC	1,600	3,300	6,220	—	—	—
sulfide	3	1	33	No PSC	60	60	60	—	—	—

Notes:
[a] data review qualifiers are not included in this table
[b] dash indicates not applicable or not established
[c] Federal MCL

Acronyms/Abbreviations:
AOC – area of concern
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/L – micrograms per liter
MCL – maximum contaminant level
PSC – preliminary screening criteria (MCL and ESL)
TPH – total petroleum hydrocarbons

Table 4-3
Soil Sampling Results, AOC 25

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	130-SS-001 130M-001 8 - 9 02-Jun-95	130-SS-001 130M-001M 8 - 9 02-Jun-95	132-001-001 132-0001 0 - 0.5 31-Mar-95	132-001-001 132-0001M 0 - 0.5 31-Mar-95	132-001-002 132-0002 0.5 - 1 31-Mar-95	132-001-002 132-0002M 0.5 - 1 31-Mar-95	132-001-003 132-0003 0.5 - 1 31-Mar-95	132-001-003 132-0003M 0.5 - 1 31-Mar-95	132-001-004 132-0004 0 - 0.5 31-Mar-95	132-001-004 132-0004M 0 - 0.5 31-Mar-95	132-002-005 132-0005M 0 - 0.5 31-Mar-95
VOCs																
acetone	14,000,000	—[b]	—	—	µg/kg	NA	36	NA	NA	NA	NA	NA	NA	NA	NA	NA
ethylbenzene	400,000	—	—	—	µg/kg	NA	9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
toluene	520,000	—	—	—	µg/kg	NA	9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
m-, p-xylene	—	—	—	—	µg/kg	NA	9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-xylene	—	—	—	—	µg/kg	NA	9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons																
diesel	—	—	100,000	—	µg/kg	NA	**210000**[d]	NA	7500	NA	11000 U	NA	1100 U	12000 U	**120000 U**[e]	NA
gasoline	—	—	100,000	—	µg/kg	NA	900 U	NA	570 U	NA	550 U	NA	550 U	600 U	620 U	NA
motor oil	—	—	500,000	—	µg/kg	NA	**1100000**	NA	280000	NA	280000 U	NA	37000	160000 J	**12000000**	NA
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																
acenaphthene	3,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	450 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	83 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs																
Aroclor 1260	220	—	—	—	µg/kg	45 U	NA	36 U	NA	36 U	NA	35 U	NA	40 U	NA	NA
dieldrin	30	—	—	—	µg/kg	4.5 U	NA	3.6 U	NA	3.6 U	NA	3.5 U	NA	4.2 J	NA	NA
Metals																
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	11900	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	***9.6***[f]	NA	**2.6**	NA	**2.8**	NA	**1.9**	**1.5**	**1.8**	**7**
barium	5,400	—	—	93.68	mg/kg	NA	*107*	NA	28	NA	49	NA	24	39.4	42	86
beryllium	150	—	—	1.27	mg/kg	NA	1.1	NA	0.38	NA	0.39	NA	0.33	0.19 U	0.31	0.45
cadmium	37	—	—	1.72	mg/kg	NA	*1.8*	NA	0.2	NA	0.11	NA	0.072	0.09 UJ	0.35	0.84
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	6780	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	*88*	NA	45	NA	29	NA	35	24.3 J	36	*150*
cobalt	900	—	—	14.30	mg/kg	NA	*16.4*	NA	6	NA	6.2	NA	4.8	4.8	6.7	8.7

Table 4-3
Soil Sampling Results, AOC 25

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	130-SS-001 130M-001 8 - 9 02-Jun-95	130-SS-001 130M-001M 8 - 9 02-Jun-95	132-001-001 132-0001 0 - 0.5 31-Mar-95	132-001-001 132-0001M 0 - 0.5 31-Mar-95	132-001-002 132-0002 0.5 - 1 31-Mar-95	132-001-002 132-0002M 0.5 - 1 31-Mar-95	132-001-003 132-0003 0.5 - 1 31-Mar-95	132-001-003 132-0003M 0.5 - 1 31-Mar-95	132-001-004 132-0004 0 - 0.5 31-Mar-95	132-001-004 132-0004M 0 - 0.5 31-Mar-95	132-002-005 132-0005M 0 - 0.5 31-Mar-95
Metals (continued)																
copper	3,100	—	—	39.14	mg/kg	NA	*61.5*	NA	37	NA	*68*	NA	12	*41.4*	*87*	*180*
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	11300	NA	NA
lead	400	150	—	37.66	mg/kg	NA	*125*	NA	9.5	NA	7.9	NA	6	27.8	*57*	*75*
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	2760	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	139 J	NA	NA
mercury	23	—	—	0.52	mg/kg	NA	*4.7*	NA	0.15	NA	0.17	NA	0.14	0.18 U	0.22	0.51
molybdenum	390	—	—	5.20	mg/kg	NA	1.7 U	NA	1.1 U	NA	1.1 U	NA	1.1 U	2.2 U	1.2 U	3.7
nickel	1,600	—	—	55.72	mg/kg	NA	*88.9*	NA	30	NA	25	NA	30	*72.5*	*99*	*120*
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	853	NA	NA
silver	390	—	—	2.22	mg/kg	NA	0.87 U	NA	0.56 U	NA	0.54 U	NA	0.54 U	0.46 U	0.6 U	0.92
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	560	NA	NA
thallium	5.2	—	—	0.50	mg/kg	NA	0.44 U	NA	0.28 U	NA	0.32	NA	0.27 U	*1.8*	0.3 U	0.29 U
vanadium	78	—	—	47.34	mg/kg	NA	*66.1*	NA	31	NA	32	NA	25	29.8	26	30
zinc	23,000	—	—	67.48	mg/kg	NA	*94.9*	NA	41	NA	33	NA	28	47.9	*92*	*120*
Organotins						ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 25

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	132-002-005 / 132-0009M (FD) / 0 - 0.5 / 31-Mar-95	132-002-006 / 132-0006M / 0 - 0.5 / 31-Mar-95	132-002-007 / 132-0007 / 0.5 - 1 / 31-Mar-95	132-002-007 / 132-0007M / 0.5 - 1 / 31-Mar-95	132-SN-001 / 132S-001 / 5.5 - 6.5 / 26-Jan-95	132-SN-001 / 132S-001M / 5.5 - 6.5 / 26-Jan-95	132-Z22-008 / 132-0008 / 0 - 0.5 / 31-Mar-95	132-Z22-008 / 132-0008M / 0 - 0.5 / 31-Mar-95	32EDC-5-128 / C032CD17 / 0 - 0.5 / 24-May-02	32EDC-5-128 / C032CD18 / 0.5 - 2 / 24-May-02	32EDC-5-128 / C032CD19 (FD) / 0.5 - 2 / 24-May-02
VOCs																
acetone	14,000,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ethylbenzene	400,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
toluene	520,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
m-, p-xylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-xylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons																
diesel	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	11000 U	8600	NA	NA	NA
gasoline	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	600 U	570 U	NA	NA	NA
motor oil	—	—	500,000	—	µg/kg	NA	NA	NA	NA	NA	NA	160000 J	260000	NA	NA	NA
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																
acenaphthene	3,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	2.1 J	5.8 U
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	1.7 J	5.8 U
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	8	2.3 J
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	49	11
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	76	14
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	24	3.8 J
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	34	6.4
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	**71**	14
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	NA	NA	NA	NA	31 J	NA	200 J	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	56	12
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	6.4	5.8 U
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	NA	NA	NA	400 U	NA	90 J	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	92	22
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	3.2 J	5.8 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	44	8.4
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	5.7 U	5.8 U
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	53	10
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	94	27
Pesticides/PCBs																
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	30 J	28	NA	NA	NA
dieldrin	30	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	3960	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	**4.9**	**8.8**	**1 U**[e]	**1.5**	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	74	*120*	25.9	20	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	0.43	0.5	0.21	0.28	NA	*25 U*[e]	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	mg/kg	0.75	0.3	0.08 UJ	0.08	NA	*25 U*[e]	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	2040	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	*130*	36	27.3 J	31	NA	25 U	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	7.2	7.2	3.4	4.6	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 25

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	132-002-005 / 132-0009M (FD) / 0 - 0.5 / 31-Mar-95	132-002-006 / 132-0006M / 0 - 0.5 / 31-Mar-95	132-002-007 / 132-0007 / 0.5 - 1 / 31-Mar-95	132-002-007 / 132-0007M / 0.5 - 1 / 31-Mar-95	132-SN-001 / 132S-001 / 5.5 - 6.5 / 26-Jan-95	132-SN-001 / 132S-001M / 5.5 - 6.5 / 26-Jan-95	132-Z22-008 / 132-0008 / 0 - 0.5 / 31-Mar-95	132-Z22-008 / 132-0008M / 0 - 0.5 / 31-Mar-95	32EDC-5-128 / C032CD17 / 0 - 0.5 / 24-May-02	32EDC-5-128 / C032CD18 / 0.5 - 2 / 24-May-02	32EDC-5-128 / C032CD19 (FD) / 0.5 - 2 / 24-May-02
Metals (continued)																
copper	3,100	—	—	39.14	mg/kg	*230*	*41*	8.9	7.6	NA	30	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	6850	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	*93*	23	12.4	3.8	NA	25 U	*39.7*	33	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	2090	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	97 J	NA	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	mg/kg	0.44	0.11 U	0.16 U	0.14	NA	*25 U* [e]	NA	NA	NA	NA	NA
molybdenum	390	—	—	5.20	mg/kg	1.1 U	1.1 U	2 U	1.1 U	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	*87*	34	23.5	26	NA	*66*	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	503	NA	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	mg/kg	0.54 U	0.56 U	0.42 U	0.53 U	NA	*25 U* [e]	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	200	NA	NA	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	mg/kg	0.27 U	0.28 U	*1.8*	0.4	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	31	34	17.4	21	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	*200*	48	19	18	NA	43	NA	NA	NA	NA	NA
Organotins						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 25

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Units	Station ID: 32EDC-5-128 / Sample: C032CD20 / [a] Depth Interval: 2 - 4 / Collection Date: 24-May-02	32EDC-5-128 C032CD21 4 - 8 24-May-02	A25SB01 C077S481 1 - 1.5 19-Dec-05	A25SB01 C077S482 2 - 2.5 19-Dec-05	A25SB01 C077S483 7.5 - 8 19-Dec-05	A25SB02 C077S484 1.5 - 2 19-Dec-05	A25SB02 C077S485 3.5 - 4 19-Dec-05	A25SB02 C077S486 7.5 - 8 19-Dec-05	A25SB03 C077S487 1.5 - 2 19-Dec-05	A25SB03 C077S488 3.5 - 4 19-Dec-05	A25SB03 C077S489 6.5 - 7 19-Dec-05	MBG-3 M-BG3-000 0.3 - 0.5 29-May-92
VOCs																	
acetone	14,000,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	12 UJ
ethylbenzene	400,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.2 U
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
toluene	520,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.2 U
m-, p-xylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
o-xylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons																	
diesel	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gasoline	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRPH	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	234000
SVOCs																	
acenaphthene	3,700,000	—	—	—	µg/kg	4.9 J	5.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	83 U
acenaphthylene	—	—	—	—	µg/kg	6.1	2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	83 U
anthracene	22,000,000	—	—	—	µg/kg	24	3.5 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	83 U
benz(a)anthracene	620[c]	—	—	—	µg/kg	110	13	NA	NA	NA	NA	NA	NA	NA	NA	NA	100 U
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	150	25	NA	NA	NA	NA	NA	NA	NA	NA	NA	100 U
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	52	7.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	100 U
benzo(g,h,i)perylene	—	—	—	—	µg/kg	65	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	170 U
benzo(a)pyrene	62[c]	—	—	—	µg/kg	**130**	23	NA	NA	NA	NA	NA	NA	NA	NA	NA	**140 U**[e]
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100 U
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	130	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	100 U
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	15	2.7 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	**170 U**[e]
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	83 U
fluoranthene	2,300,000	—	—	—	µg/kg	270	27	NA	NA	NA	NA	NA	NA	NA	NA	NA	83 U
fluorene	2,700,000	—	—	—	µg/kg	7.4	1.7 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	83 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	87	18	NA	NA	NA	NA	NA	NA	NA	NA	NA	170 U
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	2.1 J	3.9 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	83 U
phenanthrene	—	—	—	—	µg/kg	170	13	NA	NA	NA	NA	NA	NA	NA	NA	NA	83 U
pyrene	2,300,000	—	—	—	µg/kg	270	41	NA	NA	NA	NA	NA	NA	NA	NA	NA	83 U
Pesticides/PCBs																	
Aroclor 1260	220	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	34 U
dieldrin	30	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.45 U
Metals																	
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	*22500*	10400	5360	13700	11200	4670	5360	13300	*15900*	8120
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	**5.3**	**4.4**	**2.7**	**5.1**	**4.6**	**2.5**	**2.4**	**5.2**	**6.8**	**3.14**
barium	5,400	—	—	93.68	mg/kg	NA	NA	*122*	*97.5*	38.7	*101*	65.9	56.5	32.9	*130*	*155*	74.5
beryllium	150	—	—	1.27	mg/kg	NA	NA	0.35	0.35 J	0.19 J	0.32	0.35	0.15 J	0.12 J	0.4	0.36	0.516 U
cadmium	37	—	—	1.72	mg/kg	NA	NA	0.081 U	0.9 U	0.6 U	0.7 U	0.049 U	0.6 U	0.6 U	0.32 U	0.8 U	0.815
calcium	—	—	—	16,800	mg/kg	NA	NA	4460	3200	1920	3510	2060	1730	3120	5900	2850	4240
chromium	210	—	—	54.84	mg/kg	NA	NA	*90.8*	*58.7*	30.9	*58.6*	47.3	29.1	31.6	*56.5*	*64.5*	43.1
cobalt	900	—	—	14.30	mg/kg	NA	NA	11.7 J	7.6 J	1.9 J	7.2 J	4.9 J	2 J	5 J	7.7 J	9.4 J	5.42

Table 4-3
Soil Sampling Results, AOC 25

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	32EDC-5-128 C032CD20 2 - 4 24-May-02	32EDC-5-128 C032CD21 4 - 8 24-May-02	A25SB01 C077S481 1 - 1.5 19-Dec-05	A25SB01 C077S482 2 - 2.5 19-Dec-05	A25SB01 C077S483 7.5 - 8 19-Dec-05	A25SB02 C077S484 1.5 - 2 19-Dec-05	A25SB02 C077S485 3.5 - 4 19-Dec-05	A25SB02 C077S486 7.5 - 8 19-Dec-05	A25SB03 C077S487 1.5 - 2 19-Dec-05	A25SB03 C077S488 3.5 - 4 19-Dec-05	A25SB03 C077S489 6.5 - 7 19-Dec-05	MBG-3 M-BG3-000 0.3 - 0.5 29-May-92
Metals (continued)																	
copper	3,100	—	—	39.14	mg/kg	NA	NA	*54.9*	28	5.8	31	21.4	4.5	11.2	*48.6*	*40.2*	20.1
iron	23,000	—	—	22,280	mg/kg	NA	NA	***35900***	19100	5990	*22300*	18800	6100	10800	***25100***	***27600***	14900
lead	400	150	—	37.66	mg/kg	NA	NA	*43.5*	*76.9*	3.3	*39*	*76.9*	2.5	6.2	***157***	*64*	27.9
magnesium	—	—	—	7,304	mg/kg	NA	NA	*9080*	4710	2160	6190	5300	1980	2840	5870	7150	2900
manganese	1,800	—	—	383.0	mg/kg	NA	NA	241	152	75	171	150	63.9	150	193	164	186
mercury	23	—	—	0.52	mg/kg	NA	NA	0.39	0.27	0.1 U	0.45	0.35	0.1 U	0.18	*2.4*	*1.3*	0.059 U
molybdenum	390	—	—	5.20	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	*60.7*	50.5	14	51.9	39.6	13.6	25.4	53.2	*67.8*	42.2
potassium	—	—	—	1,232	mg/kg	NA	NA	*3350*	*1660*	948	*2170*	*2010*	868	738	*1750*	*2590*	1010
silver	390	—	—	2.22	mg/kg	NA	NA	0.67	0.11 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.15	0.44	0.99 U
sodium	—	—	—	1,230	mg/kg	NA	NA	773	502	*1470*	423	629	1070	179 U	304	678	302
thallium	5.2	—	—	0.50	mg/kg	NA	NA	*4 U* [e]	*4 U* [e]	*2 U* [e]	*3 U* [e]	*2 U* [e]	*3 U* [e]	*2 U* [e]	*3 U* [e]	*3 U* [e]	0.327 U
vanadium	78	—	—	47.34	mg/kg	NA	NA	*56.3*	39.3	23.6	40.7	35.7	20.4	22.4	41.4	*47.8*	31.7
zinc	23,000	—	—	67.48	mg/kg	NA	NA	*87.3*	*79.1*	14.8	*68.7*	44.2	14.7	24.2	*212*	*127*	*316*
Organotins						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 25

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Units	Station ID: MBG-3 / Sample: M-BG3-002 / [a]Depth Interval: 2 - 2.5 / Collection Date: 29-May-92	MBG-3 / M-BG3-004 / 4 - 4.5 / 29-May-92	MBG-3 / M-BG3-006 / 5.5 - 6 / 29-May-92	S03-DGS-DP04 / 385-S03-007 / 4 - 4.5 / 23-Jul-01	S03-DGS-DP05 / 385-S03-009 / 4.5 - 5 / 23-Jul-01	S03-DGS-DP05 / 385-S03-009A / 0 - 5 / 23-Jul-01	S03-DGS-DP07 / 385-S03-015 / 0.5 - 1 / 18-Jun-01	S03-DGS-DP07 / 385-S03-016 / 2.5 - 3 / 18-Jun-01	S03-DGS-DP07 / 385-S03-017 / 4.5 - 5 / 18-Jun-01
VOCs														
acetone	14,000,000	—[b]	—	—	µg/kg	22 UJ	28 UJ	35 UJ	NA	NA	11 UJ	NA	NA	NA
ethylbenzene	400,000	—	—	—	µg/kg	5.5 U	5.7 U	6.2 U	10	2 U	11 U	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	6.6	2 U	NA	NA	NA	NA
toluene	520,000	—	—	—	µg/kg	5.5 U	5.7 U	6.2 U	8.1	2 U	11 U	NA	NA	NA
m-, p-xylene	—	—	—	—	µg/kg	NA	NA	NA	53	2 U	NA	NA	NA	NA
o-xylene	—	—	—	—	µg/kg	NA	NA	NA	32	2 U	NA	NA	NA	NA
Petroleum Hydrocarbons														
diesel	—	—	100,000	—	µg/kg	NA	NA	NA	40000	50000	**430000 U**[c]	NA	NA	NA
gasoline	—	—	100,000	—	µg/kg	NA	NA	NA	530 J	100 U	480 U	NA	NA	NA
motor oil	—	—	500,000	—	µg/kg	NA	NA	NA	33000	10000 U	**1800000**	NA	NA	NA
TRPH	—	—	—	—	µg/kg	529000	37600	35500 U	NA	NA	NA	NA	NA	NA
SVOCs														
acenaphthene	3,700,000	—	—	—	µg/kg	88 U	92 U	100 U	NA	NA	NA	NA	NA	NA
acenaphthylene	—	—	—	—	µg/kg	88 U	92 U	100 U	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	88 U	92 U	100 U	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	110 U	110 U	120 U	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	110 U	110 U	120 U	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	110 U	110 U	120 U	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	180 U	180 U	200 U	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	**150 U**[c]	**160 U**[c]	**170 U**[c]	NA	NA	NA	NA	NA	NA
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	110 U	110 U	120 U	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	110 U	110 U	120 U	NA	NA	NA	NA	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	**180 U**[c]	**180 U**[c]	**200 U**[c]	NA	NA	NA	NA	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	88 U	92 U	100 U	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	88 U	92 U	100 U	NA	NA	NA	NA	NA	NA
fluorene	2,700,000	—	—	—	µg/kg	88 U	92 U	100 U	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	180 U	180 U	200 U	NA	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	88 U	92 U	100 U	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg	88 U	92 U	100 U	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	88 U	92 U	100 U	NA	NA	NA	NA	NA	NA
Pesticides/PCBs														
Aroclor 1260	220	—	—	—	µg/kg	37 U	38 U	42 U	NA	NA	NA	NA	NA	NA
dieldrin	30	—	—	—	µg/kg	3.65 U	3.83 U	4.16 U	NA	NA	NA	NA	NA	NA
Metals														
aluminum	76,000	—	—	13,960	mg/kg	6400	4450	5380	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	**1.68**	**1.63**	**1.8**	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	53.7	52	53.1	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	0.546 U	0.572 U	0.613 U	NA	NA	NA	NA	NA	NA
cadmium	37	—	—	1.72	mg/kg	0.852 U	0.893 U	0.957 U	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	2130	1480	1870	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	28.7	22.9	24.4	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	4.55	3.94 U	4.22 U	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, AOC 25

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	MBG-3 M-BG3-002 2 - 2.5 29-May-92	MBG-3 M-BG3-004 4 - 4.5 29-May-92	MBG-3 M-BG3-006 5.5 - 6 29-May-92	S03-DGS-DP04 385-S03-007 4 - 4.5 23-Jul-01	S03-DGS-DP05 385-S03-009 4.5 - 5 23-Jul-01	S03-DGS-DP05 385-S03-009A 0 - 5 23-Jul-01	S03-DGS-DP07 385-S03-015 0.5 - 1 18-Jun-01	S03-DGS-DP07 385-S03-016 2.5 - 3 18-Jun-01	S03-DGS-DP07 385-S03-017 4.5 - 5 18-Jun-01
Metals (continued)														
copper	3,100	—	—	39.14	mg/kg	6.61	5.17	4.92	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	9930	6220	7560	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	9.5	8.09	6.59	NA	NA	NA	12.9 J	*81.4 J*	*44.5 J*
magnesium	—	—	—	7,304	mg/kg	2410	1520	1580	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	151	50	112	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	mg/kg	0.065 U	0.065 U	0.086 U	NA	NA	NA	NA	NA	NA
molybdenum	390	—	—	5.20	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	21.3	14.5	15.8	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	1030	778	790	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	mg/kg	1.05 U	1.1 U	1.18 U	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	448	337	379	NA	NA	NA	NA	NA	NA
thallium	5.2	—	—	0.50	mg/kg	0.366 U	0.361 U	0.424 U	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	25	18.2	18.5	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	22.3	31.5	27.4	NA	NA	NA	NA	NA	NA
Organotins						NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[d] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL
[e] detection limit is above criteria
[f] italicized font indicates result above background

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
ND – not detected
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
TRPH – total recoverable petroleum hydrocarbons
VOC – volatile organic compound

Table 4-4
Groundwater Sampling Results, AOC 25

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Background	Result Units	Station ID: A25SB01 Sample: C077G171 [a]Depth Interval: 5 - 10 Collection Date: 19-Dec-05	A25SB02 C077G172 5 - 10 19-Dec-05	A25SB03 C077G173 2 - 7 19-Dec-05	A25SB04 C077G174 3 - 8 19-Dec-05	DHP-S03-03 280-S03-075 17.5 - 21 29-Aug-94	M03-11 M03-11-A1735 26 - 36 13-Dec-02	M03-11 M03-11-A1956 26 - 36 11-Apr-03	M03-11 M03-11-B2237 26 - 36 25-Jun-03	M03-11 M03-11-B2516 26 - 36 18-Sep-03	M03-11 M03-11-B2804 26 - 36 12-Dec-03
VOCs															
acetone	—[b]	—	—	—	µg/L	NA	NA	NA	NA	9 UJ	NA	50	100 U	100 U	100 U
tert-butyl alcohol	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	4.7 J	50 U	50 U	22 J
carbon disulfide	—	—	—	—	µg/L	NA	NA	NA	NA	1 U	NA	0.7	100 U	1.5 J	100 UJ
chloromethane	—	—	—	—	µg/L	NA	NA	NA	NA	2 U	NA	1 U	1 UJ	1 UJ	1 UJ
methylene chloride	5	5	—	—	µg/L	NA	NA	NA	NA	1 UJ	NA	5 U	1 U	1 U	1 UJ
toluene	1,000	150	—	—	µg/L	NA	NA	NA	NA	1 U	NA	0.1 J	1 U	1 U	1 U
trichloroethene	5	5	—	—	µg/L	NA	NA	NA	NA	1 U	NA	0.3 J	1 U	1 U	1 U
trichlorofluoromethane	—	150	—	—	µg/L	NA	NA	NA	NA	NA	NA	1 UJ	1 U	1 U	1 U
m-, p-xylene	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	0.5 U	1 U	1 U	1 U
Petroleum Hydrocarbons															
diesel	—	—	100	—	µg/L	NA	NA	NA	50 U	NA	NA	NA	**190 U**[c,d]	NA	**190 U**[c]
gasoline	—	—	100	—	µg/L	NA	NA	NA	100 U	NA	NA	12 U	50 U	50 U	50 U
hydrocarbons	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	290 U	50 U	98 J
motor oil	—	—	100	—	µg/L	NA	NA	NA	**500 U**[c]	NA	NA	NA	**190 U**[c]	NA	98 J
Pesticides/PCBs						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals															
aluminum	1,000	1,000	—	1,070	µg/L	100 U	100 U	76.7 J	100 U	42.4 U	150	NA	200 U	NA	200 U
antimony	6	6	—	37.50	µg/L	5 U	5 U	5 U	5 U	***46 UJ***[c,e]	0.23 J	NA	***50 U***[c]	NA	5 U
arsenic	10	50	—	20.72	µg/L	**18.6 U**[c]	**16.8 U**[c]	4.6 U	6.5 U	***52 U***[c]	**16**	NA	***21.7 J***	NA	**16 J**
barium	2,000	1,000	—	569.5	µg/L	188	421	64.9	81.2	48.1 J	47	NA	51.4 J	NA	41.1 J
beryllium	4	4	—	2.50	µg/L	0.32 J	0.24 J	0.27 J	2 U	1.8 J	2 U	NA	*4 U*[c]	NA	*4 U*[c]
cadmium	5	5	—	—	µg/L	5 U	5 U	5 U	5 U	**17.2 J**	5 U	NA	5 U	NA	5 U
calcium	—	—	—	—	µg/L	237,000	151,000	35,400	41,300	50,200 J	5,400	NA	3,520 J	NA	3,680
chromium	100	50	—	12.45	µg/L	*27.5*	9.2	3.6 J	1.6 J	*15.4 J*	1.2 U	NA	10 U	NA	10 U
cobalt	—	—	—	—	µg/L	15.6	5 U	1.4 U	0.94 U	6.6 U	0.43 J	NA	10 U	NA	10 U
copper	—	—	—	24.03	µg/L	5 U	5 U	5 U	5 U	14.6 UJ	0.53 J	NA	10 U	NA	10 U
iron	—	—	—	6,586	µg/L	*10,600*	*38,100*	240	1,650	3,340 J	480	NA	322	NA	237
lead	15	—	—	11.45	µg/L	3 U	3 U	3 U	3 U	***24 U***[c]	0.33 J	NA	10 U	NA	10 U
magnesium	—	—	—	—	µg/L	700,000	394,000	24,500	19,900	121,000 J	6,700	NA	4,230	NA	4,400
manganese	—	—	—	1,741	µg/L	1,040	*1,820*	465	792	788 J	340	NA	202	NA	211
molybdenum	—	—	—	—	µg/L	NA	NA	NA	NA	14 U	3.7 J	NA	50 U	NA	50 U
nickel	—	100	—	—	µg/L	5.9	5 U	5 U	5 U	41.3	2.9 J	NA	2.75 J	NA	20 U
potassium	—	—	—	—	µg/L	235,000	140,000	31,600	17,100	168,000 J	12,000	NA	8,950 J	NA	11,000
selenium	50	50	—	8.58	µg/L	*15.5*	*16.6*	5.4	*10.3*	***54 U***[c]	1.1 J	NA	*20 U*[c]	NA	*20 U*[c]
sodium	—	—	—	—	µg/L	6,500,000	3,980,000	151,000	47,400	3,380,000	600,000	NA	434,000 J	NA	492,000
thallium	2	2	—	16.15	µg/L	**3.5 U**[c]	**5 U**[c]	**5 U**[c]	**5 U**[c]	***51.8 J***	1.1 U	NA	**5 U**[c]	NA	**5 UJ**[c]
vanadium	—	—	—	26.27	µg/L	*29.8*	12.6	3 J	2.6 J	6.8 U	2.1 J	NA	*50 U*[c]	NA	*50 U*[c]
zinc	—	—	—	36.39	µg/L	*50 U*[c]	*50 U*[c]	*50 U*[c]	*50 U*[c]	*677 J*	1.4 J	NA	20 U	NA	20 U
Dissolved Gases															
methane	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
General Chemistry															
alkalinity (as $CaCO_3$)	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
bicarbonate	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chloride	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
solids, total dissolved	—	—	—	—	µg/L	20,400,000	7,130,000	1,730,000	374,000	NA	NA	NA	NA	NA	NA
sulfate	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sulfide	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-4
Groundwater Sampling Results, AOC 25

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	M03-11 M03-11-B2805 (FD) 26 - 36 12-Dec-03	M03-11 M03-11-C3069 26 - 36 04-Mar-04	M03-11 M03-11-C4101 26 - 36 02-Dec-04	MBG-3 108-SBG-015 5 - 15 10-Aug-98	MBG-3 MBG-3-A1606 5 - 15 11-Dec-02	MBG-3 MBG-3-B2248 5 - 15 26-Jun-03	MBG-3 MBG-3-B2815 5 - 15 15-Dec-03	MBG-3 MBG-3-C4116 5 - 15 02-Dec-04	S03-DGS-DP04 385-S03-008 0 - 4 23-Jul-01
VOCs														
acetone	—[b]	—	—	—	µg/L	100 U	20 U	10 U	NA	0.9 UJ	100 U	14 J	4.1 J	NA
tert-butyl alcohol	—	—	—	—	µg/L	15 J	50 U	10 U	NA	10 U	50 U	50 UJ	10 U	NA
carbon disulfide	—	—	—	—	µg/L	100 UJ	10 U	0.5 U	NA	0.5 U	100 U	100 U	0.5 U	NA
chloromethane	—	—	—	—	µg/L	1 UJ	1 U	1 U	NA	1 U	1 U	1	1 U	1 U
methylene chloride	5	5	—	—	µg/L	1 UJ	1 U	5 U	NA	5 U	1 U	0.77 J	5 U	1 U
toluene	1,000	150	—	—	µg/L	1 U	1 U	0.5 U	NA	0.5 U	1 U	1 U	0.5 U	2.2
trichloroethene	5	5	—	—	µg/L	1 U	1 U	0.5 U	NA	0.5 U	1 U	1 U	0.5 U	1 U
trichlorofluoromethane	—	150	—	—	µg/L	1 U	1 U	1 U	NA	1 U	1 U	0.7 J	1 U	NA
m-, p-xylene	—	—	—	—	µg/L	1 U	1 U	0.5 U	NA	0.5 U	1 U	1 U	0.5 U	1.8
Petroleum Hydrocarbons														
diesel	—	—	100	—	µg/L	**190 U**[c]	NA	**220**	NA	50 UJ	**200 UJ**[c]	**190 U**[c]	**380**	**200 U**[c]
gasoline	—	—	100	—	µg/L	50 U	50 U	50 U	NA	50 U	50 U	50 U	63	50 U
hydrocarbons	—	—	—	—	µg/L	280 U	50 U	NA	NA	NA	300 U	290 U	NA	NA
motor oil	—	—	100	—	µg/L	**190 U**[c]	NA	**300 U**[c]	NA	**300 UJ**[c]	**200 UJ**[c]	**190 U**[c]	**270 J**	**200 U**[c]
Pesticides/PCBs						NA	NA	NA	ND	NA	NA	NA	NA	NA
Metals														
aluminum	1,000	1,000	—	1,070	µg/L	200 U	NA	100	42.4 UJ	12 U	200 U	200 U	100 U	NA
antimony	6	6	—	37.50	µg/L	5 U	NA	1 U	1.8 U	0.19 J	*50 U*[c]	5 UJ	0.18 J	NA
arsenic	10	50	—	20.72	µg/L	**18.9 J**	NA	**11**	**10.6 UJ**[c]	**13**	**15.1 J**	**10.2 J**	**12**	NA
barium	2,000	1,000	—	569.5	µg/L	47.4 J	NA	44	67.3 J	75 UJ	131	130	140	NA
beryllium	4	4	—	2.50	µg/L	*4 U*[c]	NA	2 U	0.2 U	2 U	*4 U*[c]	*4 U*[c]	2 U	NA
cadmium	5	5	—	—	µg/L	5 U	NA	5 U	0.3 U	5 U	5 U	5 U	5 U	NA
calcium	—	—	—	—	µg/L	4,120	NA	5,700	29,600	30,000 J	60,700	68,900	67,000	NA
chromium	100	50	—	12.45	µg/L	10 U	NA	10 U	2.4 J	3.3 J	2.66 J	10 UJ	2.8 J	NA
cobalt	—	—	—	—	µg/L	10 U	NA	0.088 J	3 J	0.19 J	10 U	10 UJ	0.18 J	NA
copper	—	—	—	24.03	µg/L	10 U	NA	3.9 J	1.5 UJ	0.1 J	10 U	10 U	10 U	NA
iron	—	—	—	6,586	µg/L	336	NA	500	2,670	*16,000*	*18,000*	*18,200 J*	*17,000*	NA
lead	15	—	—	11.45	µg/L	10 U	NA	3 U	1.7 U	0.29 U	10 U	10 UJ	3 U	NA
magnesium	—	—	—	—	µg/L	5,000	NA	4,500	34,600	29,000 J	51,700	55,300	50,000	NA
manganese	—	—	—	1,741	µg/L	236	NA	260	340	270 J	483	499	500	NA
molybdenum	—	—	—	—	µg/L	50 U	NA	20 U	2.3 UJ	1.3 J	50 U	50 UJ	20 U	NA
nickel	—	100	—	—	µg/L	20 U	NA	20 U	1.6 UJ	1.2 J	20 U	20 UJ	2.2 J	NA
potassium	—	—	—	—	µg/L	12,900	NA	11,000	20,200 J	17,000	19,700 J	15,400	13,000	NA
selenium	50	50	—	8.58	µg/L	*20 U*[c]	NA	5 U	2.2 UJ	0.64 J	*20 U*[c]	*20 UJ*[c]	5 U	NA
sodium	—	—	—	—	µg/L	549,000	NA	430,000	117,000 J	72,000	109,000	111,000	96,000	NA
thallium	2	2	—	16.15	µg/L	**5 UJ**[c]	NA	**5 U**[c]	1.1 U	**3.3 U**[c]	**5 U**[c]	NA	**5 U**[c]	NA
vanadium	—	—	—	26.27	µg/L	*50 U*[c]	NA	2.4 J	4.1 UJ	3.4 J	3.03 J	*50 U*[c]	2.7 J	NA
zinc	—	—	—	36.39	µg/L	20 U	NA	6.2 J	2.8 UJ	20 U	13.7 J	13.9 J	8.8 J	NA
Dissolved Gases														
methane	—	—	—	—	µg/L	NA	NA	NA	NA	NA	5,100	2,000	6,100	NA
General Chemistry														
alkalinity (as $CaCO_3$)	—	—	—	—	µg/L	NA	NA	NA	NA	NA	565,000	572,000	820,000	NA
bicarbonate	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	572,000	820,000	NA
chloride	—	—	—	—	µg/L	NA	NA	NA	NA	NA	28,600 J	22,900	22,000	NA
solids, total dissolved	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA	NA	700,000	NA
sulfate	—	—	—	—	µg/L	NA	NA	NA	NA	NA	2,070	6,220	1,600	NA
sulfide	—	—	—	—	µg/L	NA	NA	NA	NA	NA	1,000 U	1,000 U	60	NA

Table 4-4
Groundwater Sampling Results, AOC 25

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Background	Result Units	Station ID: S03-DGS-DP05 Sample: 385-S03-010 [a] Depth Interval: 0 - 10 Collection Date: 24-Jul-01	S03-DGS-DP05 385-S03-010A 0 - 10 24-Jul-01	S03-DGS-DP07 385-S03-018 5 - 5.5 18-Jun-01
VOCs								
acetone	—[b]	—	—	—	µg/L	NA	5 UJ	NA
tert-butyl alcohol	—	—	—	—	µg/L	NA	NA	NA
carbon disulfide	—	—	—	—	µg/L	NA	0.5 J	NA
chloromethane	—	—	—	—	µg/L	NA	2 UJ	NA
methylene chloride	5	5	—	—	µg/L	NA	2 UJ	NA
toluene	1,000	150	—	—	µg/L	NA	0.4 J	NA
trichloroethene	5	5	—	—	µg/L	NA	2 UJ	NA
trichlorofluoromethane	—	150	—	—	µg/L	NA	NA	NA
m-, p-xylene	—	—	—	—	µg/L	NA	NA	NA
Petroleum Hydrocarbons								
diesel	—	—	100	—	µg/L	**200 U**[c]	**760**	NA
gasoline	—	—	100	—	µg/L	50 U	50 U	NA
hydrocarbons	—	—	—	—	µg/L	NA	NA	NA
motor oil	—	—	100	—	µg/L	**200 U**[c]	100 U	NA
Pesticides/PCBs						NA	NA	NA
Metals								
aluminum	1,000	1,000	—	1,070	µg/L	NA	NA	NA
antimony	6	6	—	37.50	µg/L	NA	NA	NA
arsenic	10	50	—	20.72	µg/L	NA	NA	NA
barium	2,000	1,000	—	569.5	µg/L	NA	NA	NA
beryllium	4	4	—	2.50	µg/L	NA	NA	NA
cadmium	5	5	—	—	µg/L	NA	NA	NA
calcium	—	—	—	—	µg/L	NA	NA	NA
chromium	100	50	—	12.45	µg/L	NA	NA	NA
cobalt	—	—	—	—	µg/L	NA	NA	NA
copper	—	—	—	24.03	µg/L	NA	NA	NA
iron	—	—	—	6,586	µg/L	NA	NA	NA
lead	15	—	—	11.45	µg/L	NA	NA	4.8 UJ
magnesium	—	—	—	—	µg/L	NA	NA	NA
manganese	—	—	—	1,741	µg/L	NA	NA	NA
molybdenum	—	—	—	—	µg/L	NA	NA	NA
nickel	—	100	—	—	µg/L	NA	NA	NA
potassium	—	—	—	—	µg/L	NA	NA	NA
selenium	50	50	—	8.58	µg/L	NA	NA	NA
sodium	—	—	—	—	µg/L	NA	NA	NA
thallium	2	2	—	16.15	µg/L	NA	NA	NA
vanadium	—	—	—	26.27	µg/L	NA	NA	NA
zinc	—	—	—	36.39	µg/L	NA	NA	NA
Dissolved Gases								
methane	—	—	—	—	µg/L	NA	NA	NA
General Chemistry								
alkalinity (as $CaCO_3$)	—	—	—	—	µg/L	NA	NA	NA
bicarbonate	—	—	—	—	µg/L	NA	NA	NA
chloride	—	—	—	—	µg/L	NA	NA	NA
solids, total dissolved	—	—	—	—	µg/L	NA	NA	NA
sulfate	—	—	—	—	µg/L	NA	NA	NA
sulfide	—	—	—	—	µg/L	NA	NA	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] detection limit is above criteria
[d] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL
[e] italicized font indicates result above background

Acronyms/Abbreviations:
AOC – area of concern
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
GW – groundwater
µg/L – micrograms per liter
MCL – maximum contaminant level
NA – not analyzed
ND – not detected
PCB – polychlorinated biphenyl
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 6-1
Tier 1 Evaluation Results by Exposure Group, AOC 25

Exposure Group [a]	Cancer Risk	Hazard Index
1. All soil and groundwater exposure pathways		
Total [b]	3E-03	35
Without metals below background	3E-03	34
2. Exposure pathways for soil and vapors from VOCs in groundwater		
Total [b]	2E-04	6
Without metals below background	1E-06	5
3. Exposure pathways for residential use of groundwater		
Total [b]	3E-03	29
Without metals below background	3E-03	29

Notes:

[a] PAHs are not included

[b] includes all COPCs

Acronyms/Abbreviations:

AOC – area of concern

COPC – chemical of potential concern

PAH – polynuclear aromatic hydrocarbon

VOC – volatile organic compound

Table 6-2
Tier 1 Evaluation Results by Risk Driver, AOC 25

Study Area	Analyte Name	TOTAL		WITHOUT BACKGROUND	
		Hazard Quotient	Cancer Risk	Hazard Quotient	Cancer Risk
AOC 25					
Soil					
	aluminum	0.3	—*	0.3	—
	arsenic	—	2E-04	—	—
	cadmium	1	—	1	—
	iron	2	—	2	—
	lead	1	—	—	—
	mercury	0.3	—	0.3	—
	thallium	0.4	—	0.4	—
	vanadium	0.8	—	0.8	—
	Total for soil	**6**	**2E-04**	**5**	**1E-06**
Groundwater					
	arsenic	—	3E-03	—	3E-03
	barium	0.2	—	—	—
	cadmium	0.9	—	0.9	—
	iron	3	—	3	—
	manganese	2	—	2	—
	thallium	22	—	22	—
	vanadium	0.8	—	0.8	—
	Total for groundwater	**29**	**3E-03**	**29**	**3E-03**
	Total for soil and groundwater	**35**	**3E-03**	**34**	**3E-03**

Note:
* dash indicates not applicable

Acronym/Abbreviation:
AOC – area of concern

Table 7-1
Summary of RI Results and Recommendations, AOC 25

DQO Problem	DQO Decision Questions	Nature and Extent	Tier 1 Evaluation	Recommendation
Previous investigation identified metals in soil (arsenic) and groundwater (thallium, and cadmium), north of Building 503 at concentrations above PSCs and arsenic in groundwater above its PSC in the southern portion of AOC 25. Diesel-range and motor oil–range TPH were also detected in soil and groundwater samples from AOC 25 at concentrations above PSCs. A stained area was identified in the EBS in the southern portion of AOC 25; no groundwater sampling had been performed to evaluate potential groundwater impacts.	Have the nature and extent of contamination been defined?	Yes, definition is adequate. Deeper soil samples were not collected near 132-004M to evaluate motor oil–range TPH in soil; however, motor oil–range TPH is not very mobile in soil and downgradient groundwater samples indicate no impact. The extent of diesel-range TPH in groundwater in the northern portion of the AOC is not defined, but this concentration is likely due to positive interferences in the analytical method. Metals in soil and groundwater are naturally occurring. The RI groundwater sample collected near the location of the reported stain did not indicate an impact to groundwater.	NA	No further action for metals. No further sampling is required to support risk assessment. TPH in the northern area appears to be related to adjacent CAA and should be reviewed along with CAA-3C under the Alameda Point TPH Program to see if the San Francisco Bay Regional Water Quality Control Board's criteria for low-risk fuel sites are met. TPH in the southern area is limited to surface soils and has not impacted groundwater.
	Are contaminants present at concentrations that contribute to an unacceptable risk to potential future residents?	NA	No. The total cancer risk without metals below Alameda Point background 95th percentile is 3×10^{-3} and the HI is 34. Cancer risk is primarily due to arsenic in groundwater (3×10^{-3}), which is believed to represent background concentrations. Cancer risk without arsenic and other metals present at concentrations below background is 1×10^{-6}.	No further action.

Table 7-1 (continued)

DQO Problem	DQO Decision Questions	Nature and Extent	Tier 1 Evaluation	Recommendation
			Noncancer risk is primarily due to metals reported in soil and groundwater at AOC 25. The metals concentrations are either not representative of groundwater conditions at the site (thallium [HQ of 22] and cadmium [HQ of 0.9]) or are believed to be naturally occurring (aluminum [soil HQ of 0.3], iron [soil HQ of 2, groundwater HQ of 3], manganese [groundwater HQ of 2], and vanadium [soil HQ of 0.8, groundwater HQ of 0.8]). Additionally, the maximum metals concentrations used in the Tier 1 evaluation are believed to represent total rather than dissolved concentrations.	
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?	NA	NA. This pathway was not evaluated for AOC 25, located approximately 1,700 feet from the nearest surface water body.	NA

Acronyms/Abbreviations:
AOC – area of concern
CAA – corrective action area
DQO – data quality objective
EBS – environmental baseline survey
HI – hazard index
HQ – hazard quotient
NA – not applicable
PSC – preliminary screening criterion
RI – remedial investigation
TPH – total petroleum hydrocarbons

ATTACHMENT U

EBS PARCEL 205

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL
REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT
ATTACHMENT U, EBS PARCEL 205
IR SITE 35, TRANSFER PARCEL EDC-5
ALAMEDA POINT
ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Environmental Baseline Survey (EBS) Parcel 205. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station Alameda), Alameda, California.

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

EBS Parcel 205 is an approximately 0.1-acre data gap area along the southeastern border of Transfer Parcel Economic Development Conveyance 5 (Figure 1-1). Four buildings were historically located on the EBS parcel: Buildings 507, 508, 523, and 605. Currently, there are no buildings present in the study area; only their concrete pads remain (Photograph 1-1). EBS Parcel 205 is located within the former fuel line Corrective Action Area (CAA)-B.

1.2 HISTORICAL USE

EBS Parcel 205 was used as part of a flight test area for aircraft. Buildings at this parcel were used for storage of various items including equipment, electrical parts, tools, and batteries. Additionally, various chemicals, including oils and nonchlorinated organic chemicals, were reported to have been stored inside buildings and in outdoor storage lockers. Chemicals were noted as being labeled and stored correctly and adequately.

Stains were observed in two open space areas during the EBS, including a small stain (1 by 2 feet) near Building 523 and two larger stains (4 square feet each) on the west side of Building 507. Additionally, one stain (approximately 3 by 4 feet) was observed in the southwest corner inside Building 507 during the EBS; because this stain was indoors and on a concrete pad, it was considered to be a minor cause for concern (Photograph 1-2).

The solid waste management unit (SWMU) site located in EBS Parcel 205 is a generator accumulation point (GAP) that was historically used for storing containers of jet propellant grade 5 (JP-5) and engine, lubricating, and hydraulic oils. The EBS and Parcel Evaluation Plan (PEP) listed the location of this SWMU as east of Building 523 and stated that there were no known releases at Naval Aviation Depot (NADEP) GAP 73. The SWMU Report gave this location as north of Building 507, which contradicts the location listed in the EBS and PEP. The SWMU was recommended for no further action in a November 1999 letter to the California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (SulTech 2005a). The actual location of the SWMU was not apparent during the 2005 site walk (BEI 2005b).

Photograph 1-1
Building Pads for Former Buildings 507, 508, and 523, View to East

Photograph 1-2
Stained Area of Building 507, View to East

1.3 PRELIMINARY SCREENING CRITERIA AND BACKGROUND METALS

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this EBS parcel are the following:

- Soil
  - residential preliminary remediation goals (PRGs) (U.S. EPA 2004b), except polynuclear aromatic hydrocarbons (PAHs) classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (DON 2001a)
  - environmental screening levels (ESLs) for total petroleum hydrocarbons (TPH) – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)
- Groundwater
  - maximum contaminant levels (MCLs) and advisory level for lead (U.S. EPA 2002, DHS 2006)
  - ESLs for TPH – water (RWQCB 2005)
  - Because EBS Parcel 205 is near Seaplane Lagoon, groundwater concentrations were also compared to the following surface water criteria:
    - California Toxics Rule (Title 40 *Code of Federal Regulations* Section 131.38) for saltwater aquatic organisms (saltwater criterion continuous concentration [CCC]) and human-health consumption of organisms only (HHCO)
    - National Recommended Water Quality Criteria (NRWQC) for saltwater aquatic organisms (saltwater CCC) and HHCO (U.S. EPA 2002, 2006)
    - ESLs for TPH – surface water bodies (marine) (RWQCB 2005)

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being assessed. For example, groundwater concentrations from all study areas were compared to MCLs, whether or not the groundwater was considered a potential drinking water source in that area. Groundwater concentrations in areas near surface water bodies were also compared to surface water PSCs even though surface water criteria are not applicable to groundwater. Chemicals of potential concern (COPCs) identified in the health risk evaluations include all chemicals reported above detection limits in any sample, not just those above PSCs.

In addition to the above-listed PSCs, metals concentrations in soil and groundwater at EBS Parcel 205 were compared to the following Alameda Point background concentrations to help discriminate between site-related and naturally occurring metals:

- Alameda Point background soil concentrations (95th percentile of the pink data set; Appendix E of the final RI Report of Operable Unit [OU]-1 Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)
- Alameda Point background groundwater concentrations (95th percentile; Appendix E of the final RI Report of OU-1 Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)

For ease of discussion in this report, the Alameda Point 95th percentile concentrations for metals in soil (pink background data set) and groundwater are referred to as "background."

Section 4.3 of the main RI/FS Report provides further discussion on the occurrence and interpretation of metals concentrations in soil and groundwater at IR Site 35.

1.4 PREVIOUS INVESTIGATIONS

During two previous investigations at EBS Parcel 205, soil samples were collected. In addition, an investigation and removal of a former fuel line at the study area included the collection of soil and groundwater samples. Results of these investigations are summarized below. Locations sampled in and around the study area are shown on Figure 1-1. Analytical results for samples collected within EBS Parcel 205 are summarized in Appendix B.

1.4.1 Environmental Baseline Survey

Three soil samples (205-0001M, -0002, and -0002M) were collected just outside the boundary of EBS Parcel 205, in the larger of the stained areas, and analyzed for TPH and metals (IT 2001a). These analytes were reported at concentrations below PSCs.

1.4.2 2002 Polynuclear Aromatic Hydrocarbon Study at Alameda Point

Four soil borings (C3P205B001, C3P205B002, C3P205B004, and C3P205B005) were advanced in EBS Parcel 205 during the 2002 PAH study (BEI 2005a). One soil boring (C3P205B003) was advanced just outside the boundary of the study area. Samples were collected from four depth intervals between 0 and 8 feet below ground surface (bgs) and analyzed for PAHs. B(a)P equivalent concentrations were below the PSC.

1.5 ADJACENT SITES

Underground pipelines that historically distributed JP-5 and other fuels from locations near Seaplane Lagoon to various locations at Alameda Point were removed (34,500 linear feet) or abandoned in place (24,100 linear feet) between June 1998 and February 1999 (TtEMI 2000a). TPH concentrations reported in confirmation soil and groundwater samples collected following fuel line removal and abandonment were above preliminary remediation criteria screening levels established by the Navy for petroleum-contaminated

sites at Alameda Point (DON 2001b). The former fuel line areas were designated former fuel line CAA-B. EBS Parcel 205 is located within the former fuel line areas (Figure 1-1). The former fuel lines running through EBS Parcel 205 were abandoned in place. No further action was recommended for former fuel line CAA-B because it met the criteria for low-risk fuel site closure requirements set forth by the San Francisco Bay Regional Water Quality Control Board (Water Board) (TtEMI 2003b).

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Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, geology, and groundwater beneficial use at EBS Parcel 205.

EBS Parcel 205 is located west of Saratoga Street. Topography at the study area is relatively flat. Average ground elevation, based on elevation data from the two borings (D205SB01 and D205SB02) advanced during the RI, is 9 feet above mean sea level (MSL). The average depth to water in the two RI borings was approximately 3 feet bgs. Groundwater depth was measured in temporary casings prior to groundwater sample collection. Total dissolved solids (TDS) concentrations measured in groundwater samples from the two borings were 184 to 334 milligrams per liter (mg/L), and the average TDS concentration was 259 mg/L.

The groundwater monitoring well nearest to EBS Parcel 205 is M10-02, located approximately 500 feet north in IR Site 10. A review of groundwater depths in this well over time (August 1991 through December 2003) shows depth to water from approximately 6 to 8 feet bgs. The deepest historical groundwater measured in this well is approximately 6 feet above MSL. This value, if subtracted from the ground elevation at EBS Parcel 205, would suggest depth to water in the vicinity of this study area may have been similar to the depth observed during the 2005 RI sampling (approximately 3 feet bgs).

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is south at the study area. Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Based on tidal studies performed at other Alameda Point sites, tidal influence would be expected at EBS Parcel 205, located adjacent to Seaplane Lagoon. Results of the tidal study at nearby sites (see Section 2 of the main RI/FS Report) showed significant tidal influence in wells located within 30 feet of Seaplane Lagoon and minimal tidal influence in a well located approximately 100 feet inland of Seaplane Lagoon, indicating a significant decrease in tidal influence over a relatively short distance.

Soil encountered in the two RI borings consisted of poorly graded sand. Fine-grained bay sediment (Young Bay Mud) was not encountered at about 10 feet bgs, the total depth of these borings. The Young Bay Mud is estimated to be at a depth of 17 feet bgs based on surrounding borings (see cross section E-E′ on Figure 2-8 of the main RI/FS Report). RI boring logs for EBS Parcel 205 are presented in Appendix B. The Marsh Crust was not encountered in the borings. As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust is not likely to be located beneath EBS Parcel 205.

Based on the location of EBS Parcel 205 west of Saratoga Street, groundwater at this study area would not be considered a drinking water source. In a letter dated July 21, 2003, the Navy received concurrence from the Water Board that groundwater west of Saratoga Street meets exemption criteria for the municipal and domestic water supply designation in the California State Water Resources Control Board source of drinking water policy Resolution (Res.) 88-63 (SWRCB 1988) and California Regional Water Quality Control Board Res. 89-39 (RWQCB 2003). Additionally, sustained pumping from this parcel would likely result in saltwater intrusion since EBS Parcel 205 is adjacent to Seaplane Lagoon.

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Section 3

REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for EBS Parcel 205. The RI was conducted in accordance with the sitewide data quality objectives (DQOs) for the evaluation of Data Gap Areas presented in Table 3-1 of the main RI/FS Report.

3.1 APPROACH

At the request of the regulatory agencies, EBS Parcel 205 was identified as a data gap area due to the presence of NADEP GAP 73. The 2005 SWMU Report identified NADEP GAP 73 as located north of Building 507; however, the EBS identified this SWMU as located at Building 523.

Soil and grab groundwater samples were collected from two borings at EBS Parcel 205: one in the stained area southwest of NADEP GAP 73 reported to be in the northwest portion of the study area, and one adjacent to the reported location on NADEP GAP 73 in the southeast portion of the study area. Both locations were sampled to assess whether soil and groundwater have been impacted by possible releases from this GAP.

3.2 SCOPE

Soil and groundwater samples were collected during the 2005 RI sampling from the two borings. Three soil samples (at 1 to 2, 2 to 3.5, and 7 to 8 feet bgs) were collected from each boring. Grab groundwater samples were collected from temporary casings screened from 5 to 10 feet bgs placed inside the borings. Table 3-1 includes a summary of samples collected during the RI and previous investigations. Figure 1-1 shows sampling locations from all investigations.

All soil and grab groundwater samples were analyzed for volatile organic compounds (VOCs), TPH (purgeable-range and extractable-range), and metals. Groundwater samples were also analyzed for TDS. Because EBS Parcel 205 is located adjacent to Seaplane Lagoon, groundwater was also analyzed for mercury using a low detection level for comparison to the surface water PSC.

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Section 4
NATURE AND EXTENT OF CONTAMINATION

This section discusses sampling and analysis from previous investigations and from the RI and presents the concentration ranges and spatial distributions of the analytes identified at EBS Parcel 205. Soil and groundwater samples were collected at six locations during the EBS (IT 2001a), the 2002 PAH study (BEI 2005a), and the RI (Table 3-1 and Figure 1-1). Results for analytes with concentrations above PSCs are illustrated on Figure 4-1. Metals reported in soil and groundwater at concentrations above background are discussed in detail in Section 4.3.3 of the main RI/FS Report. Metals discussion in this section focuses primarily on concentrations above PSCs. Regardless of concentration, all reported metals (except required human trace nutrients) were included in the risk evaluation (Section 6).

Statistical summaries of soil and groundwater results are presented in Tables 4-1 and 4-2, and soil and groundwater analytical results are summarized in Tables 4-3 and 4-4. The distribution of analytes reported in groundwater at concentrations above PSCs is illustrated on Figure 4-1. Complete analytical results for historical and RI samples collected within the study area are included in Appendices B and G, respectively.

4.1 SOIL SAMPLING RESULTS

Analytical soil sampling results are discussed for each class of chemicals investigated at EBS Parcel 205.

4.1.1 Volatile Organic Compounds

Carbon disulfide, cis-1,2-dichloroethene (DCE), methylene chloride, and tetrachloroethene were reported in soil from borings D205SB01 and D205SB02. VOC concentrations were below PSCs.

4.1.2 Polynuclear Aromatic Hydrocarbons

Thirteen PAHs were reported in soil from borings C3P205B001, C3P205B002, C3P205B004, and C3P205B005. PAH concentrations were below the PSC.

4.1.3 Total Petroleum Hydrocarbons

TPH was not reported at concentrations above the laboratory detection limits in soil samples collected from borings D205SB01 and D205SB02.

4.1.4 Metals

Sixteen metals were reported in soil from borings D205SB01 and D205SB02. Metals concentrations were below PSCs with one exception. Arsenic was reported at concentrations above the PSC but not above background.

4.2 GROUNDWATER SAMPLING RESULTS

Groundwater samples were not collected at EBS Parcel 205 during previous investigations. Analytical groundwater sampling results are summarized for each class of chemicals investigated at the study area during the RI.

4.2.1 Volatile Organic Compounds

Nine VOCs were reported in groundwater from borings D205SB01 and D205SB02. cis-1,2-DCE and vinyl chloride were reported in the sample from boring D205SB02 at concentrations (8.3 and 1.8 micrograms per liter [µg/L], respectively) above PSCs (MCLs of 6 µg/L for cis-1,2-DCE and 0.5 µg/L for vinyl chloride). Other VOC concentrations (a chlorinated solvent and fuel-related analytes) were below PSCs. None of the reported concentrations were above surface water PSCs.

4.2.2 Total Petroleum Hydrocarbons

TPH was not reported at concentrations above laboratory detection limits in the groundwater sample collected from boring D205SB01. Diesel- and JP-5–range TPH was reported at concentrations of 220 and 170 µg/L, respectively, in the sample from boring D205SB02. Reported TPH concentrations were above the ESL of 100 µg/L but below surface water PSCs (TPH surface water ESLs of 640 and 640 µg/L).

The gasoline- and diesel-range TPH results were both qualified by the analytical laboratory. The laboratory noted that the gasoline-range TPH result was for a wide range of hydrocarbons and did not match the gasoline standard, and that the diesel-range TPH result was representative of lower boiling point hydrocarbons like jet fuel, mineral spirits, kerosene, Stoddard solvent, or white gas. Based on laboratory qualifiers, the fuel reported in the sample represents JP-5. The gasoline- and diesel-range TPH reported likely represents the lighter and heavier fractions of JP-5 fuel.

4.2.3 Metals

Ten metals were reported in groundwater from borings D205SB01 and D205SB02. Arsenic was the only metal reported at a concentration above the PSC. Arsenic was reported at 15.7 µg/L in the sample from boring D205SB02. This concentration was above the MCL of 10 µg/L and surface water PSC (NRWQC HHCO of 0.14 µg/L), but was below the background concentration of 20.72 µg/L.

Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for EBS Parcel 205. It discusses the conceptual model, the physical and chemical changes that might occur to contaminants present at EBS Parcel 205, and the mechanisms that could potentially transfer the contaminants from the study area. The conceptual site model facilitates understanding of the present AOC conditions by integrating AOC-specific physical characteristics with the nature and extent of contaminants in the physical systems. Section 5.2 includes an evaluation of the mobility and persistence of compounds above PSCs not attributable to background and of risk drivers at EBS Parcel 205. Section 5.3 discusses potential migration pathways.

5.1 EBS PARCEL 205 CONCEPTUAL SITE MODEL

Topography at EBS Parcel 205 is flat, and the entire study area is currently paved. EBS Parcel 205 is bordered by Seaplane Lagoon to the south and is located within CAA-B.

Based on a review of RI borings logs, the subsurface lithology at EBS Parcel 205 consists of poorly graded sand. Shallow groundwater of the first water-bearing zone beneath EBS Parcel 205 occurs in the fill material. The underlying Young Bay Mud would be expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. The Marsh Crust is not likely to be located beneath the study area and was not encountered in the borings. Groundwater flow direction is south, and average depth to water is approximately 3 feet bgs. Tidal influence is expected at the study area and will likely vary with distance from Seaplane Lagoon. Groundwater at EBS Parcel 205 would not be considered a drinking water source based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.

cis-1,2-DCE, vinyl chloride, TPH (JP-5), and arsenic are the chemicals in groundwater with concentrations reported above PSCs at the study area. All were reported in one groundwater sample from boring D205SB02. Only arsenic was reported at a concentration above the surface water PSC; however, the concentration was below background. No chemicals were reported in soil at concentrations above PSCs and background.

Additionally, the human-health risk assessment (HHRA) (Section 6) identified benzene, trichloroethene (TCE), and tetrachloroethene (PCE) in groundwater as chemicals with a cancer risk contribution of greater than 10^{-6}. These three chemicals were reported in the groundwater sample from D205SB02 at concentrations below MCLs. PCE was also reported in the groundwater sample from D205SB01 at a concentration of 0.21 J µg/L, below the MCL of 5 µg/L. (The "J" qualifier indicates the value is estimated.)

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in

the environment tends to remain in place. The tendency toward immobility and persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Section 5 of the main RI/FS Report discusses the physical and chemical properties of contaminants, and their chemical class (e.g., VOCs, TPH, metals), that affect their transport and persistence in the environment. Also discussed in Section 5 of the main RI/FS Report are mobility and persistence of naturally occurring metals. This section discusses the mobility and persistence of chlorinated VOCs, benzene, and TPH.

5.2.1 Chlorinated Volatile Organic Compounds

Chlorinated VOCs (e.g., cis-1,2-DCE and vinyl chloride) generally have low-to-moderate solubilities, high volatilities, low-to-moderate partition coefficients, high mobilities, and, except for vinyl chloride, product densities greater than water. Because of their densities, PCE and TCE tend to coalesce and migrate as immiscible dense nonaqueous-phase liquids (DNAPLs) when present in groundwater at concentrations exceeding their water solubility. The concentrations of chlorinated solvents reported at EBS Parcel 205 are not high enough to suggest the presence of DNAPL.

Chlorinated VOCs tend to adsorb weakly to clay and organic soil, and under suitable conditions, they are relatively easily leached from soil into groundwater. In the subsurface, depending on conditions (the presence of nutrients, microorganisms, a reducing environment, etc.), chlorinated VOCs typically undergo reductive dechlorination, a biological process that breaks down chlorinated ethenes in groundwater. For example, PCE and TCE degrade in reducing environments to form 1,2-DCE or 1,1-DCE (with the most common intermediate being cis-1,2-DCE), and vinyl chloride. However, degradation does not always occur, and the time required for each dechlorination step may be widely variable. The presence of both cis-1,2-DCE and vinyl chloride in the groundwater suggests that PCE and TCE are degrading in the subsurface.

Estimates of mobility and persistence for cis-1,2-DCE, TCE, PCE, and vinyl chloride are summarized in Table 5-1. Because they tend to adsorb weakly to organics in soils, they are only slightly retarded relative to groundwater flow, with retardation factors ranging from 2 for vinyl chloride to about 7 for TCE. Additionally, as indicated by the estimated percent of the solvent adsorbed to soil, much of the mass of the chlorinated solvents will be present either in the groundwater or the vapor phase. A modified classification scheme has been suggested by Dragun (1988). It is based on the organic carbon partition coefficient (K_{oc}) values for constituents with a K_{oc} less than 50, 50 to 150, and 150 to 500, representing constituents that are considered very mobile, mobile, and intermediate in mobility, respectively. The chlorinated compounds reported in groundwater samples from EBS Parcel 205 are classified as either very mobile or mobile.

5.2.2 Total Petroleum Hydrocarbons

TPH is a member of a large family of several hundred chemical compounds that originated from crude oil. Most compounds in TPH are VOCs such as benzene, toluene, ethylbenzene, xylenes, hexane, and naphthalene. The relevant physicochemical

parameters for VOCs include water solubility, vapor pressure, Henry's law constant, and K_{oc}. The solubility of a chemical in water is a critical property because transport is often by water. Highly soluble substances can be readily leached from soil and are generally mobile in groundwater. Volatilization of a constituent is dependent on its vapor pressure, water solubility (if present in water), and molecular weight. Vapor pressure is the tendency of the substance to evaporate and can be thought of as the solubility of a chemical in the gas phase at a given temperature. Higher vapor pressure indicates greater tendency to volatilize. Benzene is both relatively soluble and has a tendency to volatilize. Estimates of mobility for benzene are summarized in Table 5-1. The K_{oc} value for benzene is over 50, indicating that benzene is mobile in the subsurface.

Biodegradation is one of the most important transformation mechanisms for natural attenuation of petroleum hydrocarbons. While the fuel components remain in the subsurface, they have been shown to degrade under both aerobic and anaerobic conditions. Under aerobic conditions, benzene has been shown to degrade at a faster rate than xylenes, but under anaerobic conditions benzene degrades at a very slow rate. High concentrations and very low concentrations (like those seen at EBS Parcel 205) of contaminants may not be biodegradable.

5.3 Migration Pathways

The migration pathways evaluated for relevance to EBS Parcel 205 include atmospheric transport (i.e., vapors and airborne fugitive dust), transport via surface water runoff, and groundwater transport away from the study area and toward Seaplane Lagoon. Chlorinated compounds, TPH, and arsenic were reported in groundwater at concentrations above PSCs. Arsenic was reported below background and is considered to be naturally occurring. None of the other analytes in groundwater were reported at concentrations above surface water PSCs. No compounds were reported in soil at concentrations above PSCs. Particulate dispersion (either by wind or surface water) is not a primary transport mechanism because all of EBS Parcel 205 is paved; additionally, analytes were not reported in the soil at concentrations above PSCs.

The two most likely transport pathways identified at EBS Parcel 205 are the following.

- **Atmospheric Transport by Vapors**. The VOCs identified in groundwater at EBS Parcel 205 can volatilize from the groundwater and migrate to the surface. The pavement at the study area will lessen the effects of this migration pathway. However, if buildings are constructed on the study area in the future, the volatile compounds could accumulate in indoor air. They could also be released from groundwater used for residential purposes during activities like showering.
- **Transport Due to Groundwater Flow**. Analytes present in groundwater can be transported with the flow of groundwater away from the study area and into Seaplane Lagoon. Calculations described in Section 5 of the main RI/FS Report indicate that the velocity of VOCs in the subsurface would be only slightly slower than that of groundwater. Concentrations reported in groundwater are below surface water PSCs, indicating that movement of these compounds from EBS Parcel 205 would not significantly impact Seaplane Lagoon. The concentrations reported in groundwater are above groundwater PSCs (MCLs),

but these concentrations are not expected to be widespread because they were not reported in the other groundwater sample from the study area. EBS Parcel 205 is located west of Saratoga Street, making the use of groundwater below this study area unlikely. Concentrations reported in groundwater above groundwater PSC would only be a concern if they migrated to adjacent areas with planned groundwater use.

Section 6
HUMAN-HEALTH RISK ASSESSMENT

This section summarizes the baseline HHRA results for EBS Parcel 205. In the baseline HHRA, risk for a residential exposure scenario is assessed with the assumption that no remedial action would take place at the study area. Baseline risks were evaluated for reasonable maximum exposure (RME). This section also presents a qualitative uncertainty evaluation that identifies and characterizes the effects of uncertainties on the risk results.

The HHRA calculates total cumulative risk values and was conducted in accordance with guidelines published by the United States Environmental Protection Agency (U.S. EPA) in the Risk Assessment Guidance for Superfund Part A (U.S. EPA 1989), Part B (U.S. EPA 1991), and Part E (U.S. EPA 2004a) and supporting documents and guidelines published by the Cal/EPA (1993, 1994, 1999, 2005). The approach used to calculate risk is described in Section 6 of the main RI/FS Report. HHRA information is provided in Appendix J.

Cancer risk and noncancer values for EBS Parcel 205 are shown in Table 6-1. Risk drivers for cancer and noncancer risk are presented in Table 6-2.

6.1 COPC IDENTIFICATION

The data selection and identification of COPCs are based on a compilation of all usable data for soil and groundwater. All chemicals reported in at least one sample collected during the RI and/or included in the historical data were included as HHRA COPCs. The HHRA included PAHs in soil, except calcium, magnesium, potassium, and sodium, which are known to be required human trace nutrients. All metals were included in the list of HHRA COPCs regardless of whether the concentrations were above or below background.

The identification of HHRA COPCs in soil was based on results from analyses of samples collected from 0 to 10 feet bgs or to groundwater if depth to groundwater is less than 10 feet bgs.

There are 29 COPCs in soil: 8 VOCs and 7 semivolatile organic compounds based on 12 samples, and 14 metals based on 3 samples. There are 15 COPCs in groundwater: 9 VOCs and 6 metals based on 2 samples.

None of the metals reported in soil and groundwater had concentrations above background except mercury in groundwater.

6.2 RISK CHARACTERIZATION

This section presents the results of the U.S. EPA and Cal/EPA cancer risk calculations, noncancer hazard values, and the evaluation of lead. Results are presented in terms of three exposure groups:

- **Exposure Group 1**. All soil and groundwater exposure pathways (includes residential use of groundwater)

- **Exposure Group 2**. Exposure pathways for soil and vapors from VOCs in groundwater (does not include residential use of groundwater)
- **Exposure Group 3**. Exposure pathways for residential use of groundwater

For cancer risk, specific exposure pathways are discussed in the following sections. Two results are presented for each exposure group, the total risk and a second value that does not include risk associated with metals concentrations that are below Alameda Point background. For cancer risk, specific exposure pathways are also discussed.

6.2.1 Cancer Risk

The total for both U.S. EPA and Cal/EPA RME cancer risks (including background) is 4×10^{-4} and 2×10^{-3}. The total RME cancer risks rank-ordered by exposure pathway for U.S. EPA and Cal/EPA, respectively, are as follows:

- residential use of groundwater (3×10^{-4} and 2×10^{-3})
- inhalation of vapors in indoor air (2×10^{-5} and 3×10^{-5})
- direct contact with soil (1×10^{-5} and 7×10^{-5})
- ingestion of homegrown produce (7×10^{-6} and 4×10^{-5})
- inhalation of particulates and vapors in outdoor air (2×10^{-7} and 3×10^{-7})

For residential use of groundwater, the cancer risk is above the risk management range. The cancer risks for all exposure pathways without metals below background are 8×10^{-5} and 6×10^{-5} due to vapor migration into indoor air.

For reasonable future use exposure via soil and vapors from groundwater, the cancer risks without metals below background are 2×10^{-5} and 3×10^{-5} due to vapor migration into indoor air.

6.2.2 Noncancer Hazard

For residential use of groundwater, the noncancer hazard index (HI) value is 4. Without metals below background, the HI is 0.9.

For reasonable future use exposure via soil and vapors from groundwater, HI is 1; without metals below background, the HI is 0.07.

The maximum concentration of lead in soil of 8.8 milligrams per kilogram (mg/kg) is below the background concentration of 37.7 mg/kg, below the generic lead PRG of 150 mg/kg, and below the site-specific PRGs for lead of 184 mg/kg with the ingestion of homegrown produce and 322 mg/kg without that pathway. Lead was not reported in groundwater.

6.3 UNCERTAINTY ANALYSIS

The data are considered adequate for this approximately 0.1-acre site.

6.4 CONCLUSIONS

For EBS Parcel 205, the U.S. EPA and Cal/EPA total cancer risks including metals below background are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 4×10^{-4} and 2×10^{-3}, respectively

  Without metals below background: 8×10^{-5} and 6×10^{-5}, respectively

- **Exposure Group 2** (exposure pathways for soil, and vapors from VOCs in groundwater):

  Total: 4×10^{-5} and 1×10^{-4}, respectively

  Without metals below background: 2×10^{-5} and 3×10^{-5}, respectively

  Without metals below background and PAHs in soil: 2×10^{-5} and 3×10^{-5}, respectively

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 3×10^{-4} and 2×10^{-3}, respectively

  Without metals below background: 8×10^{-5} and 6×10^{-5}, respectively

The noncancer hazard values including metals below background are as follows:

- **Exposure Group 1** (all soil and groundwater exposure pathways):

  Total: 6

  Without metals below background: less than 1

- **Exposure Group 2** (exposure pathways for soil, and vapors from VOCs in groundwater):

  Total: at or less than 1

  Without metals below background: less than 1

- **Exposure Group 3** (exposure pathways for residential use of groundwater):

  Total: 4

  Without metals below background: less than 1

The cancer risk drivers without metals below background are VOCs in groundwater. Noncancer hazard values without metals below background are below 1.

For reasonable future use (Exposure Group 2), the U.S. EPA and Cal/EPA cancer risks without metals below background are largely due to vapor migration into indoor air.

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Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at EBS Parcel 205, including the nature and extent of contamination and results of the baseline HHRA. These results form the basis of responses to the DQO decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendations presented below.

7.1 SUMMARY

The RI addressed a request by regulatory agencies to assess soil and groundwater quality near NADEP GAP 73. Because it was uncertain whether NADEP GAP 73 was located north or east of Building 523, samples were collected during the RI at two locations. Soil and groundwater samples were collected at six locations during previous investigations and the RI.

Chemicals reported in groundwater at EBS Parcel 205 that were above PSCs include the VOCs cis-1,2-DCE and vinyl chloride. VOCs were slightly above MCLs, but not above surface water PSCs at one of two groundwater sampling locations. Arsenic was also reported in one groundwater sample above the PSC, but below background. The laboratory identified TPH as JP-5 in a groundwater sample from one boring at concentrations above the groundwater PSC but below surface water PSCs. Chemicals at EBS Parcel 205 were not reported in soil above PSCs.

Groundwater at EBS Parcel 205 would not be a drinking water source, based on the Water Board's concurrence with the Navy's conclusion that groundwater west of Saratoga Street generally meets exemption criteria for the municipal and domestic water supply designation.

Results of the baseline HHRA show a U.S. EPA and Cal/EPA total cancer risk of 4×10^{-4} and 2×10^{-3}, respectively (above the risk management range), due to arsenic and VOCs. The HI is 6, due largely to arsenic in soil and groundwater. Without arsenic, which is present in soil and groundwater at concentrations below background, U.S. EPA and Cal/EPA cancer risks are 8×10^{-5} and 6×10^{-5}, respectively (within the risk management range) due to VOCs in groundwater. The HI is 0.9.

7.2 EBS PARCEL 205 CONCLUSIONS AND RECOMMENDATIONS

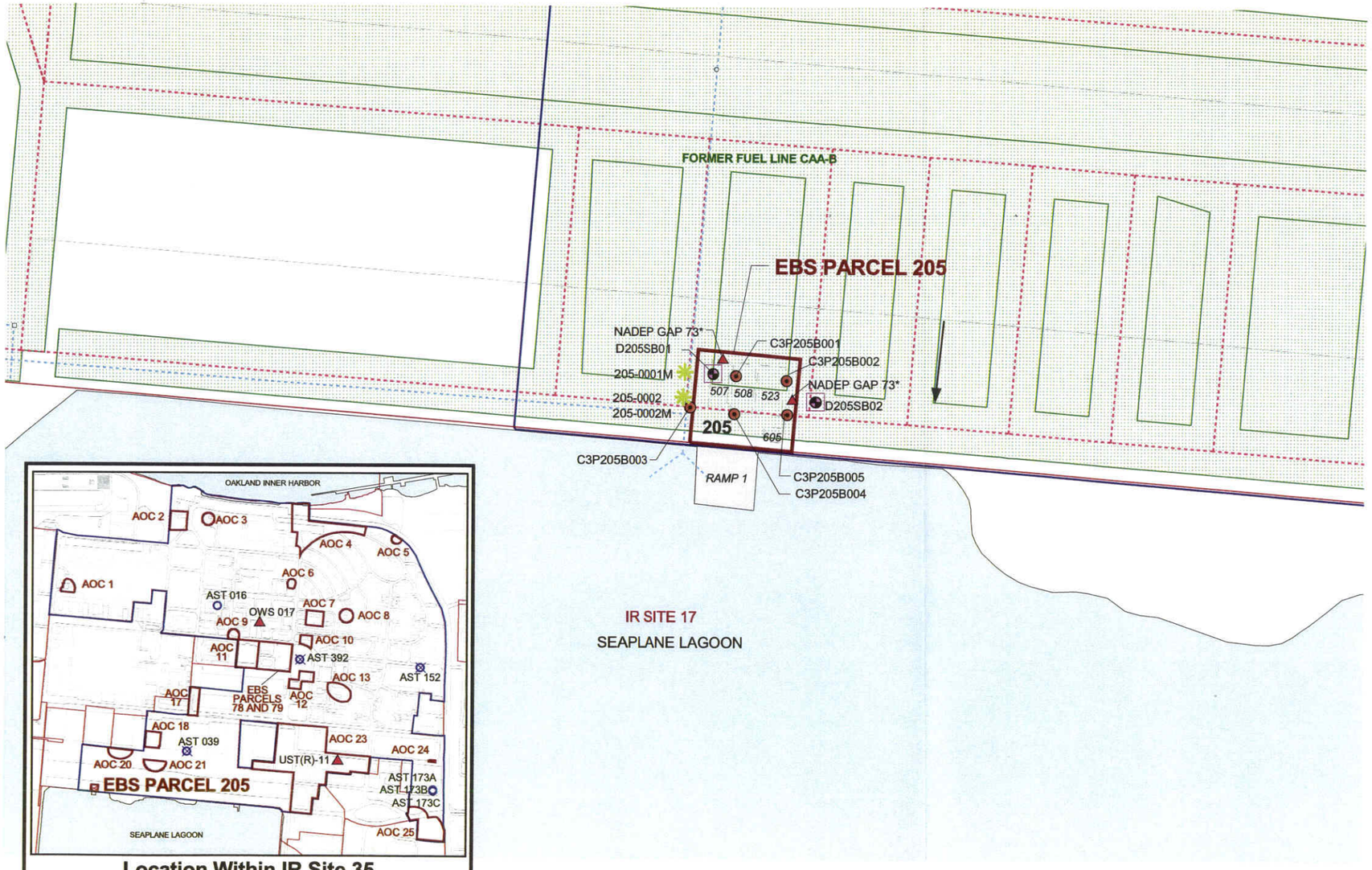
The RI was conducted using the seven-step U.S. EPA DQO process (U.S. EPA 2000); DQOs were developed for EBS Parcel 205 in the Work Plan (BEI 2006). The RI has addressed these DQOs, as summarized in Table 7-1.

Data collected during previous investigations were sufficient to perform a baseline HHRA and support decisions on the necessity for remedial actions at EBS Parcel 205. The extent of VOCs in groundwater is not completely defined; however, the relatively low concentrations of VOCs and results of the other groundwater sample (which were below PSCs) suggest that NADEP GAP 73 did not significantly impact soil or groundwater.

No further action is recommended at EBS Parcel 205. Further evaluation of the extent of VOCs and TPH in groundwater and arsenic in soil and groundwater is not recommended for the following reasons.

- Without the risk associated with the background metal arsenic, risk results indicate that VOCs are not present in groundwater at concentrations that pose a significant risk to human health; cancer risk is within the risk management range of 10^{-6} to 10^{-4} and the HI is less than 1.
- While VOC concentrations were reported slightly above MCLs, it is unlikely that groundwater would be used as a drinking water source due to the location of EBS Parcel 205 west of Saratoga Street. Additionally, saltwater intrusion from sustained pumping is likely, since EBS Parcel 205 is adjacent to Seaplane Lagoon.
- The TPH concentrations were above groundwater PSCs but below surface water PSCs. It is unlikely that the groundwater at this parcel would be used as a drinking water source. TPH data will be evaluated along with CAA-B under the TPH Program to determine whether the Water Board's criteria for closure of low-risk fuel sites are met.
- VOCs in groundwater samples were not reported above surface water PSCs. Although arsenic was reported above a surface water PSC in one sample, the concentration was below background.
- Arsenic concentrations in soil were also below background.

FIGURES



Location Within IR Site 35

1500 0 1500 Feet

LEGEND

- DATA GAP BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- WATER
- 71 EBS PARCEL
- CORRECTIVE ACTION AREA (CAA)
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- FUEL LINE (ABANDONED IN-PLACE)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS

EBS SOIL SAMPLING LOCATION WITH SAMPLE ID
- FUELS AND METALS ANALYSES ONLY

PAH STUDY SOIL SAMPLING LOCATION WITH STATION ID
- SVOCs ANALYSIS ONLY

RI SOIL SAMPLING LOCATION WITH STATION ID
- VOCs, FUELS, AND METALS ANALYSES ONLY

RI GROUNDWATER SAMPLING LOCATION WITH STATION ID
- VOCs, FUELS, AND METALS ANALYSES ONLY

N

NOTES:

*THIS SMWU IS LISTED IN TWO DIFFERENT LOCATIONS

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
NADEP – NAVAL AVIATION DEPOT
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOCs – VOLATILE ORGANIC COMPOUNDS

100 0 100 Feet

RI/FS Report for IR Site 35

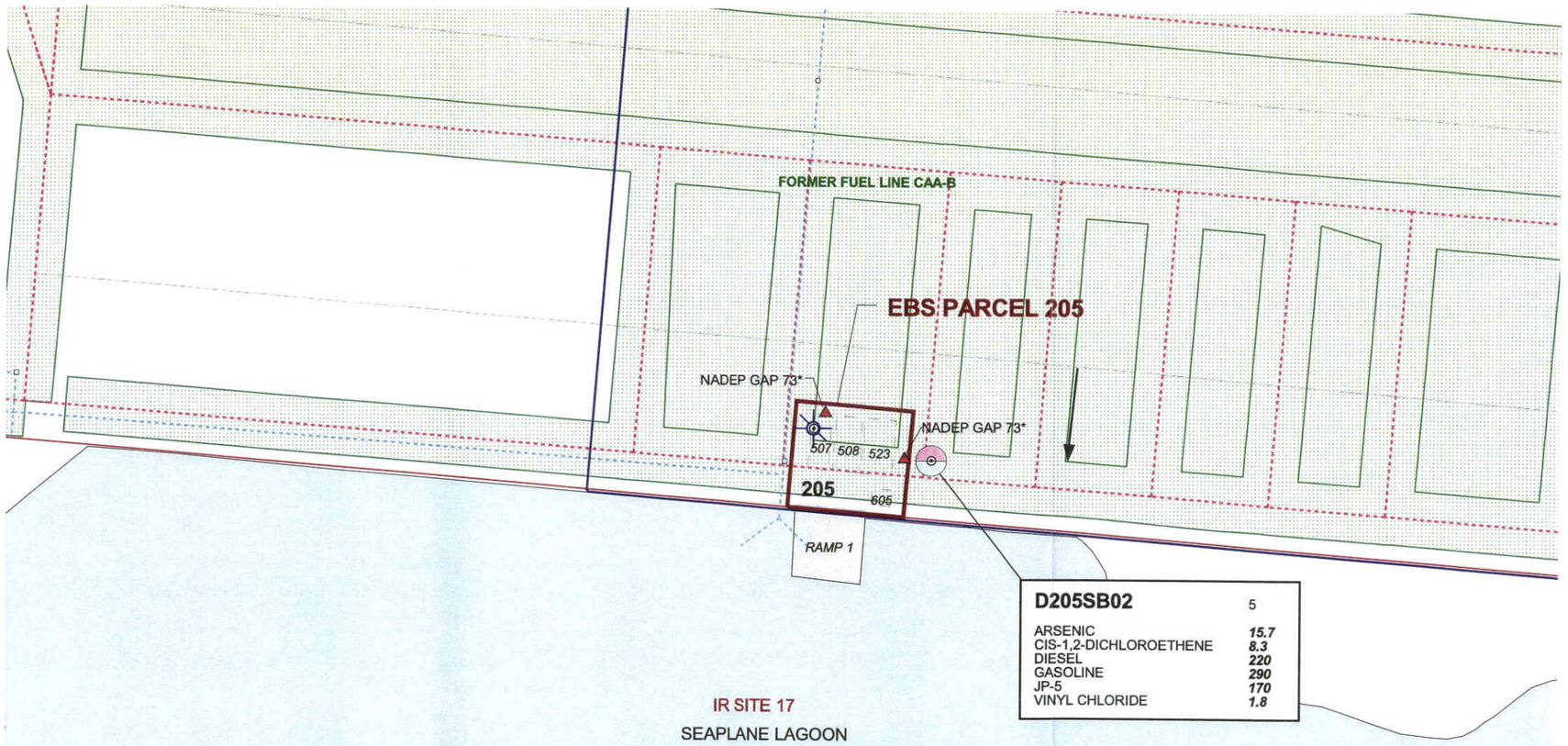
Figure 1-1

Study Area and Sampling Locations
EBS Parcel 205

Alamedа, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 7/3/06
File No.: 077L14464
Job No.: 23818-077
Rev No.: C



LEGEND

- DATA GAP BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- 17 BUILDING OR STRUCTURE (PRESENT) AND ID
- 101 BUILDING OR STRUCTURE (FORMER) AND ID
- WATER
- 71 EBS PARCEL
- CORRECTIVE ACTION AREA (CAA)
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- STORM DRAIN
- FUEL LINE (ABANDONED IN-PLACE)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- RI GROUNDWATER SAMPLING LOCATION

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC FOR :

- VOCs
- FUELS

GROUNDWATER SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :

- METALS
- VOCs
- FUELS

N

STATION ID — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

D205SB02 5

ARSENIC ***15.7***
CIS-1,2-DICHLOROETHENE ***8.3***
DIESEL ***220***

ANALYTE — CONCENTRATION in µg/L

100 0 100 Feet

NOTES:

*THIS SMWU IS LISTED IN TWO DIFFERENT LOCATIONS

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
ESL – ENVIRONMENTAL SCREENING LEVEL
GAP – GENERATOR ACCUMULATION POINT
IR – INSTALLATION RESTORATION (PROGRAM)
µg/L – MICROGRAMS PER LITER
MCL – MAXIMUM CONTAMINANT LEVEL
NA – NOT APPLICABLE
NADEP – NAVAL AVIATION DEPOT
NRWQC HHCO – NATIONAL RECOMMENDED WATER QUALITY CRITERIA HUMAN HEALTH CONSUMPTION OF ORGANISM
PSC – PRELIMINARY SCREENING CRITERION
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
TPH – TOTAL PETROLEUM HYDROCARBONS
VOCs – VOLATILE ORGANIC COMPOUNDS

Analyte	PSC	Lowest Surface Water PSC	Background 95th Percentile
ARSENIC	10 µg/L (California MCL)	0.14 µg/L (NRWQC HHCO)	20.72 µg/L
CIS-1,2-DICHLOROETHENE	6 µg/L (California MCL)	NA	NA
DIESEL	100 µg/L (TPH Groundwater ESL)	640 µg/L (ESL Marine)	NA
GASOLINE	100 µg/L (TPH Groundwater ESL)	3,700 µg/L (ESL Marine)	NA
JP-5	100 µg/L (TPH Groundwater ESL)	640 µg/L (ESL Marine)	NA
VINYL CHLORIDE	0.5 µg/L (California MCL)	2.4 µg/L (NRWQC HHCO)	NA

RI/FS Report for IR Site 35

Figure 4-1

Groundwater Sampling Results for Analytes Above PSC – EBS Parcel 205

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 2/26/07
File No.: 077L14512
Job No.: 23818-077
Rev No.: D

TABLES

Table 3-1
Sample Analysis Summary, EBS Parcel 205

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE				
				VOCs	PAHs	TPH	Metals	TDS
Soil								
C3P205B001	C0592926	PAH Study	0–0.5		X			
C3P205B001	C0592927	PAH Study	0.5–2		X			
C3P205B001	C0592928	PAH Study	2–4		X			
C3P205B001	C0592929	PAH Study	4–8		X			
C3P205B002	C0592930	PAH Study	0–0.5		X			
C3P205B002	C0592931	PAH Study	0.5–2		X			
C3P205B002	C0592932	PAH Study	2–4		X			
C3P205B002	C0592933	PAH Study	4–8		X			
C3P205B004	C0592939	PAH Study	0–0.5		X			
C3P205B004	C0592940	PAH Study	0.5–2		X			
C3P205B004	C0592941	PAH Study	2–4		X			
C3P205B004	C0592942	PAH Study	4–8		X			
C3P205B005	C0592943	PAH Study	0–0.5		X			
C3P205B005	C0592944	PAH Study	0.5–2		X			
C3P205B005	C0592945 (FD)	PAH Study	0.5–2		X			
C3P205B005	C0592946	PAH Study	2–4		X			
C3P205B005	C0592947	PAH Study	4–8		X			
D205SB01	C077S541	Site 35 RI	1.5–2	X		X*	X	
D205SB01	C077S542	Site 35 RI	3.5–5	X		X*	X	
D205SB01	C077S543	Site 35 RI	7–8	X		X*	X	
D205SB02	C077S544	Site 35 RI	1–2	X		X*	X	
D205SB02	C077S545	Site 35 RI	2–3	X		X*	X	
D205SB02	C077S546	Site 35 RI	7–8	X		X*	X	
Groundwater								
D205SB01	C077G201	Site 35 RI	5–10	X		X*	X	X
D205SB02	C077G202	Site 35 RI	5–10	X		X*	X	X

Reference:
PAH Study (BEI 2005a)

Note:
* analyzed for gasoline-, diesel-, JP-5–, and motor oil–range TPH

Acronyms/Abbreviations:
bgs – below ground surface
EBS – environmental baseline survey
FD – field duplicate
JP-5 – jet propellant grade 5
PAH – polynuclear aromatic hydrocarbon
RI – remedial investigation
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

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Table 4-1
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, EBS Parcel 205

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	Background (95th Percentile)
Volatile Organic Compounds (µg/kg)									
carbon disulfide	6	3	50	0	1.4	1.9	2.3	360,000	—[c]
cis-1,2-dichloroethene	6	3	50	0	0.28	0.34	0.38	43,000	—
methylene chloride	6	1	17	0	6.8	6.8	6.8	9,100	—
tetrachloroethene	6	1	17	0	1.4	1.4	1.4	480	—
Semivolatile Organic Compounds (µg/kg)									
acenaphthylene	17	2	12	No PSC	0.46	0.57	0.68	—	—
anthracene	17	6	35	0	0.22	0.33	0.39	22,000,000	—
benz(a)anthracene	17	8	47	0	0.25	0.73	1.5	620	—
benzo(b)fluoranthene	17	8	47	0	0.22	0.73	2.5	620	—
benzo(k)fluoranthene	17	8	47	0	0.29	0.65	2.1	380[d]	—
benzo(g,h,i)perylene	17	6	35	No PSC	0.38	2.9	6.3	—	—
benzo(a)pyrene	17	3	18	0	0.37	1.7	2.5	62	—
chrysene	17	9	53	0	0.34	0.94	2.3	3,800[d]	—
fluoranthene	17	4	24	0	0.55	2	2.6	2,300,000	—
indeno(1,2,3-cd)pyrene	17	5	29	0	0.27	2.3	5	620	—
2-methylnaphthalene	17	5	29	No PSC	0.27	0.37	0.43	—	—
phenanthrene	17	8	47	No PSC	0.33	0.69	1.2	—	—
pyrene	17	11	65	0	0.88	2.3	4.1	2,300,000	—
Metals (mg/kg)									
aluminum	6	6	100	0	4,130	5,100	6,240	76,000	13,960
arsenic	6	6	100	0	2.1	2.6	4.2	0.062[d]	9.14
barium	6	6	100	0	24.1	37	50.5	5,400	93.68
beryllium	6	6	100	0	0.13	0.16	0.19	150	1.27
calcium	6	6	100	No PSC	1,980	2,500	3,640	—	16,800
chromium	6	6	100	0	27.1	33	44.8	210	54.84
cobalt	6	6	100	0	4	5.1	7.2	900	14.30
copper	6	6	100	0	4.8	6.4	9.7	3,100	39.14
iron	6	6	100	0	8,610	11,000	12,900	23,000	22,280
lead	6	6	100	0	2.1	4.7	8.8	150[d]	37.66
magnesium	6	6	100	No PSC	2,130	2,900	4,530	—	7,304
manganese	6	6	100	0	82.1	110	174	1,800	383.0
mercury	6	3	50	0	0.03	0.069	0.11	23	0.52
nickel	6	6	100	0	25	32	51.4	1,600	55.72
potassium	6	6	100	No PSC	638	750	910	—	1,232
vanadium	6	6	100	0	18.3	20	23.1	78	47.34
zinc	6	6	100	0	15.2	19	24.5	23,000	67.48

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

Acronyms/Abbreviations:

EBS – environmental baseline survey
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criterion (PRG)

Table 4-2
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, EBS Parcel 205

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background	Minimum[a]	Average[a]	Maximum[a]	California MCL	TPH ESL	Background (95th Percentile)	Surface Water Aquatic TPH ESL	Surface Water CTR CCC	Surface Water CTR HHCO	Surface Water NRWQC CCC	Surface Water NRWQC HHCO
Volatile Organic Compounds (µg/L)															
benzene	2	1	50	0	0.48	0.48	0.48	1	—[b]	—	—	—	71	—	51
tert-butylbenzene	2	1	50	No PSC	0.26	0.26	0.26	—	—	—	—	—	—	—	—
cis-1,2-dichloroethene	2	1	50	1	8.3	8.3	8.3	6	—	—	—	—	—	—	—
isopropylbenzene	2	1	50	No PSC	0.2	0.2	0.2	—	—	—	—	—	—	—	—
tetrachloroethene	2	2	100	0	0.21	0.81	1.4	5	—	—	—	—	8.9	—	3.3
toluene	2	1	50	0	0.18	0.18	0.18	150	—	—	—	—	200,000	—	15,000
trichloroethene	2	1	50	0	2.8	2.8	2.8	5	—	—	—	—	81	—	30
vinyl chloride	2	1	50	1	1.8	1.8	1.8	0.5	—	—	—	—	530	—	2.4
xylenes, total	2	1	50	0	0.73	0.73	0.73	1,800	—	—	—	—	—	—	—
Fuels (µg/L)															
diesel	2	1	50	1	220	220	220	—	100	—	640	—	—	—	—
gasoline	2	1	50	1	290	290	290	—	100	—	3,700	—	—	—	—
JP-5	2	1	50	1	170	170	170	—	100	—	640	—	—	—	—
Metals (µg/L)															
arsenic	2	1	50	0	15.7	16	15.7	10[c]	—	20.72	—	36	—	36	0.14
barium	2	2	100	0	24.5	43	61.8	1,000	—	569.5	—	—	—	—	—
calcium	2	2	100	No PSC	22,500	34,000	44,700	—	—	—	—	—	—	—	—
iron	2	1	50	No PSC	44.7	45	44.7	—	—	6,586	—	—	—	—	—
magnesium	2	2	100	No PSC	4,660	7,800	11,000	—	—	—	—	—	—	—	—
manganese	2	2	100	No PSC	20.4	36	51.9	—	—	1,741	—	—	—	—	—
mercury	4	2	50	0	0.00053	0.00081	0.00108	2	—	—	—	0.025	0.051	0.94	—
potassium	2	2	100	No PSC	10,400	13,000	15,300	—	—	—	—	—	—	—	—
sodium	2	2	100	No PSC	32,200	42,000	52,200	—	—	—	—	—	—	—	—
vanadium	2	2	100	No PSC	1.5	2.1	2.7	—	—	26.27	—	—	—	—	—
General Chemistry (µg/L)															
solids, total dissolved	2	2	100	No PSC	184,000	260,000	334,000	—	—	—	—	—	—	—	—

Notes:
[a] data review qualifiers are not included in this table
[b] dash indicates not applicable or not established
[c] Federal MCL

Acronyms/Abbreviations:
CCC – criterion continuous concentration
CTR – California Toxics Rule
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
HHCO – human-health consumption of organisms only
JP-5 – jet propellant grade 5
µg/L – micrograms per liter
MCL – maximum contaminant level
NRWQC – National Recommended Water Quality Criteria
PSC – preliminary screening criteria (MCL, ESL, CTR, and NRWQC)
TPH – total petroleum hydrocarbons

Table 4-3
Soil Sampling Results, EBS Parcel 205

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	C3P205B001 C0592926 0 - 0.5 10-Sep-03	C3P205B001 C0592927 0.5 - 2 10-Sep-03	C3P205B001 C0592928 2 - 4 10-Sep-03	C3P205B001 C0592929 4 - 8 10-Sep-03	C3P205B002 C0592930 0 - 0.5 10-Sep-03	C3P205B002 C0592931 0.5 - 2 10-Sep-03	C3P205B002 C0592932 2 - 4 10-Sep-03	C3P205B002 C0592933 4 - 8 10-Sep-03	C3P205B004 C0592939 0 - 0.5 10-Sep-03	C3P205B004 C0592940 0.5 - 2 10-Sep-03	C3P205B004 C0592941 2 - 4 10-Sep-03	C3P205B004 C0592942 4 - 8 10-Sep-03
VOCs																	
carbon disulfide	360,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
tetrachloroethene	480	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SVOCs																	
acenaphthylene	—	—	—	—	µg/kg	0.68 J	6 U	5.9 U	6.5 U	5.4 U	5.7 U	5.9 U	5.9 U	5.4 U	5.6 U	5.9 U	6 U
anthracene	22,000,000	—	—	—	µg/kg	0.37 J	6 U	0.3 J	0.34 J	5.4 U	5.7 U	5.9 U	5.9 U	5.4 U	5.6 U	5.9 U	6 U
benz(a)anthracene	620[c]	—	—	—	µg/kg	1.5 J	6 U	5.9 U	0.44 J	0.53 J	5.7 U	5.9 U	5.9 U	0.44 J	5.6 U	0.28 J	6 U
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	2.5 J	0.27 J	5.9 U	0.89 J	5.4 U	5.7 U	5.9 U	5.9 U	0.66 J	0.49 J	0.5 J	0.3 J
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	2.1 J	0.29 J	5.9 U	0.84 J	5.4 U	5.7 U	5.9 U	5.9 U	0.57 J	0.3 J	0.48 J	0.31 J
benzo(g,h,i)perylene	—	—	—	—	µg/kg	6.1 U	6 U	5.9 U	6.5 U	4.3 J	1.8 J	1.2 J	5.9 U	5.4 U	5.6 U	5.9 U	6 U
benzo(a)pyrene	62[c]	—	—	—	µg/kg	2.5 J	6 U	5.9 U	6.5 U	5.4 U	5.7 U	5.9 U	5.9 U	5.4 U	5.6 U	5.9 U	6 U
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	2.3 J	6 U	5.9 U	0.47 J	5.4 U	5.7 U	5.9 U	5.9 U	0.8 J	0.47 J	0.45 J	0.37 J
fluoranthene	2,300,000	—	—	—	µg/kg	2.6 J	6 U	5.9 U	6.5 U	5.4 U	5.7 U	5.9 U	5.9 U	5.4 U	5.6 U	5.9 U	6 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	6.1 U	6 U	5.9 U	6.5 U	3.5 J	1.5 J	1 J	5.9 U	5.4 U	5.6 U	5.9 U	6 U
2-methylnaphthalene	—	—	—	—	µg/kg	0.41 J	6 U	5.9 U	6.5 U	5.4 U	5.7 U	0.43 J	0.38 J	5.4 U	5.6 U	5.9 U	6 U
phenanthrene	—	—	—	—	µg/kg	1.2 J	0.33 J	1.1 J	0.75 J	5.4 U	5.7 U	5.9 U	5.9 U	0.66 J	0.5 J	0.49 J	0.46 J
pyrene	2,300,000	—	—	—	µg/kg	4.1 J	6 U	0.88 J	2.1 J	5.4 U	5.7 U	5.9 U	1.7 J	1.7 J	1.3 J	1.3 J	3.3 J
Metals																	
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-3
Soil Sampling Results, EBS Parcel 205

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	C3P205B005 C0592943 0 - 0.5 10-Sep-03	C3P205B005 C0592944 0.5 - 2 10-Sep-03	C3P205B005 C0592945 (FD) 0.5 - 2 10-Sep-03	C3P205B005 C0592946 2 - 4 10-Sep-03	C3P205B005 C0592947 4 - 8 10-Sep-03	D205SB01 C077S541 1.5 - 2 13-Dec-05	D205SB01 C077S542 3.5 - 5 13-Dec-05	D205SB01 C077S543 7 - 8 13-Dec-05	D205SB02 C077S544 1 - 2 13-Dec-05	D205SB02 C077S545 2 - 3 13-Dec-05	D205SB02 C077S546 7 - 8 13-Dec-05
VOCs																
carbon disulfide	360,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	100 U	2.1 J	1.4 J	100 U	100 U	2.3 J
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	5 U	6 U	6 U	0.28 J	0.37 J	0.38 J
methylene chloride	9,100	—	—	—	µg/kg	NA	NA	NA	NA	NA	60 U	60 U	60 U	6.8 J	60 U	60 U
tetrachloroethene	480	—	—	—	µg/kg	NA	NA	NA	NA	NA	5 U	6 U	6 U	6 UJ	6 U	1.4 J
Petroleum Hydrocarbons						NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND
SVOCs																
acenaphthylene	—	—	—	—	µg/kg	5.4 U	0.46 J	5.6 U	6 U	6 U	NA	NA	NA	NA	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	0.22 J	0.36 J	0.39 J	6 U	6 U	NA	NA	NA	NA	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	1 J	1.4 J	5.6 U	6 U	0.25 J	NA	NA	NA	NA	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	5.4 U	5.6 U	5.6 U	6 U	0.22 J	NA	NA	NA	NA	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	5.4 U	5.6 U	5.6 U	6 U	0.29 J	NA	NA	NA	NA	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	6.3	3.5 J	5.6 U	6 U	0.38 J	NA	NA	NA	NA	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	2.2 J	5.6 U	5.6 U	6 U	0.37 J	NA	NA	NA	NA	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	1.5 J	1.8 J	5.6 U	6 U	0.34 J	NA	NA	NA	NA	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	2.3 J	2.6 J	5.6 U	6 U	0.55 J	NA	NA	NA	NA	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	5 J	5.6 U	5.6 U	6 U	0.27 J	NA	NA	NA	NA	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg	0.27 J	0.35 J	5.6 U	6 U	6 U	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/kg	5.4 U	5.6 U	5.6 U	6 U	6 U	NA	NA	NA	NA	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	4 J	3.9 J	5.6 U	6 U	1.1 J	NA	NA	NA	NA	NA	NA
Metals																
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	5,900	4,130	4,260	5,420	6,240	4,490
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	**2.1**[d]	**2.1**	**2.1**	**2.3**	**4.2**	**2.6**
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	38.2	32.8	24.1	50.5	44	34.5
beryllium	150	—	—	1.27	mg/kg	NA	NA	NA	NA	NA	0.17 J	0.13 J	0.15 J	0.15 J	0.19 J	0.15 J
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	2,670	2,160	2,200	1,980	3,640	2,460
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	32.6	28.6	27.1	31.9	44.8	30.1
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	6.3 J	4 J	4.2 J	5 J	7.2 J	4.1 J
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	6.7	5.3	5.1	7	9.7	4.8
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	12,300	8,610	9,080	10,900	12,900	9,380
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	8	2.8	2.1	3.4	8.8	3
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	3,300	2,130	2,270	2,740	4,530	2,250
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	123 J	85.2 J	83.6 J	117 J	174 J	82.1 J
mercury	23	—	—	0.52	mg/kg	NA	NA	NA	NA	NA	0.1 U	0.1 U	0.03 J	0.11	0.067 J	0.1 U
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	31.4	25	26	31.9	51.4	25.5
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	756	638	711	769	910	699
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	22	18.3	18.4	20.5	23.1	20
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	19.5	15.6	15.7	21.4	24.5	15.2

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[d] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL

Acronyms/Abbreviations:
B(a)P – benzo(a)pyrene
Cal – California
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
ND – not detected
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 4-4
Groundwater Sampling Results, EBS Parcel 205

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Back-ground	Result Units	Station ID: D205SB01 Sample: C077G201 [a] Depth Interval: 5 - 10 Collection Date: 14-Dec-05	Station ID: D205SB02 Sample: C077G202 [a] Depth Interval: 5 - 10 Collection Date: 14-Dec-05
VOCs							
benzene	5	1	—[b]	—	µg/L	0.5 U	0.48 J
tert-butylbenzene	—	—	—	—	µg/L	0.5 U	0.26 J
cis-1,2-dichloroethene	70	6	—	—	µg/L	0.5 U	**8.3**[c]
isopropylbenzene	—	—	—	—	µg/L	0.5 U	0.2 J
tetrachloroethene	5	5	—	—	µg/L	0.21 J	1.4
toluene	1,000	150	—	—	µg/L	0.5 U	0.18 J
trichloroethene	5	5	—	—	µg/L	0.5 U	2.8
vinyl chloride	2	0.5	—	—	µg/L	0.5 U	**1.8**
m-, p-xylene	—	—	—	—	µg/L	0.5 U	0.23 J
Petroleum Hydrocarbons							
diesel	—	—	100	—	µg/L	50 U	**220**
gasoline	—	—	100	—	µg/L	100 U	**290**
JP-5	—	—	100	—	µg/L	50 U	**170**
Metals							
arsenic	10	50	—	20.72	µg/L	4.6 U	**15.7**
barium	2,000	1,000	—	569.5	µg/L	24.5	61.8
calcium	—	—	—	—	µg/L	22,500	44,700
iron	—	—	—	6,586	µg/L	50 U	44.7 J
magnesium	—	—	—	—	µg/L	4,660	11,000 J
manganese	—	—	—	1,741	µg/L	20.4	51.9
potassium	—	—	—	—	µg/L	10,400	15,300
sodium	—	—	—	—	µg/L	32,200	52,200
vanadium	—	—	—	26.27	µg/L	2.7 J	1.5 J
Low-Level Mercury							
mercury	2	2	—	—	µg/L	0.00053	0.00108
General Chemistry							
solids, total dissolved	—	—	—	—	µg/L	184,000	334,000

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

[c] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL

Review Qualifiers:

J – indicates an estimated value

U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit

Acronyms/Abbreviations:

Cal – California

ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)

Fed – federal

GW – groundwater

JP-5 – jet propellant grade 5

µg/L – micrograms per liter

MCL – maximum contaminant level

TPH – total petroleum hydrocarbons

VOC – volatile organic compound

Table 4-5
Groundwater Sampling Results Compared to
Surface Water Preliminary Screening Criteria, EBS Parcel 205

Analyte	PRELIMINARY SCREENING CRITERIA SW TPH ESL	CTR CCC	CTR HHCO	NRWQC CCC	NRWQC HHCO	Background	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	D205SB01 C077G201 5 - 10 14-Dec-05	D205SB02 C077G202 5 - 10 14-Dec-05
VOCs									
benzene	—[b]	—	71	—	51	—	µg/L	0.5 U	0.48 J
tert-butylbenzene	—	—	—	—	—	—	µg/L	0.5 U	0.26 J
cis-1,2-dichloroethene	—	—	—	—	—	—	µg/L	0.5 U	8.3
isopropylbenzene	—	—	—	—	—	—	µg/L	0.5 U	0.2 J
tetrachloroethene	—	—	8.85	—	3.3	—	µg/L	0.21 J	1.4
toluene	—	—	200,000	—	15,000	—	µg/L	0.5 U	0.18 J
trichloroethene	—	—	81	—	30	—	µg/L	0.5 U	2.8
vinyl chloride	—	—	525	—	2.4	—	µg/L	0.5 U	1.8
m-, p-xylene	—	—	—	—	—	—	µg/L	0.5 U	0.23 J
Petroleum Hydrocarbons									
diesel	640	—	—	—	—	—	µg/L	50 U	220
gasoline	3,700	—	—	—	—	—	µg/L	100 U	290
JP-5	640	—	—	—	—	—	µg/L	50 U	170
Metals									
arsenic	—	36	—	36	0.14	20.72	µg/L	**4.6 U**[c,d]	**15.7**
barium	—	—	—	—	—	569.5	µg/L	24.5	61.8
calcium	—	—	—	—	—	—	µg/L	22,500	44,700
iron	—	—	—	—	—	6,586	µg/L	50 U	44.7 J
magnesium	—	—	—	—	—	—	µg/L	4,660	11,000 J
manganese	—	—	—	—	—	1,741	µg/L	20.4	51.9
potassium	—	—	—	—	—	—	µg/L	10,400	15,300
sodium	—	—	—	—	—	—	µg/L	32,200	52,200
vanadium	—	—	—	—	—	26.27	µg/L	2.7 J	1.5 J
Low-Level Mercury									
mercury	—	0.025	0.051	0.94	—	—	µg/L	0.00053	0.00108
General Chemistry									
solids, total dissolved	—	—	—	—	—	—	µg/L	184,000	334,000

Table 4-5
Groundwater Sampling Results Compared to
Surface Water Preliminary Screening Criteria, EBS Parcel 205

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

[c] detection limit is above criteria

[d] bolded font indicates result above one of the following: TPH ESL, CTR CCC, CTR HHCO, NRWQC CCC, NRWQC HHCO

Acronyms/Abbreviations:

CCC – criterion continuous concentration
CTR – California Toxics Rule
EBS – environmental baseline survey
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
HHCO – human-health consumption of organisms only
JP-5 – jet propellant grade 5
µg/L – micrograms per liter
NRWQC – National Recommended Water Quality Criteria
SW – surface water
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:

J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit

Table 5-1
Estimates of Mobility[a] and Persistence for Selected VOCs, EBS Parcel 205

Analyte	K_{oc} (L/kg)	f_{oc}	Percent Sorbed [a,b]	Abiotic Half-Life (range in years) [c]	Anaerobic Biodegradation Half-Life (range in days) [c]	R (unitless)
cis-1,2-dichloroethene	35.6 [d]	0.018	39	8.5E+09–2.1E+10	88–339	3
benzene	58.2 [d]	0.018	51.2	—	—	5
tetrachloroethene	40 [e]	0.018	41.9	3.8E+08–9.9E+08	34–230	4
trichloroethene	82–150 [e]	0.018	60–73	4.9E+05–1.3E+06	33–230	7–11
vinyl chloride	18.5 [d]	0.018	25	>10	>60	2

Notes:

[a] mobility is proportional to percent sorbed; percent sorbed = $K_{oc}f_{oc} / (1 + K_{oc}f_{oc}) \times 100$ (Karickhoff et al. 1979)

[b] percent sorbed was calculated using the reported f_{oc} at AOC 23 from at depth of 5 to 6.5 feet bgs in silty sand of 0.018 (from geotechnical sampling; refer to Table 2-3 of the main RI/FS Report)

[c] Barbee 1994

[d] Michigan Department of Environmental Quality 2004

[e] Howard et al. 1991

Acronyms/Abbreviations:

AOC – area of concern
bgs – below ground surface
EBS – environmental baseline survey
f_{oc} – fraction organic carbon
FS – feasibility study
K_{oc} – organic carbon partition coefficient
L/kg – liters per kilogram
R – retardation factor
RI – remedial investigation
VOC – volatile organic compound

Table 6-1
HHRA Results by Exposure Group, EBS Parcel 205

Exposure Group	CANCER RISK		Hazard Index
	U.S. EPA	Cal/EPA	
1. All soil and groundwater exposure pathways			
Total*	4E-04	2E-03	6
Without metals below background	8E-05	6E-05	0.9
2. Exposure pathways for soil and vapors from VOCs in groundwater			
Total*	4E-05	1E-04	1
Without metals below background	2E-05	3E-05	0.07
Without metals below background and PAHs in soil	2E-05	3E-05	0.07
3. Exposure pathways for residential use of groundwater			
Total*	3E-04	2E-03	4
Without metals below background	8E-05	6E-05	0.9

Note:
* includes all COPCs

Acronyms/Abbreviations:
Cal/EPA – California Environmental Protection Agency
COPC – chemical of potential concern
EBS – environmental baseline survey
HHRA – human-health risk assessment
PAH – polynuclear aromatic hydrocarbon
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Table 6-2
HHRA Results for Major Risk Contributors, EBS Parcel 205

Study Area	Analyte Name	ALL COPCs			WITHOUT BACKGROUND		
		Hazard Quotient	U.S. EPA Cancer Risk	Cal/EPA Cancer Risk	Hazard Quotient	U.S. EPA Cancer Risk	Cal/EPA Cancer Risk
EBS Parcel 205							
Soil							
	arsenic	0.3	2E-05	1E-04	—*	—	—
	chromium	0.2	—	—	—	—	—
	iron	0.5	—	—	—	—	—
	manganese	0.1	—	—	—	—	—
	vanadium	0.3	—	—	—	—	—
	Soil only	**1**	**4E-05**	**1E-04**	**0.07**	**2E-05**	**3E-05**
Groundwater							
	benzene	—	—	1E-06	—	—	1E-06
	tetrachloroethene	—	2E-05	2E-05	—	2E-05	2E-05
	trichloroethene	0.7	4E-05	1E-06	0.7	4E-05	1E-06
	vinyl chloride	—	2E-05	4E-05	—	2E-05	4E-05
	arsenic	3	3E-04	2E-03	—	—	—
	manganese	0.1	—	—	—	—	—
	vanadium	0.2	—	—	—	—	—
	Groundwater only	**4**	**3E-04**	**2E-03**	**0.9**	**8E-05**	**6E-05**
	Total for soil and groundwater	**6**	**4E-04**	**2E-03**	**0.9**	**8E-05**	**6E-05**

Note:
* dash indicates not applicable

Acronyms/Abbreviations:
Cal/EPA – California Environmental Protection Agency
COPC – chemical of potential concern
EBS – environmental baseline survey
HHRA – human-health risk assessment
U.S. EPA – United States Environmental Protection Agency

Table 7-1
Summary of RI Results and Recommendations, EBS Parcel 205

DQO Problem	DQO Decision Questions	Nature and Extent	Risk Assessment	Recommendation
At the request of the regulatory agencies, the RI investigated soil and groundwater quality near NADEP GAP 73; however, it is uncertain whether it was located north of Building 507 or east of Building 523. Therefore, RI samples investigated both locations.	Have the nature and extent of contamination been defined?	Yes, definition is adequate. The extent of VOCs in groundwater is not completely defined. The relatively low concentrations of VOCs and results of the other groundwater sample (which were below PSCs) suggest that NADEP GAP 73 did not significantly impact soil or groundwater. No other compounds were reported above PSCs except arsenic in soil and groundwater. The concentrations were below Alameda Point background 95th percentile.	NA	No further action. VOCs in groundwater samples were reported slightly above MCLs; however, it is unlikely that groundwater would be used as a drinking water source.
	Are contaminants present at concentrations that contribute to an unacceptable risk to potential future residents?	NA	Results of the baseline HHRA show U.S. EPA and Cal/EPA total cancer risks of 4×10^{-4} and 2×10^{-3}, respectively (above the risk management range), due to arsenic and VOCs. The HI is 6, due largely to arsenic in soil and groundwater. Without arsenic, which is present in soil and groundwater at concentrations below the Alameda Point background 95th percentile, U.S. EPA and Cal/EPA total cancer risks are 8×10^{-5} and 6×10^{-5}, respectively (within the risk management range), due to VOCs (inhalation of indoor air). The HI is 0.9.	No further action.

Table 7-1 (continued)

DQO Problem	DQO Decision Questions	Nature and Extent	Risk Assessment	Recommendation
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?		No. VOCs concentrations in groundwater samples were not above surface water PSCs. While arsenic was reported above a surface water PSC in one sample, the concentration was below the Alameda Point background 95th percentile.	No further action.

Acronyms/Abbreviations:
Cal/EPA – California Environmental Protection Agency
DQO – data quality objective
EBS – environmental baseline survey
GAP – generator accumulation point
HHRA – human-health risk assessment
HI – hazard index
MCL – maximum contaminant level
NA – not applicable
NADEP – Naval Aviation Depot
PSC – preliminary screening criterion
RI – remedial investigation
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

ATTACHMENT V

SOLID WASTE MANAGEMENT UNITS

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT, ATTACHMENT V SOLID WASTE MANAGEMENT UNITS, IR SITE 35, TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

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Section 1
INTRODUCTION

This attachment presents the results of the remedial investigation (RI) of Solid Waste Management Units (SWMUs). The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station Alameda), Alameda, California.

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

This section addresses nine SWMUs located in Transfer Parcel Economic Development Conveyance (EDC)-5 that are being assessed separately from those located in the areas of concern (AOCs). The regulatory agencies requested further evaluation of nine SWMUs as part of the IR Site 35 RI. The SWMUs consist of one oil/water separator (OWS) (OWS 017), seven aboveground storage tanks (ASTs) (ASTs 016, 039, 152, 173A, 173B, and 173C, and 392) and one underground storage tank (UST) (UST[R]-11). The subsections below describe these SWMUs, including location, historical uses, and previous investigations.

1.2 HISTORICAL USE

This section provides a description of the locations and historical uses for the nine SWMUs included in the RI. SWMU locations are shown on Figure 1-1.

- OWS 017 was an OWS pit reported to be located in Environmental Baseline Survey (EBS) Parcel 80, on the south side of Building 17 (bachelor officers' quarters), near the western wing. The OWS is described as a 4-by-8-foot oil trap located behind a former kitchen (SulTech 2005a). The OWS contained trash, water, and oil but did not contain hazardous materials. The area is presently covered by a rectangular concrete pad measuring approximately 10 by 15 feet.
- AST 016 is an existing 360-gallon diesel AST built into a generator located east of the parking lot on the east side of Building 16 in EBS Parcel 83. The outer steel walls of the base of the generator act as secondary containment for this AST (SulTech 2004).
- AST 039 was a 1,000-gallon diesel AST reportedly located in EBS Parcel 70 near the southeastern corner of Building 39. This AST was removed in November 1998 (SulTech 2004). No evidence of this AST was observed during a site walk conducted in August 2005 (BEI 2006).
- AST 152 was a 50-gallon fuel oil AST located on the northeastern corner of Building 152 in EBS Parcel 102; stains were noted near the AST during Phase I site inspection (IT 2001a). This AST was removed between 1995 and 2002 (SulTech 2004). Currently, two concrete pads are visible at the former location of AST 152 (BEI 2006).
- ASTs 173A, 173B, and 173C are three existing 100-gallon steel diesel ASTs (associated with backup generators) located east of Building 173 in EBS Parcel 115; stains were observed in the containment near the middle tank

(IT 2001a). Minor stains were visible near the pipe and tank connections, which may indicate that leaks may have occurred in the past (SulTech 2004).

- AST 392 was a 200-gallon diesel AST located south of Building 392 in EBS Parcel 189 that was removed between 1992 and 1994 (SulTech 2004).
- UST(R)-11 (Tank 393) was a 600-gallon waste-oil UST located in EBS Parcel 123 that was removed in 1994. This SWMU was historically located between West Trident Avenue and Building 393 within the boundaries of AOC 23. During the SWMU removal, the presence of petroleum-related compounds (e.g., benzene, toluene, ethylbenzene, and xylenes [BTEX] and total petroleum hydrocarbons [TPH]) and metals including cadmium, chromium, lead, mercury, and zinc in soil was reported.

1.3 PRELIMINARY SCREENING CRITERIA AND BACKGROUND METALS

Preliminary screening criteria (PSCs) used in the following discussions are described in Section 3.5 of the main RI/Feasibility Study (FS) Report. Those PSCs pertinent to this area are the following:

- Soil
  - residential preliminary remediation goals (PRGs) (U.S. EPA 2004b), except polynuclear aromatic hydrocarbons (PAHs) classified as carcinogens, which are compared to the Alameda Point benzo(a)pyrene (B[a]P) equivalent concentration screening level of 620 micrograms per kilogram (µg/kg) (DON 2001a)
  - environmental screening levels (ESLs) for TPH – shallow soils (groundwater is a current or potential source of drinking water) (RWQCB 2005)
- Groundwater
  - maximum contaminant levels (MCLs) and advisory level for lead (U.S. EPA 2002, DHS 2006)
  - ESLs for TPH – water (RWQCB 2005)

PSCs were identified only to focus the discussion of the nature and extent of contamination on a subset of chemicals most likely to represent a concern to human health or the environment, as some PSCs are not directly applicable to the medium being assessed. For example, groundwater concentrations from all study areas were compared to MCLs, whether or not the groundwater was considered a potential drinking water source in that area.

In addition to the above-listed PSCs, metal concentrations in soil and groundwater at the SWMUs were compared to the following Alameda Point background concentrations to help discriminate between site-related and naturally occurring metals:

- Alameda Point background soil concentrations (95th percentile of the pink data set; Appendix E of the final RI Report of Operable Unit [OU]-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)
- Alameda Point background groundwater concentrations (95th percentile; Appendix E of the final RI Report of OU-1, Sites 6, 7, 8, and 16) (TtEMI 2001b, 2004)

For ease of discussion in this report, the Alameda Point 95th percentile concentrations for metals in soil (pink background data set) and groundwater are referred to as "background."

Section 4.3 of the main RI/FS Report provides further discussion on the occurrence and interpretation of metals concentrations in soil and groundwater at IR Site 35.

1.4 PREVIOUS INVESTIGATIONS

Locations sampled during previous investigations that are near each of the nine SWMUs are shown on Figure 1-1. Locations for samples collected to evaluate PAHs in soil at IR Site 35 are not shown on Figure 1-1 or in the tables in this attachment, with the exception of the PAH samples in the vicinity of OWS 017. All of these samples from previous investigations were evaluated, and those with B(a)P equivalent concentrations above the Alameda Point PAH screening criteria are included in the PAH Areas (Appendix W). Analytical results for soil and groundwater samples collected near the SWMUs are provided in Appendix B.

Results of all past assessments and investigations of the SWMUs at Transfer Parcel EDC-5 are summarized in the SWMU Report for Transfer Parcel EDC-5 (SulTech 2005a), Site Inspection Report for Transfer Parcel EDC-5 (BEI 2005b), PAH Time-Critical Removal Action (TCRA) Report (FWEC 2004), AST Assessment Report (SulTech 2004), and PAH Field Activity Report (BEI 2004b). Only those samples collected in close proximity of the SWMUs are described below.

- **OWS 017.** Soil samples were collected from four locations near OWS 017 (BB41, CC40, DD40, and EE40) during the PAH TCRA and from one location (32EDC-5-59) during the PAH field activity (BEI 2004b). All soil samples collected as part of these investigations were analyzed for PAHs only. B(a)P equivalent concentrations were below the PSC. The SWMU Report recommended no further action for OWS 017.
- **AST 016.** Sampling was not previously conducted in the vicinity of AST 016. The AST Assessment Report noted that there were no signs of leaks or stains during a July 2004 site visit and recommended the AST for closure in place.
- **AST 039.** Several soil samples were collected near the AST during the EBS at the following five locations:
  - 070-0012M from 3 to 3.5 feet below ground surface (bgs); analyzed for volatile organic compounds (VOCs)
  - 070-0031M/13M from 0 to 0.5 and 3 to 3.5 feet bgs; analyzed for TPH and VOCs, respectively

- 070-0014M from 3 to 3.5 feet bgs; analyzed for VOCs
- 070-0032M/15M from 0 to 0.5 and 3 to 3.5 feet bgs; analyzed for TPH and VOCs, respectively
- 195-0025 from 2.5 to 3.5 feet bgs; analyzed for VOCs, TPH, and metals; one groundwater sample (195-0024 and a duplicate sample 195-0034) was also collected at the same location and analyzed for VOCs, TPH, and semivolatile organic compounds (SVOCs)

Reported soil and groundwater concentrations were not above PSCs in any soil or groundwater sample collected. AST 039 was recommended for no further action in the AST Assessment Report.

- **AST 152.** Soil samples were collected near AST 152 during the EBS. Three soil samples (102-0001, 102-0001M, 102-0002M) were collected from 0.5 to 1 and 1 to 1.5 feet bgs, respectively, beneath the stained area near the AST and were analyzed for TPH.

  Reported concentrations were not above PSCs. AST 152 was recommended for no further action in the AST Assessment Report.

- **ASTs 173A, 173B, and 173C.** Three surface soil samples (115-0001, 115-0001M, and 115-0002) were collected from the area (focused around the apparent surface spill) and analyzed for TPH. Reported concentrations of motor oil–range TPH were above the PSC in all three samples. ASTs 173A, 173B, and 173C were recommended for closure in place in the AST Assessment Report.

- **AST 392.** Soil samples were collected near AST 392 during the EBS. Soil samples (189-0001 through 189-0004) were collected from 0 to 7 feet bgs and were analyzed for one or more of the following: VOCs, TPH, SVOCs, and metals. Reported concentrations were not above PSCs. AST 392 received no further action closure from the San Francisco Bay Regional Water Quality Control Board (Water Board) in September 2001 (SulTech 2004). AST 392 was recommended for no further action in the AST Assessment Report.

- **UST(R)-11.** Five surface soil samples (123-0027 through 123-0031) were collected during the EBS. These samples were analyzed for VOCs, TPH, pesticides, polychlorinated biphenyls (PCBs), metals, and one sample also for SVOCs (123-0028 only). No analytes were reported at concentrations above PSCs. Four HydroPunch groundwater samples (123-0040 through 123-0043) were collected to evaluate UST(R)-11; samples were analyzed for VOCs, TPH, pesticides, PCBs, and metals. Arsenic was reported in groundwater in two samples (123-0042 and 123-0043) at concentrations above the PSC; diesel-range TPH was reported in two groundwater samples (123-0041 and -0043), and motor oil–range TPH was reported in one groundwater sample (123-0041) at concentrations above PSCs.

  In the No Further Action Report for UST(R)-11 (TtEMI 2002a), two soil samples were collected from the backhoe bucket during the removal of this UST in November 1994. The soil samples were analyzed for BTEX, TPH, chlorinated hydrocarbons, and metals. A groundwater sample was also collected immediately after the excavation of the UST from the water in the

excavation pit. The groundwater sample was analyzed for BTEX, TPH, chlorinated hydrocarbons, and metals. None of the analytes were reported in the soil or groundwater samples at concentrations above PSCs. Two additional surface soil samples were collected from just beneath the asphalt prior to the excavation and removal of the vent line and underground piping associated with UST(R)-11 in January 1995. These samples were analyzed for BTEX, TPH, chlorinated hydrocarbons, and metals. No analytes were reported at concentrations above PSCs. The No Further Action Report concluded that UST(R)-11 was adequately characterized based on EBS sampling efforts, and no further action was recommended for the UST (TtEMI 2002a).

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Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, potential groundwater beneficial use, and geology at the SWMUs. The SWMU areas are in various locations across Transfer Parcel EDC-5, and their physical settings vary.

Topography at each SWMU is relatively flat, with surface elevations at the SWMUs ranging from approximately 10 to 13 feet above mean sea level. A summary of groundwater elevations, depths to groundwater, and total dissolved solids (TDS) concentrations is provided in Table 2-1.

The SWMUs are located in the central groundwater region of Alameda Point. While acknowledged as unlikely in the Alameda Point groundwater beneficial use evaluation (TtEMI 2000b), the groundwater in the central region is considered a Class II potential drinking water source based on TDS concentrations and groundwater yield.

No groundwater monitoring wells are close to any of the SWMU areas. Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which is the approximate flow direction at each of the SWMUs. Groundwater flow directions at IR Site 35 are interpreted from groundwater elevation measurements in groundwater monitoring wells recorded during the basewide groundwater monitoring program. Tidal influence at the SWMUs, which are located inland, is expected to be negligible based on tidal studies performed at other Alameda Point sites.

Soil encountered at the SWMUs was generally representative of the soil types and stratification observed across Transfer Parcel EDC-5 and discussed in Section 2 of the main RI/FS Report, which includes cross sections of the parcel. Based on the RI borings, soil in the SWMU areas consisted primarily of artificial fill material comprising poorly graded sand to silty sandy, to a depth of approximately 10 to 12 feet bgs. In eastern SWMU areas (AST 173A, 173B, 173C, and AST 152), this fill layer was relatively heterogeneous, with lenses of sand or clay interfingered with the fill material; whereas in the SWMUs farther west (AST 016, AST 039, AST 392, and OWS 017), the fill material was relatively homogeneous, poorly graded sand. Underlying the fill material was generally lean clay (Young Bay Mud), which was encountered in the AST 392 and OWS 017 RI borings at approximately 10 to 12 feet bgs, but was not reached in the other borings at a maximum depth of 10 feet bgs. As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust may be located beneath the SWMU areas; however, it was not encountered in borings advanced to 10 or 12 feet bgs during the RI.

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Section 3

REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for the SWMUs. Sitewide data quality objectives (DQOs) for the evaluation of ASTs and OWSs are presented in Tables 3-2 and 3-3, respectively, of the main RI/FS Report. The sampling approach and scope for UST(R)-11 are described in Attachment R under AOC 23, EBS Parcel 123, and are not repeated here.

3.1 APPROACH

The regulatory agencies have requested further evaluation of these nine SWMUs as part of the IR Site 35 RI.

For the OWS and AST SWMUs, regulatory agencies requested that soil and groundwater be collected from one boring adjacent to each SWMU. For the UST SWMU, regulatory agencies requested that samples be collected from two borings.

This sampling approach for ASTs was proposed even though the Navy had written a letter dated July 26, 2005, to California Environmental Protection Agency Department of Toxic Substances Control (DTSC) and the Water Board requesting that ASTs 016, 039, 152, 173A, 173B, 173C, and 392 be removed from the list of SWMUs evaluated in Transfer Parcel EDC-5. These ASTs were known to contain only petroleum hydrocarbons rather than waste material, and thereby have met the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) petroleum exclusion criteria. The DTSC responded in a letter dated August 25, 2005, and acknowledged that this issue falls under the jurisdiction of the Water Board.

However, the timing for resolving the Navy's request was not known when the Work Plan was published (BEI 2006). Thus, the Navy opted to collect and analyze soil and grab groundwater samples to assess possible impact from these ASTs in the manner outlined below.

3.2 SCOPE

Soil and grab groundwater samples were collected during the 2005 RI sampling from one boring adjacent to the SWMUs. One boring was next to the three adjacent ASTs 173A, 173B, and 173C; and two borings were adjacent to the UST.

- OWS 017: Two soil samples were collected from the boring (1 to 2 and 3 to 4 feet bgs) and a grab groundwater sample was also collected from the boring. Soil samples were analyzed for VOCs, extractable-range TPH, and metals. The groundwater sample was analyzed for VOCs, extractable-range TPH, and TDS.
- ASTs: Two soil samples were collected from each boring (1 to 2 and 2.5 to 4 feet bgs) and a grab groundwater sample was also collected from each boring. Soil and groundwater samples were analyzed for VOCs and TPH (extractable-range). Groundwater samples were also analyzed for TDS.
- UST: Three samples were collected from each boring (1 to 2, 3 to 4 and 5 to 6 feet bgs) and a grab groundwater sample was collected from the boring. Soil and groundwater samples were analyzed for VOCs, TPH (extractable range), and metals. The soil sample from location A23SB28 was also analyzed for

SVOCs, pesticides, and PCBs; both groundwater samples were also analyzed for TDS.

Analytical results for samples collected during the RI and previous investigations at OWS 017, AST 016, AST 039, AST 152, AST 173A, AST 173B, AST 173C, AST 392, and UST(R)-11 are summarized in Tables 3-1 through 3-7. Sampling locations for samples associated with the SWMUs are shown on Figure 1-1.

Section 4

NATURE AND EXTENT OF CONTAMINATION

This section presents the analytical results from previous investigations and from the RI and presents the concentration ranges and spatial distributions of the analytes identified at eight of the nine SWMUs. Soil and groundwater samples were collected at locations in the vicinity of the SWMUs during the EBS (IT 2001a), the PAH TCRA report (FWEC 2004), the PAH field activity report (BEI 2004b), the AST assessment report (SulTech 2004), and the RI (Tables 3-1 through 3-7 and Figure 1-1). Metals reported in soil and groundwater at concentrations above background are discussed in detail in Section 4.3.3 of the main RI/FS Report. Metals discussion in this section focuses primarily on concentrations above PSCs. Regardless of concentration, all reported metals (except required human trace nutrients) were included in the risk evaluation (Section 6).

Concentration ranges of soil and groundwater results are presented in Tables 4-1a and b through 4-7a and b, and soil and groundwater analytical results are summarized in Tables 4-1c and d through 4-7c and d. Chemicals reported in soil and groundwater samples above the PSCs are shown on Figure 4-1 and 4-2. Complete analytical results for historical and RI samples collected within the SWMU areas are included Appendices B and G, respectively.

4.1 SOIL SAMPLING RESULTS

Analytical soil sampling results are discussed for each class of chemicals investigated at the eight SWMUs. Figure 4-1 presents the soil sampling results for analytes reported above PSCs.

4.1.1 Volatile Organic Compounds

VOCs were reported in soil samples collected in AST 152; ASTs 173A, 173B, 173C; OWS 017; and UST(R)-11. Reported VOC concentrations were all below PSCs. At AST 152, carbon disulfide and methylene chloride were the VOCs reported in soil from boring S152SB01. At ASTs 173A, 173B, and 173C, the only VOC reported in soil was 2-butanone from boring S173SB01. At OWS 017, only one VOC (4-methyl-2-pentanone) was reported in soil from boring S017SB01. At UST(R)-11, 14 VOCs were reported at concentrations below PSCs. The most frequently reported VOCs at UST(R)-11 include 2-butanone, acetone, carbon disulfide, cis-1,2-dichloroethene, methyl tert-butyl ether, and methylene chloride.

4.1.2 Semivolatile Organic Compounds

PAHs were reported in soil samples collected in the vicinity of the SWMUs. Data collected at locations near OWS 017 are included in tables in this attachment. B(a)P equivalent concentrations were below the PSC.

4.1.3 Total Petroleum Hydrocarbons

Motor oil–range TPH was reported at concentrations of 730 J (3,000 milligrams per kilogram [mg/kg] in a duplicate sample) and 570 J mg/kg in the three surface soil samples (0.5 to 1 foot bgs) collected in the vicinity of ASTs 173A, 173B, and 173C

during the EBS. These concentrations were above the PSC (ESL of 500 mg/kg). TPH concentrations for samples collected near AST 016, AST 039, AST 152, AST 392, and UST(R)-11 were reported below PSCs. Diesel- and motor oil–range TPH was reported in soil from borings near AST 016, AST 039, AST 152, and UST(R)-11 at concentrations below PSCs. Jet propellant grade 5–range TPH was also reported in soil samples from UST(R)-11 at concentrations below the PSC. Motor oil–range TPH was reported in soil samples in the vicinity of AST 392 at concentrations below the PSC.

4.1.4 Metals

Fifteen to 20 metals were reported in soil from borings in the vicinity of OWS 017, AST 039, AST 392, and UST(R)-11 at concentrations below PSCs. Arsenic was reported above the PSC (PRG) of 0.062 mg/kg, but below the background concentration of 9.14 mg/kg in samples collected near all the SWMUs. At UST(R)-11, iron was reported above the PSC (PRG) of 23,000 mg/kg and the background concentration (22,280 mg/kg) in samples collected at 1 to 2 and 3 to 4 bgs from boring A23SB27 (34,800 and 36,500 mg/kg, respectively); however, these concentrations are consistent with the range of iron concentrations reported at IR Site 35 that are believed to be naturally occurring (Section 4.3 of the main RI/FS Report).

4.2 GROUNDWATER SAMPLING RESULTS

EBS and RI groundwater sampling results are presented for each class of chemicals investigated at the eight SWMU areas. Figure 4-2 presents the groundwater sampling results for analytes reported above PSCs.

4.2.1 Volatile Organic Compounds

Carbon disulfide was the only VOC reported in groundwater from borings S017SB01 and S392SB01, located near OWS 017 and AST 392, respectively. Carbon disulfide was also reported in a groundwater sample from boring A23SB27 at UST(R)-11, and 1,2,4-trimethylbenzene was reported in groundwater samples from two other borings (123-0042 and 123-0043) at this area. Tetrachloroethene was the only VOC reported in groundwater from boring S039SB01 collected near AST 039. Six VOCs (benzene, sec-butylbenzene, isopropylbenzene, n-propylbenzene, toluene, and m-,p-xylene) were reported in groundwater from boring S173SB01 located near AST 173. VOC concentrations were below PSCs.

4.2.2 Semivolatile Organic Compounds

The SVOC bis(2-ethylhexyl)phthalate was reported in EBS sample 195-0034 in the vicinity of AST 039 at a concentration below the PSC. A duplicate (195-0024) sample collected at this location did not have the compound at concentrations above the detection limit; however, the detection limit for the sample was above the PSC. Butylbenzyl phthalate was also reported in this groundwater sample at concentrations below the PSC.

4.2.3 Total Petroleum Hydrocarbons

Diesel-range TPH was reported in groundwater from boring S152SB01 near AST 152 at a concentration of 110 micrograms per liter (µg/L). Diesel-range TPH and motor oil–range TPH were reported at concentrations of 540 and 840 µg/L, respectively, in groundwater from boring S173SB01 near AST 173. Diesel-range TPH and motor oil-range TPH were reported at concentrations of 200 µg/kg (both) from boring 123-0041, and diesel-range TPH was reported at 240 µg/kg from boring 123-0043 near UST(R)-11. These were the only TPH concentrations above PSCs for either diesel- or motor oil–range TPH (ESL of 100 µg/L for both).

4.2.4 Metals

Only groundwater samples near UST(R)-11 were analyzed for metals. Except arsenic, 18 metals were reported at concentrations below PSCs in groundwater samples from six borings in the vicinity of UST(R)-11. Arsenic was reported above the PSC (MCL) of 10 µg/L in groundwater samples from two borings (123-0042 and 123-0043 [at 16 and 13.9 µg/L, respectively]); however, these concentrations were below the background concentration of 20.72 µg/L.

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Section 5
CONCLUSIONS AND RECOMMENDATIONS

This section presents the RI conclusions and recommendations for the SWMU areas. Included is a summary of the RI results, which form the basis of responses to the DQO decisions questions that provided the framework for the RI at the SWMUs (Table 5-1).

5.1 SUMMARY

The regulatory agencies requested further evaluation of nine SWMUs (OWS 017; ASTs 016, 039, 152, 173A, 173B, 173C, and 392; and former UST[R]-11) as part of the IR Site 35 RI.

The Navy wrote a letter dated July 26, 2005, to DTSC and the Water Board requesting that ASTs 016, 039, 152, 173A, 173B, 173C, and 392 be removed from the list of SWMUs evaluated in Transfer Parcel EDC-5 because they were known to contain only petroleum hydrocarbons rather than waste material, thereby meeting the CERCLA petroleum exclusion criteria. The DTSC responded in a letter dated August 25, 2005, and acknowledged that this issue falls under the jurisdiction of the Water Board.

However, the Navy's request had not been resolved when the Work Plan (BEI 2006) was published. Thus, the Navy opted to collect and analyze soil and grab groundwater samples to assess possible impact from these ASTs. Soil and groundwater samples were collected near these SWMUs during previous investigations and the RI.

Chemicals in soil or groundwater samples collected adjacent to OWS 017 and ASTs 016, 039, and 392 were not reported above PSCs. Diesel-range TPH was reported in soil and groundwater samples above TPH ESLs near ASTs 173A, 173B, and 173C, and slightly above the TPH ESL in groundwater samples collected adjacent to AST 152 and former UST(R)-11. Motor oil–range TPH was also reported in soil and groundwater above the TPH ESL near ASTs 173A, 173B, 173C and in a groundwater sample collected adjacent to former UST(R)-11. The only other chemicals reported above PSCs were metals in samples collected adjacent to former UST(R)-11 (Figures 4-1 and 4-2). Iron was reported above background in one soil sample, and arsenic was reported above the MCL in two groundwater samples; however, arsenic concentrations were below background. Statistical analysis indicates that the iron is naturally occurring and not from releases due to Navy activities.

Risk evaluations were not performed on data collected at the OWS and AST SWMUs. Data associated with UST(R)-11 were included in the baseline human-health risk assessment for AOC 23.

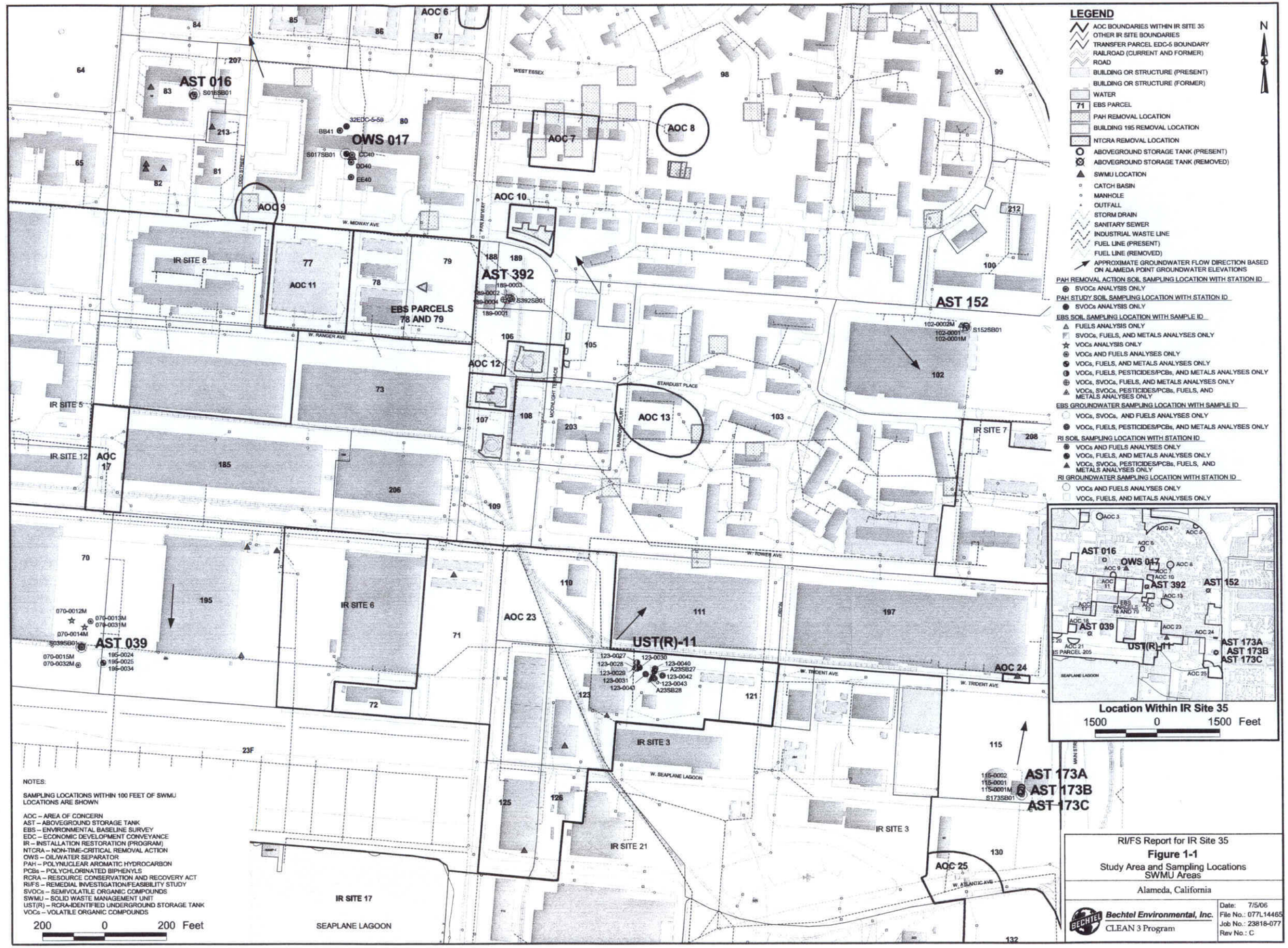
5.2 SWMU CONCLUSIONS AND RECOMMENDATIONS

Data collected during previous investigation were sufficient to assess impact to soil and groundwater quality from the nine SWMUs and support recommendations.

Recommendations for the nine SWMUs are the following.

- No further action is recommended for OWS 017 and ASTs 016, 039, and 392 because chemicals were not reported above PSCs in any of the soil or groundwater samples collected.
- No further action is recommended for AST 152 because the reported TPH concentration (110 µg/L) was only slightly above the PSC (100 µg/L).
- No further action is recommended for former UST(R)-11 because TPH concentrations reported in groundwater (up to 240 µg/L) were not much greater than the PSC (100 µg/L). Also, reported arsenic concentrations in groundwater were below background, and iron in soil above the PSC is considered naturally occurring.
- TPH concentrations above PSCs at ASTs 173A, 173B, and 173C should be reviewed under the TPH Program to determine whether the Water Board's criteria for closure of low-risk fuel sites are met.

FIGURES


LEGEND
AOC BOUNDARIES WITHIN IR SITE 35
OTHER IR SITE BOUNDARIES
TRANSFER PARCEL EDC-5 BOUNDARY
RAILROAD (CURRENT AND FORMER)
ROAD
BUILDING OR STRUCTURE (PRESENT)
BUILDING OR STRUCTURE (FORMER)
WATER
71 EBS PARCEL
PAH REMOVAL LOCATION
BUILDING 195 REMOVAL LOCATION
NTCRA REMOVAL LOCATION
ABOVEGROUND STORAGE TANK (PRESENT)
ABOVEGROUND STORAGE TANK (REMOVED)
SWMU LOCATION
CATCH BASIN
MANHOLE
OUTFALL
STORM DRAIN
SANITARY SEWER
INDUSTRIAL WASTE LINE
FUEL LINE (PRESENT)
FUEL LINE (REMOVED)
APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
PAH REMOVAL ACTION SOIL SAMPLING LOCATION WITH STATION ID
SVOCs ANALYSIS ONLY
PAH STUDY SOIL SAMPLING LOCATION WITH STATION ID
SVOCs ANALYSIS ONLY
EBS SOIL SAMPLING LOCATION WITH SAMPLE ID
FUELS ANALYSIS ONLY
SVOCs, FUELS, AND METALS ANALYSES ONLY
VOCs ANALYSIS ONLY
VOCs AND FUELS ANALYSES ONLY
VOCs, FUELS, AND METALS ANALYSES ONLY
VOCs, FUELS, PESTICIDES/PCBs, AND METALS ANALYSES ONLY
VOCs, SVOCs, FUELS, AND METALS ANALYSES ONLY
VOCs, SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY
EBS GROUNDWATER SAMPLING LOCATION WITH SAMPLE ID
VOCs, SVOCs, AND FUELS ANALYSES ONLY
VOCs, FUELS, PESTICIDES/PCBs, AND METALS ANALYSES ONLY
RI SOIL SAMPLING LOCATION WITH STATION ID
VOCs AND FUELS ANALYSES ONLY
VOCs, FUELS, AND METALS ANALYSES ONLY
VOCs, SVOCs, PESTICIDES/PCBs, FUELS, AND METALS ANALYSES ONLY
RI GROUNDWATER SAMPLING LOCATION WITH STATION ID
VOCs AND FUELS ANALYSES ONLY
VOCs, FUELS, AND METALS ANALYSES ONLY
N
AST 016
S016SB01
OWS 017
S017SB01
32EDC-5-58
BB41
CC40
DD40
EE40
AOC 6
AOC 7
AOC 8
AOC 9
AOC 10
AOC 11
AOC 12
AOC 13
AOC 17
AOC 23
AOC 24
AOC 25
EBS PARCELS 78 AND 79
AST 392
S392SB01
189-0003
189-0002
189-0004
189-0001
AST 152
S152SB01
102-0002M
102-0001
102-0001M
AST 039
S039SB01
070-0012M
070-0013M
070-0031M
070-0014M
070-0015M
070-0032M
195-0024
195-0025
195-0034
AST 173A
AST 173B
AST 173C
S173SB01
115-0002
115-0001
115-0001M
UST(R)-11
123-0027
123-0028
123-0029
123-0031
123-0041
123-0030
123-0040
A23SB27
123-0042
123-0043
A23SB28
IR SITE 3
IR SITE 5
IR SITE 6
IR SITE 7
IR SITE 8
IR SITE 12
IR SITE 17
IR SITE 21
W. MIDWAY AVE
W. RANGER AVE
W. TOWNES AVE
W. TRIDENT AVE
W. SEAPLANE LAGOON
W. ATLANTIC AVE
WEST ESSEX
STARDUST PLACE
MOONLIGHT TERRACE
RAINBOW DRIVE
DOOLITTLE DRIVE
PAN AM WAY
MAIN STREET
SEAPLANE LAGOON
Location Within IR Site 35
1500 0 1500 Feet
NOTES:
SAMPLING LOCATIONS WITHIN 100 FEET OF SWMU LOCATIONS ARE SHOWN
AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
NTCRA – NON-TIME-CRITICAL REMOVAL ACTION
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PCBs – POLYCHLORINATED BIPHENYLS
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK
VOCs – VOLATILE ORGANIC COMPOUNDS
200 0 200 Feet
RI/FS Report for IR Site 35
Figure 1-1
Study Area and Sampling Locations
SWMU Areas
Alameda, California
Bechtel Environmental, Inc.
CLEAN 3 Program
Date: 7/5/06
File No.: 077L14465
Job No.: 23818-077
Rev No.: C

LEGEND

- AOC BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- RAILROAD (CURRENT AND FORMER)
- ROAD
- BUILDING OR STRUCTURE (PRESENT)
- BUILDING OR STRUCTURE (FORMER)
- WATER
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- BUILDING 195 REMOVAL LOCATION
- NTCRA REMOVAL LOCATION
- ABOVEGROUND STORAGE TANK (PRESENT)
- ABOVEGROUND STORAGE TANK (REMOVED)
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- OUTFALL
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- FUEL LINE (PRESENT)
- FUEL LINE (REMOVED)
- APPROXIMATE GROUNDWATER FLOW DIRECTION BASED ON ALAMEDA POINT GROUNDWATER ELEVATIONS
- HISTORICAL SOIL SAMPLING LOCATION
- RI SOIL SAMPLING LOCATION

N

SOIL SAMPLING LOCATION WITH ANALYTE(S) ABOVE PSC FOR :
- METALS
- FUELS

SOIL SAMPLING LOCATION WITH ANALYTE(S) BELOW PSC FOR :
- METALS
- FUELS

STATION ID (SAMPLE ID FOR EBS LOCATIONS) — DEPTH IN FEET BGS (TOP DEPTH OF SAMPLE INTERVAL)

115-0002 0.5
MOTOR OIL 570 J

ANALYTE — REVIEW QUALIFIER — CONCENTRATION in mg/kg

Analyte	PSC
MOTOR OIL	500 mg/kg (TPH Residential Soil ESL)
IRON	23,000 mg/kg (Federal Residential PRG)

NOTES:

SAMPLING LOCATIONS WITHIN 100 FEET OF SWMU LOCATIONS ARE SHOWN

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
BGS – BELOW GROUND SURFACE
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
ESL – ENVIRONMENTAL SCREENING LEVEL
IR – INSTALLATION RESTORATION (PROGRAM)
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
mg/kg – MILLIGRAMS PER KILOGRAM
NTCRA – NON-TIME-CRITICAL REMOVAL ACTION
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PRG – PRELIMINARY REMEDIATION GOAL
PSC – PRELIMINARY SCREENING CRITERION
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
TPH – TOTAL PETROLEUM HYDROCARBONS
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK

RI/FS Report for IR Site 35

Figure 4-1

Soil Sampling Results for Analytes Above PSC – SWMU Areas

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 7/5/06
File No.: 077L14513
Job No.: 23818-077
Rev No.: C

Analyte	PSC	Background 95th Percentile
ARSENIC	10 µg/L (Federal MCL)	20.72 µg/L
DIESEL	100 µg/L (TPH Groundwater ESL)	NA
MOTOR OIL	100 µg/L (TPH Groundwater ESL)	NA

RI/FS Report for IR Site 35

Figure 4-2

Groundwater Sampling Results for Analytes Above PSC – SWMU Areas

Alameda, California

Bechtel Environmental, Inc.

CLEAN 3 Program

Date: 2/26/07
File No.: 077L14514
Job No.: 23818-077
Rev No.: D

TABLES

Table 2-1
Surface Elevations, Groundwater Elevations, and Total Dissolved Solids Results, SWMUs

SWMU	Surface Elevation (feet above MSL)	Depth to Groundwater* (feet bgs)	Groundwater Elevation (feet above MSL)	Total Dissolved Solids (mg/L)
OWS 017	12.34	6.5	5.8	1,060
AST 016	10.06	4.0	6.1	980
AST 039	10.80	4.0	6.8	192
AST 152	11.26	4.5	6.8	3,070
ASTs 173A, 173B, and 173C	11.72	3.75	8.0	8,370
AST 392	13.06	6.25	6.8	1,630
UST(R)-11	11.68	5.0	6.7	1,278

Note:
* all information in this table is based on one boring installed at each SWMU; groundwater depth was measured in temporary casings prior to groundwater sample collection

Acronyms/Abbreviations:
bgs – below ground surface
mg/L – milligrams per liter
MSL – mean sea level
SWMU – solid waste management unit

Table 3-1
Sample Analysis Summary, OWS 017

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE				
				VOCs	PAHs	TPH	Metals	TDS
Soil								
32EDC-5-59	C032CA14	PAH Study	0–0.5		X			
32EDC-5-59	C032CA15	PAH Study	0.5–2		X			
32EDC-5-59	C032CA16	PAH Study	2–4		X			
32EDC-5-59	C032CA17	PAH Study	4–8		X			
BB41	0040-WHA-1443	PAH TCRA	0–0.5		X			
BB41	0040-WHA-1444	PAH TCRA	0.5–2		X			
BB41	0040-WHA-1445	PAH TCRA	2–4		X			
BB41	0040-WHA-1446	PAH TCRA	4–8		X			
CC40	0040-WHA-0458	PAH TCRA	1–1.5		X			
DD40	0040-WHA-0459	PAH TCRA	1–1.5		X			
EE40	0040-WHA-0460	PAH TCRA	1–2		X			
S017SB01	C077S581	Site 35 RI	1–2	X		X*	X	
S017SB01	C077S582	Site 35 RI	3–4	X		X*	X	
Groundwater								
S017SB01	C077G221	Site 35 RI	6–11	X		X*		X
S017SB01	C077G222 (FD)	Site 35 RI	6–11	X				

References:
PAH Study (BEI 2005a)
PAH TCRA (FWEC 2004)

Note:
* analyzed for diesel-, JP-5–, and motor oil–range TPH

Acronyms/Abbreviations:
bgs – below ground surface
FD – field duplicate
JP-5 – jet propellant grade 5
OWS – oil/water separator
PAH – polynuclear aromatic hydrocarbon
RI – remedial investigation
TCRA – time-critical removal action
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 3-2
Sample Analysis Summary, AST 016

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE		
				VOCs	TPH	TDS
Soil						
S016SB01	C077S561	Site 35 RI	1–2	X	X*	
S016SB01	C077S562	Site 35 RI	2.5–4	X	X*	
Groundwater						
S016SB01	C077G211	Site 35 RI	5–10	X	X*	X
S016SB01	C077G212 (FD)	Site 35 RI	5–10		X*	X

Note:

* analyzed for diesel-, JP-5–, and motor oil–range TPH

Acronyms/Abbreviations:

AST – aboveground storage tank
bgs – below ground surface
FD – field duplicate
JP-5 – jet propellant grade 5
RI – remedial investigation
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 3-3
Sample Analysis Summary, AST 039

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE				
				VOCs	SVOCs	TPH	Metals	TDS
Soil								
070-003-012	070-0012M	EBS	3–3.5	X				
070-003-013	070-0031M	EBS	0–0.5			X[a]		
070-003-013	070-0013M	EBS	3–3.5	X				
070-003-014	070-0014M	EBS	3–3.5	X				
070-003-015	070-0032M	EBS	0–0.5			X[a]		
070-003-015	070-0015M	EBS	3–3.5	X				
195-Z11-021	195-0025	EBS	2.5–3.5	X		X[a]	X	
S039SB01	C077S601	Site 35 RI	1–2	X		X[b]		
S039SB01	C077S602	Site 35 RI	2.5–4	X		X[b]		
Groundwater								
S039SB01	C077G231	Site 35 RI	5–10	X		X[b]		X
195-Z11-021	195-0024	EBS	7.5–8.5	X	X	X[a]		
195-Z11-021	195-0034 (FD)	EBS	7.5–8.5	X	X	X[a]		

Reference: EBS (IT 2001a)

Notes:

[a] analyzed for gasoline-, diesel-, and motor oil–range TPH

[b] analyzed for diesel-, JP-5–, and motor oil–range TPH

Acronyms/Abbreviations:

AST – aboveground storage tank
bgs – below ground surface
EBS – environmental baseline survey
FD – field duplicate
JP-5 – jet propellant grade 5
RI – remedial investigation
SVOC – semivolatile organic compound
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 3-4
Sample Analysis Summary, AST 152

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE		
				VOCs	TPH	TDS
Soil						
102-001-001	102-0001[a]	EBS	0.5–1		X[b]	
102-001-001	102-0001M[a]	EBS	0.5–1		X[b]	
102-001-002	102-0002M	EBS	1–1.5		X[b]	
S152SB01	C077S621	Site 35 RI	1–2	X	X[c]	
S152SB01	C077S622	Site 35 RI	3–4	X	X[c]	
Groundwater						
S152SB01	C077G241	Site 35 RI	3.5–8.5	X	X[c]	X

Reference: EBS (IT 2001a)

Notes:

[a] sample 102-0001 was analyzed by a fixed-base laboratory; sample 102-0001M was analyzed by a mobile or screening laboratory; samples 102-0001/-0001M were collected from the same location

[b] analyzed for diesel- and motor oil–range TPH

[c] analyzed for diesel-, JP-5–, and motor oil–range TPH

Acronyms/Abbreviations:

AST – aboveground storage tank
bgs – below ground surface
EBS – environmental baseline survey
JP-5 – jet propellant grade 5
RI – remedial investigation
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 3-5
Sample Analysis Summary, ASTs 173A, -B, and -C

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE		
				VOCs	TPH	TDS
Soil						
115-001-001	115-0001[a]	EBS	0.5–1		X[b]	
115-001-001	115-0001M[a]	EBS	0.5–1		X[b]	
115-001-002	115-0002	EBS	0.5–1		X[b]	
S173SB01	C077S641	Site 35 RI	1–2	X	X[c]	
S173SB01	C077S642	Site 35 RI	3–4	X	X[c]	
Groundwater						
S173SB01	C077G251	Site 35 RI	5–10	X	X[c]	X
S173SB01	C077G252 (FD)	Site 35 RI	5–10			X

Reference: EBS (IT 2001a)

Notes:

[a] sample 115-0001 was analyzed by a fixed-base laboratory; sample 115-0001M was analyzed by a mobile or screening laboratory; samples 115-0001/-0001M were collected from the same location

[b] analyzed for diesel- and motor oil–range TPH

[c] analyzed for diesel-, JP-5–, and motor oil–range TPH

Acronyms/Abbreviations:

AST – aboveground storage tank
bgs – below ground surface
EBS – environmental baseline survey
FD – field duplicate
JP-5 – jet propellant grade 5
RI – remedial investigation
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 3-6
Sample Analysis Summary, AST 392

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE				
				VOCs	SVOCs	TPH	Metals	TDS
Soil								
189-001-001	189-0001	EBS	0–0.5			X[a]		
189-001-002	189-0002	EBS	0–0.5			X[a]		
189-002-003	189-0003	EBS	4.5–5		X	X[b]	X	
189-002-004	189-0004	EBS	6–7	X	X	X[b]	X	
S392SB01	C077S661	Site 35 RI	1–2	X		X[c]		
S392SB01	C077S662	Site 35 RI	3–4	X		X[c]		
Groundwater								
S392SB01	C077G261	Site 35 RI	7–12	X		X[c]		X

Reference: EBS (IT 2001a)

Notes:

[a] analyzed for diesel- and motor oil–range TPH

[b] analyzed for gasoline-, diesel-, and motor oil–range TPH

[c] analyzed for diesel-, JP-5–, and motor oil–range TPH

Acronyms/Abbreviations:

AST – aboveground storage tank
bgs – below ground surface
EBS – environmental baseline survey
JP-5 – jet propellant grade 5
RI – remedial investigation
SVOC – semivolatile organic compound
TDS – total dissolved solids
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 3-7
Sample Analysis Summary, UST(R)-11

Station ID	Sample ID	Investigation	Approximate Sample Depth Interval (feet bgs)	ANALYTE						
				VOCs	SVOCs	TPH	Pest/PCBs	Herbicides	Metals	Organotins
Soil										
123-0027	123-0027	EBS	0–1	X		X[a]	X		X	
123-0028	123-0028	EBS	0–1	X	X	X[a]	X		X	
123-0029	123-0029	EBS	0–1	X		X[a]	X		X	
123-0030	123-0030	EBS	0–1	X		X[a]	X		X	
123-0031	123-0031	EBS	0–1	X		X[a]	X		X	
A23SB27	C077S418	Site 35 RI	1–2	X		X[b]			X	
A23SB27	C077S419	Site 35 RI	3–4	X		X[b]			X	
A23SB27	C077S420	Site 35 RI	5–6	X		X[b]			X	
A23SB28	C077S421	Site 35 RI	1–2	X	X	X[b]	X		X	
A23SB28	C077S422	Site 35 RI	3–4	X		X[b]			X	
A23SB28	C077S423	Site 35 RI	5–6.5	X		X[b]			X	
Groundwater										
123-0040	123-0040	EBS	6–10	X		X[a]	X		X	
123-0041	123-0041	EBS	4–8	X		X[a]	X		X	
123-0042	123-0042	EBS	4–8	X		X[a]	X		X	
123-0043	123-0043	EBS	4–8	X		X[a]	X		X	
A23SB27	C077G135	Site 35 RI	5–10	X		X[c]			X	X
A23SB28	C077G136	Site 35 RI	5–10	X		X[c]			X	X

References:
PAH Study (BEI 2005a)
EBS (IT 2001a)
QS_2003 – historical quarterly sampling results now available in ArcView Database
BGMP2004_IRSite6 – historical quarterly sampling results now available in ArcView Database
BGMP2004Fall_Winter – historical quarterly sampling results now available in ArcView Database

Notes:
[a] analyzed for gasoline-, diesel-, and motor oil–range TPH
[b] analyzed for gasoline-range TPH
[c] analyzed for diesel-, JP-5–, and motor oil–range TPH

Acronyms/Abbreviations:
AOC – area of concern
bgs – below ground surface
EBS – environmental baseline survey
FD – field duplicate
JP-5 – jet propellant grade 5
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
Pest – pesticides
RI – remedial investigation
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-1a
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, OWS 017

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	Background (95th Percentile)
Volatile Organic Compounds (µg/kg)									
4-methyl-2-pentanone	2	1	50	0	1.1	1.1	1.1	5,300,000	—[c]
Semivolatile Organic Compounds (µg/kg)									
anthracene	11	3	27	0	0.53	1	1.8	22,000,000	—
benz(a)anthracene	11	7	64	0	0.84	4.4	14	620	—
benzo(b)fluoranthene	11	8	73	0	0.88	6.4	28	620	—
benzo(k)fluoranthene	11	7	64	0	1.2	3.3	7.3	380 [d]	—
benzo(g,h,i)perylene	11	6	55	No PSC	1.4	6.7	20	—	—
benzo(a)pyrene	11	8	73	0	1.2	6.2	21	62	—
chrysene	11	6	55	0	1.2	7.3	23	3,800 [d]	—
dibenz(a,h)anthracene	11	5	45	0	0.26	1.1	3	62	—
fluoranthene	11	9	82	0	3	11	32	2,300,000	—
indeno(1,2,3-cd)pyrene	11	7	64	0	1.4	5.3	17	620	—
2-methylnaphthalene	8	1	13	No PSC	0.32	0.32	0.32	—	—
naphthalene	11	2	18	0	0.33	0.35	0.36	1,700 [d]	—
phenanthrene	11	7	64	No PSC	0.92	5.2	16	—	—
pyrene	11	7	64	0	3.8	14	37	2,300,000	—
Metals (mg/kg)									
aluminum	2	2	100	0	3,880	4,300	4,650	76,000	13,960
arsenic	2	2	100	0	1.6	1.6	1.6	0.062 [d]	9.14
barium	2	2	100	0	29.2	30	30.6	5,400	93.68
calcium	2	2	100	No PSC	2,100	2,200	2,320	—	16,800
chromium	2	2	100	0	27.2	29	29.9	210	54.84
cobalt	2	2	100	0	3.9	4.4	4.8	900	14.30
copper	2	2	100	0	5.6	6	6.3	3,100	39.14
iron	2	2	100	0	8,230	9,400	10,600	23,000	22,280
lead	2	2	100	0	1.9	2	2	150 [d]	37.66
magnesium	2	2	100	No PSC	2,000	2,400	2,750	—	7,304
manganese	2	2	100	0	91.2	120	145	1,800	383.0
nickel	2	2	100	0	23.2	24	23.9	1,600	55.72
potassium	2	2	100	No PSC	525	590	648	—	1,232
silver	2	2	100	0	0.06	0.11	0.15	390	2.22
vanadium	2	2	100	0	18.1	21	24.1	78	47.34
zinc	2	2	100	0	14.1	15	15.2	23,000	67.48

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

Acronyms/Abbreviations:

µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
OWS – oil/water separator
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criterion (PRG)

Table 4-1b
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, OWS 017

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC	Minimum*	Average*	Maximum*
Volatile Organic Compounds (µg/L)							
carbon disulfide	2	2	100	No PSC	0.37	0.37	0.37
General Chemistry (µg/L)							
solids, total dissolved	1	1	100	No PSC	1,060,000	1,100,000	1,060,000

Note:
* data review qualifiers are not included in this table

Acronyms/Abbreviations:
µg/L – micrograms per liter
MCL – maximum contaminant level
OWS – oil/water separator
PSC – preliminary screening criterion

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Table 4-1c
Soil Sampling Results, OWS 017

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: 32EDC-5-59 / Sample: C032CA14 / [a]Depth Interval: 0 - 0.5 / Collection Date: 15-May-02	32EDC-5-59 / C032CA15 / 0.5 - 2 / 15-May-02	32EDC-5-59 / C032CA16 / 2 - 4 / 15-May-02	32EDC-5-59 / C032CA17 / 4 - 8 / 15-May-02	BB41 / 0040-WHA-1443 / 0 - 0.5 / 14-Jul-03	BB41 / 0040-WHA-1444 / 0.5 - 2 / 14-Jul-03	BB41 / 0040-WHA-1445 / 2 - 4 / 14-Jul-03	BB41 / 0040-WHA-1446 / 4 - 8 / 14-Jul-03
VOCs													
4-methyl-2-pentanone	5,300,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons						NA	NA	NA	NA	NA	NA	NA	NA
SVOCs													
anthracene	22,000,000	—	—	—	µg/kg	0.76 J	0.53 J	5.2 U	5.5 U	1.8 J	5.1 U	52 U	5.4 U
benz(a)anthracene	620[c]	—	—	—	µg/kg	4.5 J	1.5 J	1.8 J	0.84 J	14	3.5 J	52 U	5.4 U
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	5.1	1.7 J	2.5 J	0.88 J	28	8.4	52 U	5.4 U
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	5 J	2.1 J	2.5 J	1.2 J	7.3	2.7 J	52 U	5.4 U
benzo(g,h,i)perylene	—	—	—	—	µg/kg	5.9	2.4 J	3.3 J	1.4 J	20	7.1	52 U	5.4 U
benzo(a)pyrene	62[c]	—	—	—	µg/kg	5.5	2.3 J	2.9 J	1.2 J	21	6.8	52 U	5.4 U
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	7.6	2.2 J	3.2 J	1.2 J	23	6.6	52 U	5.4 U
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	1.5 J	0.53 J	0.44 J	0.26 J	3 J	5.1 U	52 U	5.4 U
fluoranthene	2,300,000	—	—	—	µg/kg	11	6	4.6 J	3.1 J	32	12	22 J	5.4 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	5.7	2.5 J	2.8 J	1.4 J	17 J	5.8 J	52 U	5.4 U
2-methylnaphthalene	—	—	—	—	µg/kg	0.32 J	5.1 U	5.2 U	5.5 U	5.1 U	5.1 U	52 U	5.4 U
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	0.36 J	0.33 J	5.2 UJ	5.5 UJ	5.1 U	5.1 U	52 U	5.4 U
phenanthrene	—	—	—	—	µg/kg	5 J	5.1	2 J	0.92 J	16	6.1	52 U	5.4 U
pyrene	2,300,000	—	—	—	µg/kg	14	7.4	6.1	3.8 J	37	14	17 J	5.4 U
Metals													
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
silver	390	—	—	2.22	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA

Table 4-1c
Soil Sampling Results, OWS 017

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: CC40 / Sample: 0040-WHA-0458 / [a]Depth Interval: 1 - 1.5 / Collection Date: 25-Apr-03	DD40 / 0040-WHA-0459 / 1 - 1.5 / 25-Apr-03	EE40 / 0040-WHA-0460 / 1 - 2 / 25-Apr-03	S017SB01 / C077S581 / 1 - 2 / 16-Dec-05	S017SB01 / C077S582 / 3 - 4 / 16-Dec-05
VOCs										
4-methyl-2-pentanone	5,300,000	—[b]	—	—	µg/kg	NA	NA	NA	20 U	1.1 J
Petroleum Hydrocarbons						NA	NA	NA	ND	ND
SVOCs										
anthracene	22,000,000	—	—	—	µg/kg	1.9 U	2.4 U	2.5 U	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	4.6 U	5 J	6.3 U	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	1.9 U	3	2 J	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	1.9 U	2 J	2.5 U	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	7.4 U	8.5 U	8.8 U	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	4.6 U	6 J	4 J	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	4.6 U	6.1 U	6.3 U	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	19 U	21 U	21 U	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	4.6 U	6 J	3 J	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	4.6 U	2 J	6.3 U	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	46 U	61 U	63 U	NA	NA
phenanthrene	—	—	—	—	µg/kg	3.7 U	1 J	5 U	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	9.3 U	12 U	13 U	NA	NA
Metals										
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	4,650	3,880
arsenic	0.39	0.062	—	9.14	mg/kg	NA	NA	NA	**1.6**[d]	**1.6**
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	30.6	29.2
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	2,320	2,100
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	27.2	29.9
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	4.8 J	3.9 J
copper	3,100	—	—	39.14	mg/kg	NA	NA	NA	6.3 J	5.6 J
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	10,600	8,230
lead	400	150	—	37.66	mg/kg	NA	NA	NA	2	1.9
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	2,750	2,000
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	145	91.2
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	23.2 J	23.9 J
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	648	525
silver	390	—	—	2.22	mg/kg	NA	NA	NA	0.15	0.06 J
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	24.1	18.1
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	15.2	14.1

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[d] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL

Acronyms/Abbreviations:
B(a)P – benzo(a)pyrene
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
ND – not detected
OWS – oil/water separator
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the com pound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 4-1d
Groundwater Sampling Results, OWS 017

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Background	Result Units	Station ID: S017SB01 Sample: C077G221 [a]Depth Interval: 6 - 11 Collection Date: 16-Dec-05	Station ID: S017SB01 Sample: C077G222 (FD) [a]Depth Interval: 6 - 11 Collection Date: 16-Dec-05
VOCs							
carbon disulfide	—[b]	—	—	—	µg/L	0.37 J	0.37 J
Petroleum Hydrocarbons						ND	NA
General Chemistry							
solids, total dissolved	—	—	—	—	µg/L	1,060,000	NA

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

Acronyms/Abbreviations:

Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
GW – groundwater
µg/L – micrograms per liter
MCL – maximum contaminant level
NA – not analyzed
ND – not detected
OWS – oil/water separator
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifier:

J – indicates an estimated value

Table 4-2a
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AST 016

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC	Minimum*	Average*	Maximum*	TPH ESL
Fuels (µg/kg)								
diesel	2	2	100	0	10,000	10,000	10,000	100,000
motor oil	2	2	100	0	13,000	13,000	13,000	500,000

Note:
* data review qualifiers are not included in this table

Acronyms/Abbreviations:
AST – aboveground storage tank
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/kg – micrograms per kilogram
PSC – preliminary screening criterion (ESL)
TPH – total petroleum hydrocarbons

Table 4-2b
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, AST 016

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC	Minimum*	Average*	Maximum*
General Chemistry (µg/L)							
solids, total dissolved	2	2	100	No PSC	980,000	980,000	984,000

Note:

* data review qualifiers are not included in this table

Acronyms/Abbreviations:

AST – aboveground storage tank
µg/L – micrograms per liter
PSC – preliminary screening criterion

Table 4-2c
Soil Sampling Results, AST 016

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: S016SB01 / Sample: C077S561 / [a]Depth Interval: 1 - 2 / Collection Date: 16-Dec-05	Station ID: S016SB01 / Sample: C077S562 / [a]Depth Interval: 2.5 - 4 / Collection Date: 16-Dec-05
VOCs						ND	ND
Petroleum Hydrocarbons							
diesel	—[b]	—	100,000	—	µg/kg	10,000 J	10,000 J
motor oil	—	—	500,000	—	µg/kg	13,000	13,000

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

Acronyms/Abbreviations:

AST – aboveground storage tank
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
µg/kg – micrograms per kilogram
ND – not detected
PRG – preliminary remediation goal
Res – residential
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifier:

J – indicates an estimated value

Table 4-2d
Groundwater Sampling Results, AST 016

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Background	Result Units	Station ID: / Sample: / [a]Depth Interval: / Collection Date:	S016SB01 C077G211 5 - 10 16-Dec-05	S016SB01 C077G212 (FD) 5 - 10 16-Dec-05
VOCs							ND	NA
Petroleum Hydrocarbons							ND	ND
General Chemistry								
solids, total dissolved	—[b]	—	—	—	µg/L		980,000	984,000

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

Acronyms/Abbreviations:

AST – aboveground storage tank
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
GW – groundwater
µg/L – micrograms per liter
MCL – maximum contaminant level
NA – not analyzed
ND – not detected
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

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Table 4-3a
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AST 039

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
Fuels (µg/kg)										
diesel	5	2	40	0	2,400	3,600	4,700	—[c]	100,000	—
motor oil	5	1	20	0	160,000	160,000	160,000	—	500,000	—
Semivolatile Organic Compounds (µg/kg)										
anthracene	4	1	25	0	0.96	0.96	0.96	22,000,000	—	—
benz(a)anthracene	4	2	50	0	1.8	2.2	2.5	620	—	—
benzo(b)fluoranthene	4	2	50	0	2.1	3.7	5.3	620	—	—
benzo(k)fluoranthene	4	2	50	0	2.5	3.5	4.4	380[d]	—	—
benzo(g,h,i)perylene	4	3	75	No PSC	0.58	2.7	4	—	—	—
benzo(a)pyrene	4	2	50	0	3.5	5.1	6.6	62	—	—
chrysene	4	2	50	0	2.1	3.5	4.8	3,800[d]	—	—
dibenz(a,h)anthracene	4	2	50	0	0.3	1.1	1.9	62	—	—
fluoranthene	4	2	50	0	2.2	2.8	3.3	2,300,000	—	—
indeno(1,2,3-cd)pyrene	4	3	75	0	0.55	2.7	4.7	620	—	—
2-methylnaphthalene	4	2	50	No PSC	0.37	0.37	0.37	—	—	—
naphthalene	4	2	50	0	0.34	0.47	0.59	1,700[d]	—	—
phenanthrene	4	2	50	No PSC	0.44	1.9	3.4	—	—	—
pyrene	4	3	75	0	0.41	2.6	5.1	2,300,000	—	—
Metals (mg/kg)										
aluminum	1	1	100	0	3,890	3,900	3,890	76,000	—	13,960
barium	1	1	100	0	34.4	34	34.4	5,400	—	93.68
calcium	1	1	100	No PSC	2,370	2,400	2,370	—	—	16,800
chromium	1	1	100	0	31.7	32	31.7	210	—	54.84
cobalt	1	1	100	0	4.3	4.3	4.3	900	—	14.30
iron	1	1	100	0	7,900	7,900	7,900	23,000	—	22,280
lead	1	1	100	0	5.5	5.5	5.5	150[d]	—	37.66
magnesium	1	1	100	No PSC	1,870	1,900	1,870	—	—	7,304
manganese	1	1	100	0	74.6	75	74.6	1,800	—	383.0
nickel	1	1	100	0	23.4	23	23.4	1,600	—	55.72
potassium	1	1	100	No PSC	835	840	835	—	—	1,232
selenium	1	1	100	0	0.67	0.67	0.67	390	—	1.78
sodium	1	1	100	No PSC	103	100	103	—	—	1,230
vanadium	1	1	100	0	18.6	19	18.6	78	—	47.34
zinc	1	1	100	0	16.1	16	16.1	23,000	—	67.48

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

Acronyms/Abbreviations:

AST – aboveground storage tank
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
TPH – total petroleum hydrocarbons

Table 4-3b
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, AST 039

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC	Minimum [a]	Average [a]	Maximum [a]	California MCL
Volatile Organic Compounds (µg/L)								
tetrachloroethene	3	1	33	0	0.17	0.17	0.17	5
Semivolatile Organic Compounds (µg/L)								
bis(2-ethylhexyl)phthalate	2	1	50	0	2	2	2	4
butyl benzyl phthalate	2	1	50	No PSC	3	3	3	—[b]
General Chemistry (µg/L)								
solids, total dissolved	1	1	100	No PSC	192,000	190,000	192,000	—

Notes:
[a] data review qualifiers are not included in this table
[b] dash indicates not applicable or not established

Acronyms/Abbreviations:
AST – aboveground storage tank
µg/L – micrograms per liter
MCL – maximum contaminant level
PSC – preliminary screening criterion (MCL)

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Table 4-3c
Soil Sampling Results, AST 039

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Back-ground	Station ID: / Sample: / [a]Depth Interval: / Collection Date: / Result Units	070-003-012 070-0012M 3 - 3.5 30-Mar-95	070-003-013 070-0013M 3 - 3.5 30-Mar-95	070-003-013 070-0031M 0 - 0.5 30-Mar-95	070-003-014 070-0014M 3 - 3.5 30-Mar-95	070-003-015 070-0015M 3 - 3.5 30-Mar-95	070-003-015 070-0032M 0 - 0.5 30-Mar-95	195-Z11-021 195-0025 2.5 - 3.5 09-Oct-95	32EDC-5-27 C032C873 0 - 0.5 20-May-02	32EDC-5-27 C032C874 0.5 - 2 20-May-02	32EDC-5-27 C032C875 2 - 4 20-May-02	32EDC-5-27 C032C876 4 - 8 20-May-02	S039SB01 C077S601 1 - 2 16-Dec-05	S039SB01 C077S602 2.5 - 4 16-Dec-05
VOCs						ND	ND	NA	ND	ND	NA	ND	NA	NA	NA	NA	ND	ND
Petroleum Hydrocarbons																		
diesel	—[b]	—	100,000	—	µg/kg	NA	NA	2,400	NA	NA	4,700	28,000 U	NA	NA	NA	NA	1,100 UJ	1,200 UJ
motor oil	—	—	500,000	—	µg/kg	NA	NA	28,000 U	NA	NA	160,000	28,000 U	NA	NA	NA	NA	11,000 U	12,000 U
SVOCs																		
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	0.96 J	5.4 UJ	5.6 UJ	6.5 U	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	2.5 J	5.4 UJ	5.6 UJ	1.8 J	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	5.3 J	5.4 UJ	5.6 UJ	2.1 J	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	4.4 J	5.4 UJ	5.6 UJ	2.5 J	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	4 J	5.4 UJ	0.58 J	3.6 J	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	6.6 J	5.4 UJ	5.6 UJ	3.5 J	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	4.8 J	5.4 UJ	5.6 UJ	2.1 J	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	1.9 J	5.4 UJ	5.6 UJ	0.3 J	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	2.2 J	5.4 UJ	5.6 UJ	3.3 J	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	4.7 J	5.4 UJ	0.55 J	2.9 J	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	0.37 J	0.37 J	5.6 UJ	6.5 U	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	0.34 J	5.4 UJ	5.6 UJ	0.59 J	NA	NA
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	3.4 J	5.4 UJ	5.6 UJ	0.44 J	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	2.2 J	5.4 UJ	0.41 J	5.1 J	NA	NA
Metals																		
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	NA	3,890	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	NA	NA	NA	NA	34.4	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	NA	2,370	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	NA	NA	NA	NA	31.7	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	NA	NA	NA	NA	4.3	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	NA	7,900	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	NA	NA	NA	NA	5.5	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	NA	1,870	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	NA	74.6	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	NA	NA	NA	NA	23.4	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	NA	835	NA	NA	NA	NA	NA	NA
selenium	390	—	—	1.78	mg/kg	NA	NA	NA	NA	NA	NA	0.67	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	NA	103	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	NA	NA	NA	NA	18.6	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	NA	NA	NA	NA	16.1	NA	NA	NA	NA	NA	NA

Notes:
- [a] feet below ground surface
- [b] dash indicates not applicable or not established
- [c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

Acronyms/Abbreviations:
- AST – aboveground storage tank
- B(a)P – benzo(a)pyrene
- Cal – California
- ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
- Fed – federal
- µg/kg – micrograms per kilogram
- mg/kg – milligrams per kilogram
- NA – not analyzed
- ND – not detected
- PAH – polynuclear aromatic hydrocarbon
- PRG – preliminary remediation goal
- PSC – preliminary screening criterion
- Res – residential
- SVOC – semivolatile organic compound
- TPH – total petroleum hydrocarbons
- VOC – volatile organic compound

Review Qualifiers:
- J – indicates an estimated value
- U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
- UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 4-3d
Groundwater Sampling Results, AST 039

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Background	Result Units	Station ID: 195-Z11-021 Sample: 195-0024 [a]Depth Interval: 7.5 - 8.5 Collection Date: 09-Oct-95	Station ID: 195-Z11-021 Sample: 195-0034 (FD) [a]Depth Interval: 7.5 - 8.5 Collection Date: 09-Oct-95	Station ID: S039SB01 Sample: C077G231 [a]Depth Interval: 5 - 10 Collection Date: 16-Dec-05
VOCs								
tetrachloroethene	5	5	—[b]	—	µg/L	1 UJ	1 UJ	0.17 J
Petroleum Hydrocarbons						ND	ND	ND
SVOCs								
bis(2-ethylhexyl)phthalate	6	4	—	—	µg/L	**10 U**[c,d]	2 J	NA
butylbenzyl phthalate	—	—	—	—	µg/L	3 J	10 U	NA
General Chemistry								
solids, total dissolved	—	—	—	—	µg/L	NA	NA	192,000

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL
[d] detection limit is above criteria

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the com pound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Acronyms/Abbreviations:
AST – aboveground storage tank
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
GW – groundwater
µg/L – micrograms per liter
MCL – maximum contaminant level
NA – not analyzed
ND – not detected
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-4a
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AST 152

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC[a]	Minimum[b]	Average[b]	Maximum[b]	Federal Residential PRG	TPH ESL
Volatile Organic Compounds (µg/kg)									
carbon disulfide	2	1	50	0	3.7	3.7	3.7	360,000	—[c]
methylene chloride	2	2	100	0	17	17	17	9,100	—
Fuels (µg/kg)									
diesel	5	1	20	0	13,000	13,000	13,000	—	100,000
motor oil	5	3	60	0	17,000	42,000	62,000	—	500,000
Semivolatile Organic Compounds (µg/kg)									
acenaphthene	14	4	29	0	1.9	8.8	26	3,700,000	—
acenaphthylene	14	9	64	No PSC	2.6	8.4	35	—	—
anthracene	14	10	71	0	2.9	11	51	22,000,000	—
benz(a)anthracene	14	13	93	0	1.6	53	400	620	—
benzo(b)fluoranthene	14	14	100	0	1.8	65	460	620	—
benzo(k)fluoranthene	14	11	79	0	3.9	28	110	380[d]	—
benzo(g,h,i)perylene	14	14	100	No PSC	2.3	52	320	—	—
benzo(a)pyrene	14	12	86	0	2.4	70	420	62	—
chrysene	14	14	100	0	3.2	53	370	3,800[d]	—
dibenz(a,h)anthracene	14	10	71	0	4.1	11	51	62	—
fluoranthene	14	14	100	0	1.5	89	720	2,300,000	—
fluorene	14	7	50	0	1.4	2.6	4.1	2,700,000	—
indeno(1,2,3-cd)pyrene	14	14	100	0	1.1	46	300	620	—
2-methylnaphthalene	14	3	21	No PSC	1.9	3.8	6.1	—	—
naphthalene	14	9	64	0	1.3	3.5	7.5	1,700[d]	—
phenanthrene	14	12	86	No PSC	2	37	180	—	—
pyrene	14	14	100	0	2.2	110	870	2,300,000	—

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

Acronyms/Abbreviations:

AST – aboveground storage tank
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/kg – micrograms per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
TPH – total petroleum hydrocarbons

Table 4-4b
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, AST 152

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC	Minimum [a]	Average [a]	Maximum [a]	TPH ESL
Fuels (µg/L)								
diesel	1	1	100	1	110	110	110	100
General Chemistry (µg/L)								
solids, total dissolved	1	1	100	No PSC	3,070,000	3,100,000	3,070,000	—[b]

Notes:

[a] data review qualifiers are not included in this table

[b] dash indicates not applicable or not established

Acronyms/Abbreviations:

AST – aboveground storage tank
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/L – micrograms per liter
PSC – preliminary screening criterion (ESL)
TPH – total petroleum hydrocarbons

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Table 4-4c
Soil Sampling Results, AST 152

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: 102-001-001 Sample: 102-0001 [a]Depth Interval: 0.5 - 1 Collection Date: 16-Jun-95	102-001-001 102-0001M 0.5 - 1 16-Jun-95	102-001-002 102-0002M 1 - 1.5 16-Jun-95	32EDC-5-133 C032CD39 0 - 0.5 31-May-02	32EDC-5-133 C032CD40 0.5 - 2 31-May-02	32EDC-5-133 C032CD41 2 - 4 31-May-02	32EDC-5-133 C032CD42 (FD) 2 - 4 31-May-02	32EDC-5-133 C032CD43 4 - 8 31-May-02	LL5 0040-WHA-1906 0 - 0.5 23-Jul-03	LL5 0040-WHA-1907 0.5 - 2 23-Jul-03
VOCs															
carbon disulfide	360,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
methylene chloride	9,100	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Petroleum Hydrocarbons															
diesel	—	—	100,000	—	µg/kg	11,000 U	1,000 U	1,000 U	NA	NA	NA	NA	NA	NA	NA
motor oil	—	—	500,000	—	µg/kg	21,000 U	46,000	62,000	NA	NA	NA	NA	NA	NA	NA
SVOCs															
acenaphthene	3,700,000	—	—	—	µg/kg	NA	NA	NA	5.3 U	5.2 U	5.2 U	5.3 U	5.9 U	5.3 U	5.3 U
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	5.3 U	5.2 U	5.2 U	5.3 U	2.6 J	2.8 J	4.1 J
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	5.3 U	5.2 U	5.2 U	5.3 U	4.7 J	5.1 J	5.5
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	2.5 J	26	1.6 J	5.3 U	23	41	32
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	3.9 J	36	2.1 J	1.8 J	31	67	55
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	5.3 U	29	5.2 U	5.3 U	25	18	16
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	2.6 J	23	2.3 J	2.4 J	44	49	65
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	2.4 J	33	5.2 U	5.3 U	41	50	54
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	12	32	3.7 J	3.2 J	29	52	36
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	5.3 U	5.7	5.2 U	5.3 U	4.1 J	8.1	6.6
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	1.7 J	28	1.8 J	1.5 J	58	63	54
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	5.3 U	5.2 U	5.2 U	5.3 U	1.4 J	5.3 U	5.3 U
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	1.1 J	24	1.6 J	1.3 J	38	41	52
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	5.3 U	5.2 U	5.2 U	5.3 U	5.9 U	5.3 U	5.3 U
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	5.3 U	5.2 U	5.2 U	5.3 U	2.2 J	2 J	2.2 J
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	2 J	5.5	5.2 U	5.3 U	33	27	21
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	2.9 J	29	2.9 J	2.2 J	76	71	77

Table 4-4c
Soil Sampling Results, AST 152

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: LL6 / Sample: 0040-WHA-1901 / [a] Depth Interval: 0 - 0.5 / Collection Date: 23-Jul-03	LL6 / 0040-WHA-1902 / 0.5 - 2 / 23-Jul-03	LL6 / 0040-WHA-1903 / 2 - 4 / 23-Jul-03	LL6 / 0040-WHA-1904 / 4 - 8 / 23-Jul-03	LL6 / 0040-WHA-1905 (FD) / 0 - 0.5 / 23-Jul-03	LL7 / 0040-WHA-1899 / 0 - 0.5 / 23-Jul-03	LL7 / 0040-WHA-1900 / 0.5 - 2 / 23-Jul-03	S152SB01 / C077S621 / 1 - 2 / 13-Dec-05	S152SB01 / C077S622 / 3 - 4 / 13-Dec-05
VOCs														
carbon disulfide	360,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	3.7 J	100 U
methylene chloride	9,100	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	17 J	17 J
Petroleum Hydrocarbons														
diesel	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	13,000	1,100 U
motor oil	—	—	500,000	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	17,000 J	11,000 U
SVOCs														
acenaphthene	3,700,000	—	—	—	µg/kg	1.9 J	5.3 U	5.6 U	5.9 U	5.2 J	2 J	26	NA	NA
acenaphthylene	—	—	—	—	µg/kg	7.4	5.3 U	7.7	3.9 J	6.9	5.4	35	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	12	4 J	7.2	2.9 J	4.4 J	8.2	51	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	43	12	27	18	24	42	400	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	63	12	30	24	45	73	460	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	22	3.9 J	29	22	11	22	110	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	47	7.5	46	32	37	55	320	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	52	11	47 J	35 J	34	62	**420**[d]	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	53	11	28	22	37	54	370	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	7.4	5.3 U	7.9	5.3 J	5.2 J	10	51	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	82	19	47 J	37 J	43	89	720	NA	NA
fluorene	2,700,000	—	—	—	µg/kg	4.1 J	1.7 J	2.4 J	5.9 U	3.6 J	1.9 J	3.3 J	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	40	6.6 J	34	24	31	51 J	300	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg	3.4 J	5.3 UJ	5.6 U	5.9 U	6.1	1.9 J	5.4 U	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	4.1 J	5.3 UJ	3.2 J	1.3 J	7.5	2.7 J	6.1	NA	NA
phenanthrene	—	—	—	—	µg/kg	58	17	23	13	19	40	180	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	94	21	70 J	51 J	53	100	870	NA	NA

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[d] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Acronyms/Abbreviations:
AST – aboveground storage tank
B(a)P – benzo(a)pyrene
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
µg/kg – micrograms per kilogram
NA – not analyzed
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-4d
Groundwater Sampling Results, AST 152

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Background	Result Units	Station ID: S152SB01 Sample: C077G241 [a] Depth Interval: 3.5 - 8.5 Collection Date: 13-Dec-05
VOCs						ND
Petroleum Hydrocarbons						
diesel	—[b]	—	100	—	µg/L	**110**[c]
General Chemistry						
solids, total dissolved	—	—	—	—	µg/L	3,070,000

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

[c] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL

Acronyms/Abbreviations:

AST – aboveground storage tank
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
GW – groundwater
µg/L – micrograms per liter
MCL – maximum contaminant level
ND – not detected
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-5a
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, ASTs 173A, -B, -C

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC	Minimum [a]	Average [a]	Maximum [a]	Federal Residential PRG	TPH ESL
VOCs (µg/kg)									
2-butanone	2	1	50	0	1.4	1.4	1.4	22,000,000	—[b]
Fuels (µg/kg)									
diesel	5	2	40	0	61,000	71,000	80,000	—	100,000
motor oil	5	5	100	3	64,000	890,000	3,000,000	—	500,000

Notes:

[a] data review qualifiers are not included in this table

[b] dash indicates not applicable or not established

Acronyms/Abbreviations:

AST – aboveground storage tank
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/kg – micrograms per kilogram
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-5b
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, ASTs 173A, -B, -C

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC	Minimum [a]	Average [a]	Maximum [a]	California MCL	TPH ESL
VOCs (µg/L)									
benzene	1	1	100	0	0.48	0.48	0.48	1	—[b]
sec-butylbenzene	1	1	100	No PSC	0.23	0.23	0.23	—	—
isopropylbenzene	1	1	100	No PSC	2.3	2.3	2.3	—	—
n-propylbenzene	1	1	100	No PSC	1.4	1.4	1.4	—	—
toluene	1	1	100	0	0.35	0.35	0.35	150	—
xylenes, total	1	1	100	0	0.89	0.89	0.89	1,800	—
Fuels (µg/L)									
diesel	1	1	100	1	540	540	540	—	100
motor oil	1	1	100	1	840	840	840	—	100
General Chemistry (µg/L)									
solids, total dissolved	2	2	100	No PSC	8,200,000	8,300,000	8,370,000	—	—

Notes:
[a] data review qualifiers are not included in this table
[b] dash indicates not applicable or not established

Acronyms/Abbreviations:
AST – aboveground storage tank
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/L – micrograms per liter
MCL – maximum contaminant level
PSC – preliminary screening criteria (MCL and ESL)
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Table 4-5c
Soil Sampling Results, ASTs 173A, -B, -C

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: 115-001-001	115-001-001	115-001-002	S173SB01	S173SB01
						Sample: 115-0001	115-0001M	115-0002	C077S641	C077S642
						[a] Depth Interval: 0.5 - 1	0.5 - 1	0.5 - 1	1 - 2	3 - 4
						Collection Date: 19-Jun-95	19-Jun-95	19-Jun-95	19-Dec-05	19-Dec-05
VOCs										
2-butanone	22,000,000	—[b]	—	—	µg/kg	NA	NA	NA	100 U	1.4 J
Petroleum Hydrocarbons										
diesel	—	—	100,000	—	µg/kg	54,000 U	11,000 U	56,000 U	61,000	80,000
motor oil	—	—	500,000	—	µg/kg	**730,000 J**[c]	**3,000,000**	**570,000 J**	64,000	95,000

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

[c] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL

Review Qualifiers:

J – indicates an estimated value

U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit

Acronyms/Abbreviations:

AST – aboveground storage tank

Cal – California

ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)

Fed – federal

µg/kg – micrograms per kilogram

NA – not analyzed

PRG – preliminary remediation goal

Res – residential

TPH – total petroleum hydrocarbons

VOC – volatile organic compound

Table 4-5d
Groundwater Sampling Results, ASTs 173A, -B, -C

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Background	Result Units	Station ID: S173SB01 Sample: C077G251 [a]Depth Interval: 5 - 10 Collection Date: 19-Dec-05	Station ID: S173SB01 Sample: C077G252 (FD) Depth Interval: 5 - 10 Collection Date: 19-Dec-05
VOCs							
benzene	5	1	—[b]	—	µg/L	0.48 J	NA
sec-butylbenzene	—	—	—	—	µg/L	0.23 J	NA
isopropylbenzene	—	—	—	—	µg/L	2.3	NA
n-propylbenzene	—	—	—	—	µg/L	1.4	NA
toluene	1,000	150	—	—	µg/L	0.35 J	NA
m-, p-xylene	—	—	—	—	µg/L	0.39 J	NA
Petroleum Hydrocarbons							
diesel	—	—	100	—	µg/L	**540**[c]	NA
motor oil	—	—	100	—	µg/L	**840**	NA
General Chemistry							
solids, total dissolved	—	—	—	—	µg/L	8,370,000	8,200,000

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL

Review Qualifier:
J – indicates an estimated value

Acronyms/Abbreviations:
AST – aboveground storage tank
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
FD – field duplicate
Fed – federal
GW – groundwater
µg/L – micrograms per liter
MCL – maximum contaminant level
NA – not analyzed
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

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Table 4-6a
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, AST 392

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
Fuels (µg/kg)										
motor oil	6	2	33	0	69,000	180,000	300,000	—[c]	500,000	—
Semivolatile Organic Compounds (µg/kg)										
acenaphthylene	5	1	20	No PSC	1.1	1.1	1.1	—	—	—
anthracene	5	3	60	0	0.71	1	1.4	22,000,000	—	—
benz(a)anthracene	5	5	100	0	0.88	3.6	9.7	620	—	—
benzo(b)fluoranthene	5	5	100	0	1.7	4.8	13	620	—	—
benzo(k)fluoranthene	5	5	100	0	1.1	4.6	13	380[d]	—	—
benzo(g,h,i)perylene	5	5	100	No PSC	2	4.7	10	—	—	—
benzo(a)pyrene	5	5	100	0	1.3	4.7	12	62	—	—
chrysene	5	5	100	0	1.2	4.6	12	3,800[d]	—	—
dibenz(a,h)anthracene	5	5	100	0	0.33	1.1	3.2	62	—	—
fluoranthene	5	5	100	0	1.2	5.9	14	2,300,000	—	—
indeno(1,2,3-cd)pyrene	5	5	100	0	1.8	4.2	10	620	—	—
naphthalene	5	1	20	0	0.51	0.51	0.51	1,700[d]	—	—
phenanthrene	5	5	100	No PSC	0.51	2.5	5.7	—	—	—
pyrene	5	5	100	0	1.7	6.9	14	2,300,000	—	—
Metals (mg/kg)										
aluminum	2	2	100	0	4,330	4,700	5,040	76,000	—	13,960
barium	2	2	100	0	25.6	32	37.7	5,400	—	93.68
calcium	2	2	100	No PSC	2,440	2,700	2,860	—	—	16,800
chromium	2	2	100	0	30.6	32	33.2	210	—	54.84
cobalt	2	2	100	0	3.9	4.7	5.4	900	—	14.30
copper	2	2	100	0	6	8	10	3,100	—	39.14
iron	2	2	100	0	8,710	9,100	9,580	23,000	—	22,280
lead	2	1	50	0	17.4	17	17.4	150[d]	—	37.66
magnesium	2	2	100	No PSC	2,340	2,400	2,520	—	—	7,304
manganese	2	2	100	0	104	100	105	1,800	—	383.0
mercury	2	1	50	0	0.06	0.06	0.06	23	—	0.52
nickel	2	2	100	0	23.8	24	24.5	1,600	—	55.72
potassium	2	2	100	No PSC	473	660	840	—	—	1,232
sodium	2	2	100	No PSC	109	110	111	—	—	1,230
vanadium	2	2	100	0	19.6	21	22.6	78	—	47.34
zinc	2	2	100	0	17	41	65.4	23,000	—	67.48

Notes:

[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[b] data review qualifiers are not included in this table

[c] dash indicates not applicable or not established

[d] California PRG

Acronyms/Abbreviations:

AST – aboveground storage tank
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
TPH – total petroleum hydrocarbons

Table 4-6b
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, AST 392

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC	Minimum*	Average*	Maximum*
Volatile Organic Compounds (µg/L)							
carbon disulfide	1	1	100	No PSC	0.36	0.36	0.36
General Chemistry (µg/L)							
solids, total dissolved	1	1	100	No PSC	1,630,000	1,600,000	1,630,000

Note:
* data review qualifiers are not included in this table

Acronyms/Abbreviations:
AST – aboveground storage tank
µg/L – micrograms per liter
PSC – preliminary screening criterion

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Table 4-6c
Soil Sampling Results, AST 392

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: 189-001-001 Sample: 189-0001 [a]Depth Interval: 0 - 0.5 Collection Date: 11-May-95	189-001-002 189-0002 0 - 0.5 11-May-95	189-002-003 189-0003 4.5 - 5 09-Nov-95	189-002-004 189-0004 6 - 7 02-Nov-95	32EDC-5-83 C032CB19 0 - 0.5 16-May-02	32EDC-5-83 C032CB20 0.5 - 2 16-May-02	32EDC-5-83 C032CB21 (FD) 0.5 - 2 16-May-02	32EDC-5-83 C032CB22 2 - 4 16-May-02	32EDC-5-83 C032CB23 4 - 8 16-May-02	S392SB01 C077S661 1 - 2 16-Dec-05	S392SB01 C077S662 3 - 4 16-Dec-05
VOCs						NA	NA	NA	ND	NA	NA	NA	NA	NA	ND	ND
Petroleum Hydrocarbons																
motor oil	—[b]	—	500,000	—	µg/kg	69,000 J	300,000 J	26,000 UJ	27,000 U	NA	NA	NA	NA	NA	10,000 U	10,000 U
SVOCs																
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	NA	5.2 U	5.2 U	5.2 U	5.2 U	1.1 J	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	0.71 J	5.2 U	1.4 J	5.2 U	0.93 J	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	9.7	1.2 J	1.3 J	0.88 J	4.8 J	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	13 J	2 J	2.6 J	1.7 J	4.5 J	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	13	1.3 J	1.7 J	1.1 J	6	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	10	2.3 J	4.8 J	2 J	4.2 J	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	12	2 J	2 J	1.3 J	6.4	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	12	2.9 J	1.5 J	1.2 J	5.4 J	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	3.2 J	0.39 J	0.33 J	0.45 J	0.96 J	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	14	2 J	1.5 J	1.2 J	11	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	10	1.8 J	3.1 J	2 J	4.1 J	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	0.51 J	5.2 U	5.2 U	5.2 U	5.5 U	NA	NA
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	4.4 J	1.1 J	0.58 J	0.51 J	5.7	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	14 J	3.1 J	1.9 J	1.7 J	14 J	NA	NA
Metals																
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	5,040	4,330	NA	NA	NA	NA	NA	NA	NA
barium	5,400	—	—	93.68	mg/kg	NA	NA	37.7 J	25.6	NA	NA	NA	NA	NA	NA	NA
calcium	—	—	—	16,800	mg/kg	NA	NA	2,860	2,440	NA	NA	NA	NA	NA	NA	NA
chromium	210	—	—	54.84	mg/kg	NA	NA	33.2	30.6	NA	NA	NA	NA	NA	NA	NA
cobalt	900	—	—	14.30	mg/kg	NA	NA	5.4	3.9	NA	NA	NA	NA	NA	NA	NA
copper	3,100	—	—	39.14	mg/kg	NA	NA	10 J	6	NA	NA	NA	NA	NA	NA	NA
iron	23,000	—	—	22,280	mg/kg	NA	NA	9,580	8,710	NA	NA	NA	NA	NA	NA	NA
lead	400	150	—	37.66	mg/kg	NA	NA	17.4	1.4 U	NA	NA	NA	NA	NA	NA	NA
magnesium	—	—	—	7,304	mg/kg	NA	NA	2,520	2,340	NA	NA	NA	NA	NA	NA	NA
manganese	1,800	—	—	383.0	mg/kg	NA	NA	105	104	NA	NA	NA	NA	NA	NA	NA
mercury	23	—	—	0.52	mg/kg	NA	NA	0.06	0.05 U	NA	NA	NA	NA	NA	NA	NA
nickel	1,600	—	—	55.72	mg/kg	NA	NA	24.5	23.8	NA	NA	NA	NA	NA	NA	NA
potassium	—	—	—	1,232	mg/kg	NA	NA	840	473	NA	NA	NA	NA	NA	NA	NA
sodium	—	—	—	1,230	mg/kg	NA	NA	111	109	NA	NA	NA	NA	NA	NA	NA
vanadium	78	—	—	47.34	mg/kg	NA	NA	22.6	19.6	NA	NA	NA	NA	NA	NA	NA
zinc	23,000	—	—	67.48	mg/kg	NA	NA	65.4	17 J	NA	NA	NA	NA	NA	NA	NA

Notes:
- [a] feet below ground surface
- [b] dash indicates not applicable or not established
- [c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

Acronyms/Abbreviations:
- AST – aboveground storage tank
- B(a)P – benzo(a)pyrene
- Cal – California
- ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
- FD – field duplicate
- Fed – federal
- µg/kg – micrograms per kilogram
- mg/kg – milligrams per kilogram
- NA – not analyzed
- ND – not detected
- PAH – polynuclear aromatic hydrocarbon
- PRG – preliminary remediation goal
- PSC – preliminary screening criterion
- Res – residential
- SVOC – semivolatile organic compound
- TPH – total petroleum hydrocarbons
- VOC – volatile organic compound

Review Qualifiers:
- J – indicates an estimated value
- U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
- UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 4-6d
Groundwater Sampling Results, AST 392

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Background	Result Units	Station ID: S392SB01 Sample: C077G261 [a] Depth Interval: 7 - 12 Collection Date: 16-Dec-05
VOCs						
carbon disulfide	—[b]	—	—	—	µg/L	0.36 J
Petroleum Hydrocarbons						ND
General Chemistry						
solids, total dissolved	—	—	—	—	µg/L	1,630,000

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established

Acronyms/Abbreviations:
AST – aboveground storage tank
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
GW – groundwater
µg/L – micrograms per liter
MCL – maximum contaminant level
ND – not detected
TPH – total petroleum hydrocarbons
VOC – volatile organic compound

Review Qualifier:
J – indicates an estimated value

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Table 4-7a
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, UST(R)-11

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
Volatile Organic Compounds (µg/kg)										
acetone	6	6	100	0	75	98	130	14,000,000	—[c]	—
bromoform	11	1	9.1	0	1.2	1.2	1.2	62,000	—	—
2-butanone	6	6	100	0	1.9	2.7	3.9	22,000,000	—	—
sec-butylbenzene	11	1	9.1	0	2	2	2	220,000	—	—
carbon disulfide	6	2	33	0	2.1	2.4	2.7	360,000	—	—
cis-1,2-dichloroethene	11	3	27	0	1.1	1.6	2.3	43,000	—	—
p-isopropyltoluene	11	1	9.1	No PSC	3	3	3	—	—	—
methyl tert-butyl ether	11	4	36	0	1.2	1.5	1.7	17,000	—	—
methylene chloride	11	9	82	0	2	11	19	9,100	—	—
naphthalene	6	1	17	0	7.4	7.4	7.4	1,700[d]	—	—
n-propylbenzene	11	1	9.1	0	1.5	1.5	1.5	240,000	—	—
tetrachloroethene	11	1	9.1	0	1.2	1.2	1.2	480	—	—
toluene	11	1	9.1	0	1.4	1.4	1.4	520,000	—	—
1,3,5-trimethylbenzene	11	1	9.1	0	2.5	2.5	2.5	21,000	—	—
Fuels (µg/kg)										
diesel	11	8	73	0	4,000	18,000	33,000	—	100,000	—
JP-5	6	1	17	0	3,800	3,800	3,800	—	100,000	—
motor oil	11	10	91	0	24,000	57,000	140,000	—	500,000	—
Semivolatile Organic Compounds (µg/kg)										
benzo(g,h,i)perylene	1	1	100	No PSC	27	27	27	—	—	—
benzo(a)pyrene	1	1	100	0	20	20	20	62	—	—
fluoranthene	1	1	100	0	13	13	13	2,300,000	—	—
indeno(1,2,3-cd)pyrene	1	1	100	0	17	17	17	620	—	—
2-methylnaphthalene	1	1	100	No PSC	33	33	33	—	—	—
phenanthrene	1	1	100	No PSC	15	15	15	—	—	—
pyrene	1	1	100	0	9	9	9	2,300,000	—	—
Pesticides/PCBs (µg/kg)										
Aroclor 1260	6	1	17	0	11	11	11	220	—	—
alpha-BHC	6	1	17	0	0.2	0	0.2	90	—	—
Metals (mg/kg)										
aluminum	6	6	100	0	4,430	9,500	18,300	76,000	—	13,960
arsenic	11	11	100	11	1.8	3.7	8.6	0.39	—	9.14
barium	11	11	100	0	34.7	55	102	5,400	—	93.68
beryllium	11	6	55	0	0.13	0	0.46	150	—	1.27
cadmium	11	6	55	0	0.018	0	0.17	37	—	1.72
calcium	6	6	100	No PSC	1,830	3,300	7,650	—	—	16,800
chromium	11	11	100	0	10.8	34	70.2	210	—	54.84
cobalt	11	11	100	0	4	7.4	14.3	900	—	14.30
copper	11	11	100	0	6.1	14	25.5	3,100	—	39.14
iron	6	6	100	2	9,550	20,000	36,500	23,000	—	22,280
lead	11	11	100	0	3	12	59.4	400	—	37.66
magnesium	6	6	100	No PSC	2,400	3,900	6,300	—	—	7,304
manganese	6	6	100	0	100	290	635	1,800	—	383.0

Table 4-7a
Concentration Ranges for Organic and Inorganic Analytes Reported in Soil, UST(R)-11

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC and Background [a]	Minimum [b]	Average [b]	Maximum [b]	Federal Residential PRG	TPH ESL	Background (95th Percentile)
Metals (mg/kg) (continued)										
mercury	11	5	45	0	0.055	0.4	1.6	23	—	0.52
nickel	11	11	100	0	8.4	31	80.1	1,600	—	55.72
potassium	6	6	100	No PSC	370	970	1,860	—	—	1,232
silver	11	5	45	0	0.069	0.095	0.12	390	—	2.22
sodium	6	1	17	No PSC	530	530	530	—	—	1,230
vanadium	11	11	100	0	18.6	31	46.9	78	—	47.34
zinc	11	11	100	0	18.4	42	80.4	23,000	—	67.48

Notes:
[a] the PSCs for PAHs classified as carcinogens are not PRGs; benzo(a)pyrene equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential benzo(a)pyrene equivalent screening level of 620 µg/kg; benzo(a)pyrene equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W
[b] data review qualifiers are not included in this table
[c] dash indicates not applicable or not established
[d] California PRG

Acronyms/Abbreviations:
BHC – benzene hexachloride
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
JP-5 – jet propellant grade 5
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
PAH – polynuclear aromatic hydrocarbon
PCB – polychlorinated biphenyl
PRG – preliminary remediation goal
PSC – preliminary screening criteria (PRG and ESL)
TPH – total petroleum hydrocarbons
UST – underground storage tank

Table 4-7b
Concentration Ranges for Organic and Inorganic Analytes Reported in Groundwater, UST(R)-11

Analyte	Total Number of Samples	Number Reported Above Detection Limit	Percent Reported Above Detection Limit	Number Exceeding PSC	Minimum[a]	Average[a]	Maximum[a]	Federal MCL	TPH ESL	Background (95th percentile)
Volatile Organic Compounds (µg/L)										
carbon disulfide	2	1	50	No PSC	0.32	0.32	0.32	—[b]	—	—
carbon disulfide	6	2	33	No PSC	0.6	1.3	2	—	—	—
Fuels (µg/L)										
diesel	6	4	67	2	70	150	240	—	100	—
gasoline	4	1	25	0	30	30	30	—	100	—
motor oil	6	4	67	1	70	110	200	—	100	—
Metals (µg/L)										
arsenic	6	6	100	2	5.5	9.9	16	10	—	20.72
barium	6	6	100	0	43.3	54	76.3	1,000[c]	—	569.5
cadmium	6	3	50	0	0.15	0.18	0.23	5	—	—
calcium	2	2	100	No PSC	20,500	28,000	34,700	—	—	—
chromium	6	6	100	0	0.53	1.8	3.8	50[c]	—	12.45
cobalt	6	4	67	No PSC	0.81	1.9	3.7	—	—	—
copper	6	4	67	No PSC	1.7	2.7	4.7	—	—	24.03
iron	2	2	100	No PSC	980	1,400	1,880	—	—	6,586
lead	6	1	17	0	1.2	1.2	1.2	15	—	11.45
magnesium	2	2	100	No PSC	17,900	22,000	26,500	—	—	—
manganese	2	2	100	No PSC	277	530	790	—	—	1,741
mercury	6	1	17	0	0.12	0.12	0.12	2	—	—
molybdenum	4	4	100	No PSC	6.7	8.7	10.5	—	—	—
nickel	6	4	67	0	2.8	3.8	6.3	100[c]	—	—
potassium	2	2	100	No PSC	20,500	24,000	27,200	—	—	—
silver	6	1	17	No PSC	0.61	0.61	0.61	—	—	—
sodium	2	2	100	No PSC	291,000	410,000	531,000	—	—	—
vanadium	6	6	100	No PSC	0.7	2.1	3.3	—	—	26.27
zinc	6	4	67	No PSC	3.2	20	54.2	—	—	36.39
General Chemistry Parameters (µg/L)										
solids, total dissolved	2	2	100	No PSC	996,000	1,300,000	1,560,000	—	—	—

Notes:
- [a] data review qualifiers are not included in this table
- [b] dash indicates not applicable or not established
- [c] California MCL

Acronyms/Abbreviations:
- ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
- µg/L – micrograms per liter
- MCL – maximum contaminant level
- PSC – preliminary screening criteria (MCL and ESL)
- TPH – total petroleum hydrocarbons
- UST – underground storage tank

Table 4-7c
Soil Sampling Results, UST(R)-11

Analyte	PRELIMINARY SCREENING CRITERIA Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: 123-0027	123-0028	123-0029	123-0030	123-0031	A23SB27	A23SB27	A23SB27	A23SB28	A23SB28	A23SB28
Sample:						123-0027	123-0028	123-0029	123-0030	123-0031	C077S418	C077S419	C077S420	C077S421	C077S422	C077S423
[a] Depth Interval:						0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	1 - 2	3 - 4	5 - 6	1 - 2	3 - 4	5 - 6.5
Collection Date:						18-Aug-99	18-Aug-99	18-Aug-99	18-Aug-99	18-Aug-99	07-Dec-05	07-Dec-05	07-Dec-05	07-Dec-05	07-Dec-05	07-Dec-05
VOCs																
acetone	14,000,000	—[b]	—	—	µg/kg	NA	NA	NA	NA	NA	89 J	86 J	120	75 J	130 J	88 J
benzene	640	—	—	—	µg/kg	5.6 U	5.4 U	5.5 U	5.5 U	5.3 U	5 U	5 U	7 U	6 U	6 U	6 U
bromoform	62,000	—	—	—	µg/kg	5.6 U	5.4 U	5.5 U	5.5 U	5.3 U	5 U	5 U	7 U	1.2 J	6 U	6 U
2-butanone	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	2.5 J	2.5 J	3.4 J	1.9 J	3.9 J	2.2 J
sec-butylbenzene	220,000	—	—	—	µg/kg	5.6 U	5.4 U	5.5 U	5.5 U	5.3 U	20 UJ	20 UJ	30 UJ	2 J	20 U	30 UJ
carbon disulfide	360,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	100 U	2.1 J	2.7 J	100 U	100 U	100 U
1,2-dichlorobenzene	600,000	—	—	—	µg/kg	5.6 U	5.4 U	5.5 U	5.5 U	5.3 U	5 UJ	5 UJ	7 UJ	6 UJ	6 U	6 UJ
1,1-dichloroethene	120,000	—	—	—	µg/kg	5.6 U	5.4 U	5.5 U	5.5 U	5.3 U	5 U	5 U	7 U	6 U	6 U	6 U
cis-1,2-dichloroethene	43,000	—	—	—	µg/kg	5.6 U	5.4 U	5.5 U	5.5 U	5.3 U	5 U	1.4 J	7 U	1.1 J	2.3 J	6 U
trans-1,2-dichloroethene	69,000	—	—	—	µg/kg	5.6 U	5.4 U	5.5 U	5.5 U	5.3 U	5 U	5 U	7 U	6 U	6 U	6 U
p-isopropyltoluene	—	—	—	—	µg/kg	5.6 U	5.4 U	5.5 U	5.5 U	5.3 U	5 UJ	5 UJ	7 UJ	3 J	6 U	6 UJ
methyl tert-butyl ether	17,000	—	—	—	µg/kg	5.6 U	5.4 U	5.5 U	5.5 U	5.3 U	1.2 J	1.4 J	1.6 J	40 U	1.7 J	50 U
methylene chloride	9,100	—	—	—	µg/kg	2 J	2 J	5.5 U	5.5 U	2 J	12 J	14 J	18 J	12 J	19 J	16 J
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	20 UJ	20 UJ	30 UJ	7.4 J	20 U	30 UJ
n-propylbenzene	240,000	—	—	—	µg/kg	5.6 U	5.4 U	5.5 U	5.5 U	5.3 U	5 UJ	5 UJ	7 UJ	1.5 J	6 U	6 UJ
tetrachloroethene	480	—	—	—	µg/kg	5.6 U	5.4 U	5.5 U	5.5 U	5.3 U	5 U	5 U	7 U	6 U	1.2 J	6 U
toluene	520,000	—	—	—	µg/kg	5.6 UJ	5.4 UJ	5.5 UJ	5.5 UJ	5.3 UJ	5 U	5 U	7 U	6 U	1.4 J	6 U
trichloroethene	53	2,900	—	—	µg/kg	5.6 U	5.4 U	5.5 U	5.5 U	5.3 U	5 U	5 U	7 U	6 U	6 U	6 U
1,3,5-trimethylbenzene	21,000	—	—	—	µg/kg	5.6 U	5.4 U	5.5 U	5.5 U	5.3 U	20 UJ	20 UJ	30 UJ	2.5 J	20 U	30 UJ
vinyl chloride	79	—	—	—	µg/kg	5.6 U	5.4 U	5.5 U	5.5 U	5.3 U	10 U	10 U	10 U	10 U	10 U	10 U
m-, p-xylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	5 U	5 U	7 U	6 U	6 U	6 U
Petroleum Hydrocarbons																
diesel	—	—	100,000	—	µg/kg	11,000 U	54,000 U	55,000 U	14,000 J	4,000 J	22,000	18,000	17,000	33,000	20,000	19,000
gasoline	—	—	100,000	—	µg/kg	560 U	540 U	550 U	550 U	530 U	NA	NA	NA	NA	NA	NA
JP-5	—	—	100,000	—	µg/kg	NA	NA	NA	NA	NA	3,800	1,100 U	1,400 U	1,100 U	1,100 U	1,300 U
motor oil	—	—	500,000	—	µg/kg	11,000 U	86,000	110,000	140,000	67,000	29,000	31,000	24,000	26,000	29,000	28,000
SVOCs																
acenaphthene	3,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	6 U	NA	NA
acenaphthylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	6 U	NA	NA
anthracene	22,000,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	6 U	NA	NA
benz(a)anthracene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	6 U	NA	NA
benzo(b)fluoranthene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	6 U	NA	NA
benzo(k)fluoranthene	6,200[c]	380[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	6 U	NA	NA
benzo(g,h,i)perylene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	27	NA	NA
benzo(a)pyrene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	20 J	NA	NA
bis(2-ethylhexyl)phthalate	35,000	—	—	—	µg/kg	NA	540 U	NA	NA	NA	NA	NA	NA	300 U	NA	NA
chrysene	62,000[c]	3,800[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	6 U	NA	NA
dibenz(a,h)anthracene	62[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	6 U	NA	NA
di-n-butyl phthalate	6,100,000	—	—	—	µg/kg	NA	540 U	NA	NA	NA	NA	NA	NA	300 UJ	NA	NA
diethyl phthalate	49,000,000	—	—	—	µg/kg	NA	540 U	NA	NA	NA	NA	NA	NA	300 U	NA	NA
fluoranthene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	13	NA	NA
fluorene	2,700,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	6 U	NA	NA
indeno(1,2,3-cd)pyrene	620[c]	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	17	NA	NA
2-methylnaphthalene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	33	NA	NA
naphthalene	56,000[c]	1,700[c]	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	6 U	NA	NA
phenanthrene	—	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	15 J	NA	NA
pyrene	2,300,000	—	—	—	µg/kg	NA	NA	NA	NA	NA	NA	NA	NA	8.9 J	NA	NA

Table 4-7c
Soil Sampling Results, UST(R)-11

Analyte	PRELIMINARY SCREENING CRITERIA: Fed Res PRG	Cal Res PRG	Soil TPH ESL	Background	Result Units	Station ID: 123-0027	123-0028	123-0029	123-0030	123-0031	A23SB27	A23SB27	A23SB27	A23SB28	A23SB28	A23SB28
						Sample: 123-0027	123-0028	123-0029	123-0030	123-0031	C077S418	C077S419	C077S420	C077S421	C077S422	C077S423
						[a] Depth Interval: 0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	1 - 2	3 - 4	5 - 6	1 - 2	3 - 4	5 - 6.5
						Collection Date: 18-Aug-99	18-Aug-99	18-Aug-99	18-Aug-99	18-Aug-99	07-Dec-05	07-Dec-05	07-Dec-05	07-Dec-05	07-Dec-05	07-Dec-05
Pesticides/PCBs																
Aroclor 1260	220	—	—	—	µg/kg	28 U	27 U	11 J	28 U	130 U	NA	NA	NA	100 UJ	NA	NA
alpha-BHC	90	—	—	—	µg/kg	1.1 U	1.1 U	0.2 J	1.1 U	5.3 U	NA	NA	NA	6 UJ	NA	NA
4,4'-DDE	1,700	—	—	—	µg/kg	2.3 U	2.2 U	2.2 U	2.2 U	11 U	NA	NA	NA	6 UJ	NA	NA
4,4'-DDT	1,700	—	—	—	µg/kg	2.3 U	2.2 U	2.2 U	2.2 U	11 U	NA	NA	NA	6 UJ	NA	NA
endosulfan II	370,000	—	—	—	µg/kg	2.3 U	2.2 U	2.2 U	2.2 U	11 U	NA	NA	NA	6 UJ	NA	NA
heptachlor epoxide	53	—	—	—	µg/kg	1.1 U	1.1 U	1.1 U	1.1 U	5.3 U	NA	NA	NA	6 UJ	NA	NA
Herbicides						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals																
aluminum	76,000	—	—	13,960	mg/kg	NA	NA	NA	NA	NA	*16,200* [d]	*18,300*	7,560	5,090	4,430	5,420
antimony	31	—	—	9.50	mg/kg	5.6 U	5.4 U	5.5 U	5.5 U	5.3 U	0.6 UJ	0.6 UJ	0.7 UJ	0.6 UJ	0.6 UJ	0.7 UJ
arsenic	0.39	0.062	—	9.14	mg/kg	**3** [e]	**2.2**	**4.1**	**4.9**	**1.8**	**8.6**	**5.6**	**3.7**	**2.6**	**1.9**	**2.2**
barium	5,400	—	—	93.68	mg/kg	*102*	34.8	42.9	50.7	47.8	65.1 J	76.2 J	45.3 J	43.2 J	34.7 J	60.9 J
beryllium	150	—	—	1.27	mg/kg	0.23 U	0.22 U	0.22 U	0.22 U	0.21 U	0.31	0.46	0.2 J	0.13 J	0.14 J	0.14 J
cadmium	37	—	—	1.72	mg/kg	0.018 J	0.04 J	0.17 J	0.17 J	0.067 J	0.6 U	0.15 J	0.7 U	0.6 U	0.6 U	0.7 U
calcium	—	—	—	16,800	mg/kg	NA	NA	NA	NA	NA	7,650 J	3,300 J	2,620 J	2,210 J	1,830 J	1,900 J
chromium	210	—	—	54.84	mg/kg	25.1	34.7	26	34.3	48.5	10.8	*70.2*	34.8	28.3	27.9	30.5
cobalt	900	—	—	14.30	mg/kg	9	6.1	7.9	9.8	5.8	7.9 J	*14.3 J*	6.7 J	4.6 J	4 J	5 J
copper	3,100	—	—	39.14	mg/kg	20.2	10	18.4	23.5	8.9	25.5	18.9	11.4	7	6.1	7.6
iron	23,000	—	—	22,280	mg/kg	NA	NA	NA	NA	NA	***34,800***	***36,500***	14,800	10,500	9,550	11,600
lead	400	150	—	37.66	mg/kg	3.6	10.1	18.4	*59.4*	8.1	3.8	12.2	6.3	3.1	3	4.1
magnesium	—	—	—	7,304	mg/kg	NA	NA	NA	NA	NA	5,250	6,300	4,050	2,530	2,400	3,140
manganese	1,800	—	—	383.0	mg/kg	NA	NA	NA	NA	NA	*635 J*	*600 J*	160 J	120 J	100 J	110 J
mercury	23	—	—	0.52	mg/kg	*1.6*	0.055 J	0.082 J	0.15 J	0.21 U	0.13	0.043 U	0.073 U	0.04 U	0.037 U	0.11 U
nickel	1,600	—	—	55.72	mg/kg	23.2	26.4	23	29.9	25.5	8.4	*80.1*	37.7	28	26.5	35.1
potassium	—	—	—	1,232	mg/kg	NA	NA	NA	NA	NA	370	*1,860*	1,180	713	739	978
selenium	390	—	—	1.78	mg/kg	0.56 U	0.54 U	0.55 U	0.55 U	0.53 U	0.78 U	0.39 U	0.7 U	0.5 U	0.6 U	0.35 U
silver	390	—	—	2.22	mg/kg	0.56 U	0.54 U	0.55 U	0.55 U	0.53 U	0.1 U	0.069 J	0.11	0.12	0.075 J	0.1
sodium	—	—	—	1,230	mg/kg	NA	NA	NA	NA	NA	530	457 U	264 U	210 U	153 U	275 U
thallium	5.2	—	—	0.50	mg/kg	*0.56 U* [f]	*0.54 U* [f]	*0.55 U* [f]	*0.55 U* [f]	*0.53 U* [f]	*2 U* [f]	*2 U* [f]	3 U [f]	*2 U* [f]	2 U [f]	*3 U* [f]
vanadium	78	—	—	47.34	mg/kg	37	30.1	41.5	32.7	30.6	33.1	46.9	25.8	20	18.6	20.3
zinc	23,000	—	—	67.48	mg/kg	39.6	27.4	*68.6*	*73.9*	24.7	*80.4*	54.5	29.9	20.1	18.4	22.3
Organotins						NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

[a] feet below ground surface

[b] dash indicates not applicable or not established

[c] the PSCs for PAHs classified as carcinogens are not PRGs; B(a)P equivalent concentrations for these PAHs are compared to the Alameda Point site-specific soil residential B(a)P equivalent screening level of 620 µg/kg; B(a)P equivalent concentrations that are above the PSC of 620 µg/kg are presented in Attachment W

[d] italicized font indicates result above background

[e] bolded font indicates result above one of the following: Fed PRG, Cal PRG, TPH ESL

[f] detection limit is above criteria

Acronyms/Abbreviations:

B(a)P – benzo(a)pyrene
BHC – benzene hexachloride
Cal – California
DDE – dichlorodiphenyldichloroethene
DDT – dichlorodiphenyltrichloroethane
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
JP–5 – jet propellant grade 5
µg/kg – micrograms per kilogram
mg/kg – milligrams per kilogram
NA – not analyzed
PAH – polynuclear aromatic hydrocarbon
PRG – preliminary remediation goal
PSC – preliminary screening criterion
Res – residential
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
UST – underground storage tank
VOC – volatile organic compound

Review Qualifiers:

J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit
UJ – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit; the detection limit, in this case, is an estimated value

Table 4-7d
Groundwater Sampling Results, UST(R)-11

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Back-ground	Station ID: / Sample: / [a] Depth Interval: / Collection Date: / Result Units	123-0040 / 123-0040 / 6 - 10 / 18-Aug-99	123-0041 / 123-0041 / 4 - 8 / 18-Aug-99	123-0042 / 123-0042 / 4 - 8 / 18-Aug-99	123-0043 / 123-0043 / 4 - 8 / 18-Aug-99	A23SB27 / C077G135 / 5 - 10 / 07-Dec-05	A23SB28 / C077G136 / 5 - 10 / 07-Dec-05
VOCs											
benzene	5	1	—[b]	—	µg/L	1 U	1 U	1 U	1 U	0.5 U	0.5 U
carbon disulfide	—	—	—	—	µg/L	NA	NA	NA	NA	0.32 J	0.5 U
1,2-dichlorobenzene	600	600	—	—	µg/L	1 U	1 U	1 U	1 U	0.5 U	0.5 U
1,3-dichlorobenzene	—	—	—	—	µg/L	1 U	1 U	1 U	1 U	0.5 U	0.5 U
1,1-dichloroethane	—	5	—	—	µg/L	1 U	1 U	1 U	1 U	0.5 U	0.5 U
cis-1,2-dichloroethene	70	6	—	—	µg/L	1 U	1 U	1 U	1 U	0.5 U	0.5 U
trans-1,2-dichloroethene	100	10	—	—	µg/L	1 U	1 U	1 U	1 U	0.5 U	0.5 U
toluene	1,000	150	—	—	µg/L	1 U	1 U	1 U	1 U	0.5 U	0.5 U
trichloroethene	5	5	—	—	µg/L	1 U	1 U	1 U	1 U	0.5 U	0.5 U
1,2,4-trimethylbenzene	—	—	—	—	µg/L	1 U	1 U	2	0.6 J	0.5 U	0.5 U
vinyl chloride	2	0.5	—	—	µg/L	1 U [c,d]	**1 U** [d]	**1 U** [d]	**1 U** [d]	0.5 U	0.5 U
total xylenes	10,000	1,800	—	—	µg/L	1 U	1 U	1 U	1 U	NA	NA
Petroleum Hydrocarbons											
diesel	—	—	100	—	µg/L	70 J	**200**	80 J	**240**	50 U	50 U
gasoline	—	—	100	—	µg/L	50 U	50 U	30 J	50 U	NA	NA
motor oil	—	—	100	—	µg/L	70 J	**200**	70 J	100	**500 U** [d]	**500 U** [d]
SVOCs											
acenaphthene	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA
benz(a)anthracene	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA
fluorene	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA
phenanthrene	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA
pyrene	—	—	—	—	µg/L	NA	NA	NA	NA	NA	NA
Pesticides/PCBs											
Aroclor 1016	0.5	0.5	—	—	µg/L	**2 U** [d]	**2 U** [d]	**2 U** [d]	**2 U** [d]	NA	NA
Aroclor 1260	0.5	0.5	—	—	µg/L	**1 U** [d]	**1 U** [d]	**1 U** [d]	**1 U** [d]	NA	NA

Table 4-7d
Groundwater Sampling Results, UST(R)-11

Analyte	PRELIMINARY SCREENING CRITERIA Fed MCL	Cal MCL	GW TPH ESL	Back-ground	Result Units	Station ID: 123-0040 Sample: 123-0040 [a] Depth Interval: 6 - 10 Collection Date: 18-Aug-99	123-0041 123-0041 4 - 8 18-Aug-99	123-0042 123-0042 4 - 8 18-Aug-99	123-0043 123-0043 4 - 8 18-Aug-99	A23SB27 C077G135 5 - 10 07-Dec-05	A23SB28 C077G136 5 - 10 07-Dec-05
Metals											
arsenic	10	50	—	20.72	µg/L	6.8	9.7	**16**	**13.9**	7.3	5.5
barium	2,000	1,000	—	569.5	µg/L	45.9	43.3	46.9	45.7	76.3 J	68.3 J
beryllium	4	4	—	2.50	µg/L	2 U	2 U	2 U	2 U	2 U	2 U
cadmium	5	5	—	—	µg/L	0.23 J	0.15 J	2 U	0.16 J	5 U	5 U
calcium	—	—	—	—	µg/L	NA	NA	NA	NA	34,700 J	20,500 J
chromium	100	50	—	12.45	µg/L	0.53 J	0.54 J	0.58 J	2.1 J	3.8 J	3.3 J
cobalt	—	—	—	—	µg/L	3.7 J	0.81 J	1.2 J	2 J	5 U	3.3 U
copper	—	—	—	24.03	µg/L	4.7 J	2.1 J	1.7 J	2.4 J	5 U	5 U
iron	—	—	—	6,586	µg/L	NA	NA	NA	NA	1,880	980
lead	15	—	—	11.45	µg/L	5 U	5 U	1.2 J	5 U	3 U	3 U
magnesium	—	—	—	—	µg/L	NA	NA	NA	NA	26,500 J	17,900 J
manganese	—	—	—	1,741	µg/L	NA	NA	NA	NA	790 J	277 J
mercury	2	2	—	—	µg/L	0.5 U	0.5 U	0.5 U	0.12 J	0.2 U	0.2 U
molybdenum	—	—	—	—	µg/L	6.7	7.7	10.5	10	NA	NA
nickel	—	100	—	—	µg/L	2.8 J	3 J	2.9 J	6.3	5 U	5 U
potassium	—	—	—	—	µg/L	NA	NA	NA	NA	20,500 J	27,200 J
selenium	50	50	—	8.58	µg/L	*10 U* [d,e]	*10 U* [d]	*10 U* [d]	*10 U* [d]	4.7 U	5 U
silver	—	—	—	—	µg/L	10 U	10 U	0.61 J	10 U	1 U	1 U
sodium	—	—	—	—	µg/L	NA	NA	NA	NA	291,000	531,000
thallium	2	2	—	16.15	µg/L	**10 U** [d]	**10 U** [d]	**10 U** [d]	**10 U** [d]	**5 U** [d]	**5 U** [d]
vanadium	—	—	—	26.27	µg/L	1.9 J	1.1 J	0.7 J	3.2 J	2.6 J	3.3 J
zinc	—	—	—	36.39	µg/L	12	*54.2*	3.2 J	9.1	*50 U* [d]	*50 U* [d]
Low-Level Mercury											
mercury	2	2	—	—	µg/L	NA	NA	NA	NA	NA	NA
General Chemistry											
solids, total dissolved	—	—	—	—	µg/L	NA	NA	NA	NA	996,000	1,560,000

Table 4-7d
Groundwater Sampling Results, UST(R)-11

Notes:
[a] feet below ground surface
[b] dash indicates not applicable or not established
[c] bolded font indicates result above one of the following: Fed MCL, Cal MCL, TPH ESL
[d] detection limit is above criteria
[e] italicized font indicates result above background

Acronyms/Abbreviations:
Cal – California
ESL – environmental screening level (San Francisco Bay Regional Water Quality Control Board)
Fed – federal
GW – groundwater
µg/L – micrograms per liter
MCL – maximum contaminant level
NA – not analyzed
PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
TPH – total petroleum hydrocarbons
UST – underground storage tank
VOC – volatile organic compound

Review Qualifiers:
J – indicates an estimated value
U – indicates the compound or analyte was analyzed for, but was not detected above the stated detection limit

Table 5-1
Summary of RI Results and Recommendations, SWMUs

DQO Problem	DQO Decision Questions	Nature and Extent	Risk Assessment	Recommendation
The RI addressed a request by regulatory agencies to further assess soil and groundwater quality at nine SWMUs (OWS 017; ASTs 016, 039, 152, 173A, -B, and -C, and 392; and former UST(R)-11) as part of the IR Site 35 RI. One of these SWMUs (UST[R]-11) is fully contained within the boundaries of AOC 23 and is summarized here and in Table 7-1 for AOC 23.	Have the nature and extent of contamination been defined?	Yes. Definition is adequate. Diesel-range TPH was reported in soil and groundwater samples above TPH ESLs near AST 173A, -B, -C; and slightly above the TPH ESL in groundwater samples collected adjacent to AST 152 and former UST(R)-11. Motor oil–range TPH was also reported slightly above the TPH ESL in a groundwater sample collected adjacent to former UST(R)-11.	See below.	No further action is recommended for OWS 017 and ASTs 016, 039, and 392 because chemicals were not reported above PSCs in any of the soil or groundwater samples collected. No further action is recommended for AST 152 because TPH (110 µg/L) was only slightly above the PSC (100 µg/L). No further action is recommended for former UST(R)-11 because TPH concentrations in groundwater (up to 240 µg/L) were not much greater than the PSC (100 µg/L). Also arsenic concentrations in groundwater were below Alameda Point background, and iron in soil above the PSC is considered naturally occurring. Exceedances reported at AST 173A,-B,-C should be reviewed under the Alameda Point TPH Program to determine whether the San Francisco Bay Regional Water Quality Control Board's criteria for closure for low-risk fuel sites have been met.
	Are contaminants present in soil or groundwater at concentrations that pose unacceptable risk to potential future residents?	See above.	Risk evaluations were not performed on the OWS and AST SWMUs. Data associated with UST(R)-11 were included in the baseline risk assessment for AOC 23.	See above.
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?	None of the SWMUs are located near surface water bodies.	NA	NA

Table 5-1 (continued)

Acronyms/Abbreviations:
- AOC – area of concern
- AST – aboveground storage tank
- DQO – data quality objective
- ESL – environmental screening level
- IR – Installation Restoration (Program)
- µg/L – micrograms per liter
- NA – not applicable
- OWS – oil/water separator
- PSC – preliminary screening criterion
- RI – remedial investigation
- SWMU – solid waste management unit
- TPH – total petroleum hydrocarbons
- UST – underground storage tank

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ATTACHMENT W

POLYNUCLEAR AROMATIC HYDROCARBON AREAS

Department of the Navy
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Contract No. N68711-95-D-7526

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY

CLEAN 3

DRAFT FINAL REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT, ATTACHMENT W POLYNUCLEAR AROMATIC HYDROCARBON AREAS IR SITE 35, TRANSFER PARCEL EDC-5 ALAMEDA POINT ALAMEDA, CALIFORNIA

CTO-0077/0105
March 2007

Prepared by:

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7-1 Summary of RI Results and Recommendations

Section 1
INTRODUCTION

This attachment presents the results of Polynuclear Aromatic Hydrocarbon (PAH) soil data collected during previous investigations and during the remedial investigation (RI) within Transfer Parcel Economic Development Conveyance (EDC)-5. The RI was conducted at Installation Restoration (IR) Program Site 35, Alameda Point (formerly Naval Air Station Alameda), Alameda, California (Figure 1-1).

Figures and tables are presented at the end of this attachment. Acronyms/abbreviations and references for all attachments are provided under separate tabs.

1.1 BACKGROUND

PAHs in soil within Transfer Parcel EDC-5 are addressed under IR Site 35 in response to regulatory agency comments on the draft RI Work Plan (BEI 2006). PAH Areas were identified as those areas with residual benzo(a)pyrene (B[a]P) equivalent concentrations in soil above the Alameda Point site-specific residential screening criterion of 620 micrograms per kilogram (µg/kg) at Transfer Parcel EDC-5. The identified PAH Areas overlap with some of the IR Site 35 areas of concern (AOCs); B(a)P equivalent concentrations above the screening criterion identified within AOCs were addressed as part of the PAH Areas (this attachment) rather than the AOC. AOCs 14, 15, and 16, which were identified solely because of the presence of PAHs, were incorporated into these PAH Areas.

During the RI, no additional PAH Area samples were collected outside of existing AOC boundaries. Although these areas were identified for inclusion in the feasibility study (FS), baseline risks were not calculated for the PAH Areas, as agreed upon in discussions with United States Environmental Protection Agency (U.S. EPA) on November 14, 2005. However, post- and pre-time-critical removal action (TCRA) risks associated with PAHs in soil were calculated during the site inspection (SI) and RI, respectively, and are included in Appendix I.

1.2 HISTORICAL USE

Transfer Parcel EDC-5 is an area of approximately 286 acres in the central portion of Alameda Point. Approximately 83 percent of this acreage is open space, which consists of unpaved areas and paved areas including roadways, runways, and sidewalks. The PAH Areas are located primarily in the north and central portions of Transfer Parcel EDC-5, in the West Housing Area, with a limited number of other locations outside this residential area (Figure 1-1).

The Navy formerly used the land included in Transfer Parcel EDC-5 for industrial, residential, and recreational activities.

1.3 PRELIMINARY SCREENING CRITERION

The preliminary screening criterion (PSC) used in the following discussions is described in this section. The PSC for evaluation of PAH compounds in soil is the Alameda Point–

specific residential soil PAH screening criterion of 620 µg/kg. This screening criterion was established at the PAH technical meeting with the Navy, regulatory agencies, and the City of Alameda on May 31, 2001 (DON 2001a). The development of this criterion considered human-health risk and is associated with a carcinogenic cumulative target risk level for PAHs in soil equivalent to 10^{-5} (the middle of the risk management range of 10^{-6} to 10^{-4}).

PAH evaluation for soil at Alameda Point is based on a B(a)P equivalent concentration, which normalizes the toxicity of each of the carcinogenic PAHs relative to the toxicity of B(a)P. Toxicity equivalency factors are shown in Table 1-1. Because B(a)P is the only carcinogenic PAH for which the U.S. EPA publishes a cancer slope factor, B(a)P equivalent concentrations were calculated for each of the eight carcinogenic PAHs to allow comparable screening of PAHs reported above the detection limits. The eight carcinogenic PAHs included in the B(a)P equivalent evaluation are the following:

- benz(a)anthracene
- benzo(b)fluoranthene
- benzo(k)fluoranthene
- B(a)P
- chrysene
- dibenz(a,h)anthracene
- indeno(1,2,3-cd)pyrene
- naphthalene

To achieve a total B(a)P equivalent concentration for each sample, each carcinogenic PAH concentration was multiplied by the assigned toxicity equivalency factor, and the results were summed. For results reported as "nondetect" (i.e., qualified as "U" [analyte not reported above the detection limit] or "UJ" [analyte was analyzed for but not detected; the sample detection limit is an estimated value]), a value of one-half the detection limit was used. Estimated values ("J" qualified) were used without modification. For samples with associated field duplicates, the highest analyte concentration was selected to represent the sample results.

1.4 PREVIOUS INVESTIGATIONS

During previous investigations and as part of a PAH TCRA, soil samples for PAH analyses were collected at Transfer Parcel EDC-5, and results are summarized below. Many samples collected during the Environmental Baseline Survey (EBS) program at Alameda Point were analyzed for PAHs; however, these PAH results were not used because analytical methods at the time did not provide sufficiently low detection limits. Locations sampled during previous investigations and the areas subject to the TCRA (postremoval samples) are shown on Figure 1-1. Analytical results for soil samples collected within Transfer Parcel EDC-5 are provided in Appendix B. Locations where

B(a)P equivalent concentrations were above the PSC for samples collected during previous investigations (and during the RI) are shown on Figure 4-1.

1.4.1 Phases 2B and 3 Investigation

In 1991, soil and groundwater samples were collected during an investigation to assess whether contamination exists at IR Site 6, which is surrounded by Transfer Parcel EDC-5 (PRC Environmental and Montgomery 1992). During this investigation, a small number of soil samples were also collected that were outside of IR Site 6, but within the boundaries of Transfer Parcel EDC-5. Samples from three locations in Transfer Parcel EDC-5 had reported B(a)P equivalent concentrations above the PSC.

1.4.2 Operable Unit 5 Addendum Sampling

Samples were collected within IR Site 35 as part of Operable Unit (OU)-5 Addendum activities conducted in 2001 in support of the OU-5 RI (IT 2001b). Twenty-four samples of fill soil were collected from six locations in Transfer Parcel EDC-5. Nine of the 24 samples had reported B(a)P equivalent concentrations above the PSC.

1.4.3 Polynuclear Aromatic Hydrocarbon Studies at Alameda Point

In 2002 and 2003, Bechtel Environmental, Inc., conducted two separate PAH-related investigations that included the collection of soil samples within the boundaries of Transfer Parcel EDC-5. The 2002 PAH study (BEI 2005a) was included as Appendix D of the SI Report for Transfer Parcel EDC-5 (BEI 2005b). Results of the 2003 PAH sampling investigation were included in the Field Activity Report, Assessment of PAH Contamination at Selected Comprehensive Environmental Response, Compensation, and Liability Act Sites and EBS Parcels (BEI 2004b).

The 2002 PAH study was designed to characterize PAH concentrations in fill soil at transfer parcels with no known releases. In Transfer Parcel EDC-5, 540 soil samples were collected from 136 soil borings. Soil samples were collected at four depths from each location (0 to 0.5, 0.5 to 2, 2 to 4, and 4 to 8 feet below ground surface [bgs]). PAH concentrations in 31 of the samples were above the soil screening criterion; these samples were primarily located in the northeastern portion of the transfer parcel. Based on findings of the 2002 PAH study (BEI 2005a), soil removals were subsequently conducted at Transfer Parcel EDC-5, as discussed further in Section 1.4.5.

The second PAH study was conducted at 19 IR sites and 3 EBS parcels at Alameda Point in 2003 (BEI 2004b). The purpose of the investigation was to collect sufficient data to identify possible PAH contamination in soil at these IR sites and EBS parcels. During this investigation, five soil borings were advanced at Transfer Parcel EDC-5. Four soil borings were advanced in EBS Parcel 205 and one soil boring in EBS Parcel 23F. None of the soil samples collected in Transfer Parcel EDC-5 had reported concentrations of PAHs above the soil screening criterion.

1.4.4 Site Inspection, Transfer Parcel EDC-5

An SI was conducted in 2005 at Alameda Point to evaluate current environmental conditions at Transfer Parcel EDC-5 (BEI 2005b). Historical uses of the 74 EBS parcels within the transfer parcel were evaluated. Where past use indicated the potential for adverse environmental conditions, analytical data and human-health risk were assessed to determine whether further evaluation of the parcels should be recommended. Because of the large size of Transfer Parcel EDC-5, 18 subareas, referred to as "decision areas" (DAs), were designated within the transfer parcel as exposure units for risk assessment purposes.

Risks associated with PAHs in soil using post-PAH TCRA data were calculated in the SI Report (BEI 2005b) and are discussed in Section 6.1. The cumulative target risk level for PAHs in soil of 10^{-5} was calculated using B(a)P equivalent concentrations, as established during the PAH technical meeting between the Navy, regulatory agencies, and the City of Alameda in May 2001. Based on the target risk level, the SI recommended three areas for further evaluation based solely on PAHs: AOCs 14, 15, and 16. These AOCs have since been incorporated into the PAH Areas for IR Site 35.

1.4.5 Polynuclear Aromatic Hydrocarbon Removal Action

PAHs were reported at concentrations above the Alameda Point–specific residential soil screening criterion (620 µg/kg) in soil samples collected from portions of Transfer Parcel EDC-5 during the 2002 PAH study. This prompted the Navy to conduct a TCRA of soil with reported B(a)P equivalent concentrations above 1,000 µg/kg in the top 2 feet of soil in an area referred to as the West Housing Area (FWEC 2004). Soil removals in that area were conducted using a grid pattern at EBS Parcels 62, 96, 97 (AOC 4), 80 (AOC 9), 98 (AOCs 5, 7, and 8), and 103 (AOCs 13, 14, and 18). TCRA activities resulted in the removal of 7,542 tons of nonhazardous soil and 68 tons of non–Resource Conservation and Recovery Act hazardous soil, which was properly disposed of. PAHs reported in the excavated sampling locations were not considered for this RI/FS Report. Clean fill material was placed and compacted to backfill the area with a minimum of 2 feet of soil cover. Locations of PAH removal areas at Transfer Parcel EDC-5 are shown on Figure 4-1.

Soil samples collected from six locations had B(a)P equivalent concentrations above the TCRA cleanup goal (1,000 µg/kg) after the removal action. Soil from these locations was not removed for the following reasons.

- Location 32EDC-5-34 was nonresidential (FWEC 2004).
- Locations 32EDC-5-132, 32EDC-5-135, S9C, DA7, and Y21 were covered with asphalt (FWEC 2004).

Section 2
PHYSICAL SETTING

This section provides an overview of the topography, ground elevation, groundwater levels, and geology at the PAH Areas.

The PAH Areas are located throughout Transfer Parcel EDC-5, but predominantly in the northeastern portion. PAH Areas are generally open space covered with grass, asphalt, or concrete. Topography in these areas is relatively flat, and average ground elevation, based on data from the borings advanced during the RI, is approximately 11 feet above mean sea level. Groundwater depth measured in temporary casings prior to groundwater sample collection during the RI field work ranged from approximately 2 to 7 feet bgs. The average depth to water was approximately 6 feet bgs across IR Site 35.

Figure 2-11 of the main RI/FS Report illustrates the interpreted groundwater flow direction at IR Site 35, which varies at each PAH Area, but generally flows toward the closest surface water body (Seaplane Lagoon or Oakland Inner Harbor). Groundwater flow direction across IR Site 35 is interpreted from groundwater elevation measurements taken as part of the basewide groundwater monitoring program and adjacent IR site investigations. Based on tidal studies performed at other Alameda Point sites, tidal influence would be expected at the PAH Areas located near surface water bodies. Results of tidal studies at nearby sites (discussed in Section 2 of the main RI/FS Report) indicated a minimal effect on groundwater elevations in the fill material at the inland wells (BEI 2004b).

Soil encountered in the RI borings at Alameda Point IR Site 35 predominantly consisted of fill material (fine- to medium-grained, poorly graded sand and lesser amounts of fine-grain silty sand and fine-grained clayey sand) underlain by fine-grained bay sediment (Young Bay Mud). Fill material thickness generally decreased from west to east across Alameda Point. Depth to the Young Bay Mud at IR Site 35 PAH Areas ranged from 4 to 9 feet bgs (BEI 2004b) in RI borings where the Young Bay Mud was encountered (see cross sections on Figures 2-8 and 2-9 of the main RI/FS Report). The contact between the fill soil and the Bay Sediment Unit (BSU) in the eastern portion of Alameda Point commonly includes the Marsh Crust. However, the Marsh Crust was seldom observed at IR Site 35. In the eastern portion of Alameda Point, a Marsh Crust Horizon (2 to 6 inches thick), located just beneath the fill layer and overlying the BSU, may be present. The Marsh Crust was impacted by petroleum-related chemicals, including semivolatile organic compounds (SWDIV 2001). A Remedial Action Plan/Record of Decision has been written for the Marsh Crust and has been signed and approved by the Navy, U.S. EPA, and California Environmental Protection Agency (Cal/EPA) (SWDIV 2001). As shown on Figure 2-1 of the main RI/FS Report, the Marsh Crust may be located beneath PAH Areas; however, it was not encountered in borings advanced in these areas during the RI.

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Section 3
REMEDIAL INVESTIGATION APPROACH AND SCOPE

This section provides an overview of the RI approach and scope for the PAH Areas. The RI was conducted in accordance with the sitewide data quality objectives (DQOs) for evaluation of AOCs presented in Table 3-1 of the main RI/FS Report.

3.1 APPROACH

PAHs in soil within Transfer Parcel EDC-5 were addressed under IR Site 35 in response to regulatory agency comments on the draft Work Plan. Previous investigations identified locations with reported PAH concentrations above 620 µg/kg in soil, the Alameda Point site-specific residential soil screening criterion.

Regulatory agencies agreed that additional PAH samples would not be collected at locations outside the existing AOC boundaries during the RI. Additionally, baseline risks were not calculated for the PAH Areas in the RI, as agreed upon with U.S. EPA on November 14, 2005.

3.2 SCOPE

Soil samples were collected at several study areas within IR Site 35 to help assess the distribution of B(a)P equivalent concentrations above the PSC. Transfer Parcel EDC-5 was sampled extensively for PAHs during previous investigations. Additional soil samples were collected and analyzed for PAHs at 53 locations from 0 to 8 feet bgs during the 2005 RI sampling. All 53 locations sampled during the RI fall within the boundaries of IR Site 35 study areas. Soil samples were collected at over 1,500 locations throughout Transfer Parcel EDC-5 during previous investigations and at AOC locations during the RI (Figure 4-1).

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Section 4
NATURE AND EXTENT OF CONTAMINATION

This section presents the analytical results from previous investigations and the RI for the B(a)P equivalent concentrations that were reported above the PSC of 620 µg/kg. Soil samples were collected from more than 1,500 sampling locations during previous sampling events such as the Phases 2B and 3 investigation (PRC Environmental and Montgomery 1992), the OU-5 addendum sampling (IT 2001b), the PAH studies (BEI 2005a, 2004b), and the RI. Samples that were excavated from the top 2 feet bgs during the PAH TCRA were not considered in this RI. A summary for all post-TCRA samples collected during the RI and previous investigations with B(a)P equivalent concentrations reported above the PSC is included in Table 4-1. Locations of PAH soil samples with at least one B(a)P equivalent concentration above the PSC are illustrated on Figure 4-1. Complete analytical results for historical (post-PAH TCRA) and RI samples collected within the PAH Areas are included in Appendices B and G, respectively.

B(a)P equivalent concentrations were reported above the PSC of 620 µg/kg in 216 samples at 176 separate boring locations at Transfer Parcel EDC-5. Analytical results for PAHs investigated at IR Site 35 are discussed by depth intervals of 0 to 2, 2 to 4, and greater than 4 feet bgs. Table 4-2 summarizes the number of B(a)P equivalent concentrations above the PSC by depth. While some individual samples had B(a)P equivalent concentrations above 620 µg/kg, average concentrations were below 620 µg/kg (Table 4-3). Average concentrations ranged from 6 to 506 µg/kg.

B(a)P equivalent concentrations were reported above the PSC in 57 soil borings from the 0- to 2-foot-bgs interval. This is approximately 32 percent of the B(a)P equivalent concentrations reported above the PSC. B(a)P equivalent concentrations at six of these locations were reported in samples collected during previous investigations above the PAH TCRA removal action objective of 1,000 µg/kg; however, these locations were not excavated for the following reasons.

- Location 32EDC-5-34 was nonresidential.
- Locations 32EDC-5-132, 32EDC-5-135, S9C, DA7, and Y21 were covered with asphalt.

B(a)P equivalent concentrations were reported above the PSC in 71 soil borings from the 2- to 4-foot-bgs interval. This is approximately 40 percent of the B(a)P equivalent concentrations reported above the PSC.

B(a)P equivalent concentrations were reported above the PSC in 84 soil borings from depths greater than 4 feet bgs. This is approximately 48 percent of the B(a)P equivalent concentrations reported above the PSC.

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Section 5
CONTAMINANT FATE AND TRANSPORT

This section summarizes the fate and transport analysis for the PAH Areas. It discusses the conceptual site model, the physical and chemical changes that might transform PAHs, and the mechanisms that could potentially transfer the PAHs from the study area. The conceptual site model facilitates understanding of the present conditions by integrating area-specific physical characteristics with the location of PAHs in the physical system. Section 5.2 includes an evaluation of the mobility and persistence of PAHs. Section 5.3 discusses potential migration pathways.

5.1 PAH AREAS CONCEPTUAL SITE MODEL

The PAH Areas are located across Transfer Parcel EDC-5, but primarily in the northeastern portion of the parcel. Topography at the PAH Areas is generally flat with most of the area being open space covered by paved areas (e.g., roads, runways, and parking lots) and unpaved areas (e.g., grassy areas). The remainder of the PAH Areas is covered by buildings. The nearest surface waters are Oakland Inner Harbor, along the northern edge of IR Site 35, and Seaplane Lagoon, along the southern edge of IR Site 35 (Figure 1-1).

Based on a review of borings logs for the PAH Areas, the subsurface lithology consists of generally homogeneous fill material comprising fine- to medium-grained sand, and silty-to-clayey sand underlain by fine-grained bay sediments of the Young Bay Mud. Thickness of the fill material generally decreases from west to east across Alameda Point and IR Site 35. Shallow groundwater of the first water-bearing zone beneath the PAH Areas occurs in the fill material; the underlying Young Bay Mud would be expected to be an aquitard and inhibit hydraulic communication with deeper water-bearing zones. The Marsh Crust Horizon (2 to 6 inches thick), which exists just beneath the fill layer and overlies the Young Bay Mud, may be located beneath PAH Areas; however, it was not encountered in borings advanced to 9 feet bgs during the RI. The average depth to water was approximately 6 feet bgs across IR Site 35 and was measured at depths from approximately 2 to 7 feet bgs in the PAH Areas. Groundwater flow direction at IR Site 35 is generally towards the closest surface water and varies across the PAH Areas, based on location. Some tidal influence is expected at PAH Areas located near the surface waters (Seaplane Lagoon or Oakland Inner Harbor) but not those located inland.

PAHs were reported in soil at B(a)P equivalent concentrations above the PSC of 620 µg/kg at 176 boring locations within Transfer Parcel EDC-5. Most of the B(a)P equivalent concentrations above the PSC were from locations in the northeast portion of the transfer parcel. PAHs are ubiquitous in the fill material at Alameda Point, and concentrations above the PSC were identified in each soil interval that was sampled. There were fewer reported B(a)P equivalent concentrations above the PSC in the upper 2 feet bgs (57 boring locations) than in deeper samples (71 boring locations in the 2 to 4 feet bgs interval and 84 boring locations from depths greater than 4 feet bgs).

5.2 CONTAMINANT MOBILITY AND PERSISTENCE

Contaminant mobility refers to the tendency of a contaminant to move along a pathway in response to a driving force. Contaminant persistence refers to the tendency of a chemical to resist transformation or degradation. A contaminant that is immobile and persistent in the environment tends to remain in place. The tendency toward immobility and persistence is a function of site-specific characteristics and the physical and chemical properties of the contaminants. Section 5 of the main RI/FS Report discusses the physical and chemical properties of PAHs that affect their transport and persistence in the environment. This section discusses the mobility and persistence of PAHs in soil.

As a chemical class, PAHs generally have low volatility, low water solubility, and a high affinity for sorption to soil organic matter. As discussed in Section 1.3, B(a)P equivalent concentrations were calculated for each sample considering the reported concentrations of eight carcinogenic PAHs. For the purposes of describing environmental fate, these PAHs have been grouped into very low (less than 152 grams per mole [g/mol]) and high (greater than 228 g/mol) molecular weight classes (Table 5-1). In general, chemicals within each class have similar environmental fates. Seven of the eight PAHs fall into the "high molecular weight" class, and naphthalene is classified as "very low molecular weight." Naphthalene is a much smaller molecule and behaves more like a volatile compound than a PAH.

For high-molecular-weight PAHs, low volatility, expressed quantitatively by vapor pressure, constrains vapor-phase transport of the PAHs in the vadose zone. The high-molecular-weight PAHs are hydrophobic compounds (i.e., lacking an affinity for water) with low water solubility and high affinity for sorption to organic particles (expressed quantitatively as the organic carbon partition coefficient [K_{oc}] value). Low water solubility and strong sorption to soil particles limit the relative importance of leaching through soil as a transport process and cause the PAHs to move very slowly relative to percolating infiltration. The lower weight PAHs, such as naphthalene, have higher water solubilities and vapor pressures and lower K_{oc} values, and tend to have greater volatility and lower sorption potential, resulting in greater mobility in liquid and gaseous media. Table 5-1 provides estimates of mobility and persistence for the eight carcinogenic PAHs. The low solubility and mobility exhibited by these compounds retard their migration to groundwater, as indicated by the estimate that essentially all the high-molecular-weight PAHs and over 76 percent of the very-low-molecular-weight PAHs will remain sorbed to soil.

PAHs in soil can undergo nonbiological degradation (photolysis and oxidation), accumulate in plants, or biodegrade. However, Alameda Point–specific field studies by U.S. EPA found no uptake of PAHs in homegrown produce. In shallow soil, biodegradation is the most important transformation process affecting the persistence of PAHs. Another potentially important transformation process, photolysis, is limited to areas where surface soils are exposed to sunlight. The persistence of some PAHs is due to their resistance to biodegradation. This resistance is proportional to molecular weight and the number of polar functional groups attached to the PAH aromatic ring structure. High-molecular-weight, multi-ringed PAHs that do not contain polar functional groups

(e.g., pyrene) are the most resistant to biodegradation. As such, they remain in soil for significantly longer periods of time than lower-molecular-weight PAHs containing fewer aromatic rings (e.g., naphthalene) (Howard et al. 1991).

5.3 CONTAMINANT MIGRATION

The potential migration pathways considered for the PAH Areas include atmospheric transport (i.e., vapors and airborne fugitive dust) and transport by surface water runoff. Groundwater transport was not considered because the PAH Areas were created to address B(a)P equivalent concentrations in vadose zone soil. Analytical results of groundwater sampling at IR Site 35 are evaluated along with the appropriate AOC or study area (e.g., EBS Parcel 205). Atmospheric transport of PAHs from soil is not considered significant because concentrations of potentially volatile PAHs are not widespread. The only significant transport pathway identified at the PAH Areas is particulate dispersion (either as fugitive dust or by surface water runoff).

Concentrations of PAHs present in surface soils can be transferred from the PAH Areas to other areas of IR Site 35 or off IR Site 35 if they are airborne by wind or dissolved in or carried by surface water runoff. Due to the low water solubility of PAHs, it is unlikely that they will become dissolved in surface water runoff. In general, the highest concentrations of B(a)P equivalents and the highest number of PSC exceedances were reported in the soil interval from deeper than 4 feet bgs. For this pathway to be significant, high concentrations of PAHs would need to be present in surface soil in unpaved or poorly landscaped areas. Additionally, for migration of PAHs to occur, this soil would need to become either windblown or be subjected to surface water runoff at a velocity high enough to suspend the particulate matter. The current surface covering of the PAH Areas makes this transport pathway unlikely; however, if the surface cover of the PAH Areas is disturbed or removed during and after redevelopment, particulate dispersion from soil is considered a possible transport pathway for PAHs in surface soil.

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Section 6
HUMAN-HEALTH RISK ASSESSMENT

This section summarizes the risk assessment activities preformed for the PAH Areas. As agreed upon with U.S. EPA on November 14, 2005, baseline risks were not calculated for the PAH Areas as part of the RI for IR Site 35. However, post- and pre-TCRA risks associated with PAHs in soil were calculated in the SI and this RI, respectively. Because of the large size of Transfer Parcel EDC-5, these risks were calculated for 18 subareas (exposure units) within the transfer parcel referred to as DAs. DAs were designated in the SI Report to reduce the size of exposure areas (initially EBS parcels) so that estimates of human-health risks were conservative.

Section 6.1 describes the method used in this RI/FS to calculate the pre-TCRA risks and the methods used in the Transfer Parcel EDC-5 SI Report to calculate the post-TCRA risks. The results of both risk calculations are presented in Section 6.2 and Tables 6-1 and 6-2. Supplementary risk assessment information is provided in Appendix I.

6.1 PRE- AND POST-TCRA RISK CALCULATIONS

The pre-TCRA cancer risks and noncancer hazard values calculated for this RI/FS are presented for PAHs at DAs 2, 3, 4, 5, 6, 7, 8, 9, 11, 16, 17, and 18 for three depth intervals: 0 to 2, 0 to 4, and 0 to 8 feet bgs. A removal action occurred at each of these DAs. The post-TCRA risks from the SI Report include the cancer risk and noncancer hazard values calculated for all 18 DAs.

The pre-TCRA U.S. EPA and Cal/EPA cancer risk and noncancer hazard values were calculated by dividing the exposure point concentration (EPC) by the chemical-specific residential preliminary remediation goal (PRG). The EPC/PRG ratio was multiplied by 10^{-6} to convert to cancer risk for the carcinogenic PAHs.

An EPC was calculated for each COPC (carcinogenic and noncarcinogenic PAHs) using the U.S. EPA software ProUCL, Version 2.3. Samples reported as nondetect were included as values with a concentration of one-half the detection limit. There were no limitations on the percentage of nondetects. The Student's t-test was used to calculate the EPC for normal data, the Land equation was used for lognormal data, and the gamma upper confidence limit was used for data that fit a gamma distribution. The approximate Chebyshev limit was used for nonparametric data.

The post-TCRA cancer risks are based on a composite of U.S. EPA and Cal/EPA cancer risks, with the most stringent (highest risk) value selected for each carcinogenic PAH. The pre-TCRA calculations have separate U.S. EPA and Cal/EPA cancer risks.

Surrogate PRGs were used when no state or federal PRGs were available. These surrogate PRGs were selected based on chemical similarity with chemicals for which PRGs have been developed.

6.2 PRE- AND POST-TCRA RESULTS

The results for pre- and post-TCRA estimates are presented in Tables 6-1 and 6-2, respectively. The pre-TCRA cancer risk and noncancer hazard calculations are presented in Appendix I. For the 12 DAs subject to the PAH TCRA, the pre-TCRA risk

calculations show that cancer risks associated with PAHs in soil range from 2×10^{-6} to 4×10^{-5} for all depth intervals, and from 2×10^{-6} to 4×10^{-5} for the 0- to 2-foot-bgs depth interval that was subject to the TCRA. Results of post-TCRA calculations (for the same 12 DAs) show slightly lower cancer risks that range from 2×10^{-6} to 1×10^{-5} for all depth intervals, and 2×10^{-6} to 4×10^{-5} for the 0- to 2-foot-bgs depth interval. Reductions in risk for individual DAs ranged from 0 to a factor of 5.

Section 7
CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key points for the RI at the PAH Areas, including the occurrence and distribution of PAHs and results of the human-health pre- and post-TCRA risk evaluation. RI results form the basis of responses to the DQO decision questions (Table 7-1) that provided the framework for the RI and drive the conclusions and recommendations presented below.

7.1 SUMMARY

PAHs in soil within Transfer Parcel EDC-5 are addressed under IR Site 35 in response to regulatory agency comments on the draft Work Plan (BEI 2006). AOCs 14, 15, and 16, identified solely because of the presence of PAHs, were incorporated into the PAH Areas. Previous investigations identified PAHs in soil above the Alameda Point–specific residential soil screening criterion of 620 µg/kg for B(a)P equivalent concentrations. This prompted the Navy to conduct a TCRA of the upper 2 feet of what was referred to as the West Housing Area (FWEC 2004). Soil around sampling locations with B(a)P equivalent concentrations above 1,000 mg/kg in the top 2 feet bgs of soil was removed, except at six locations that were covered by hardscape and one area that was not residential. Average B(a)P equivalent concentrations were below 620 µg/kg (Table 4-3). Average B(a)P concentrations ranged from 6 to 506 µg/kg.

Soil samples were collected at over 1,500 locations throughout Transfer Parcel EDC-5 during previous investigations and at AOCs during the RI. Agencies agreed that additional PAH samples would not be collected outside the AOCs during the RI.

As agreed upon with U.S. EPA on November 14, 2005, baseline risks were not calculated for the PAH Areas in the RI for IR Site 35. However, post- and pre-TCRA risk associated with PAHs in soil were calculated in the SI and this RI, respectively. Because of the large size of Transfer Parcel EDC-5, these risks were calculated for 18 subareas within the transfer parcel, referred to as DAs, to reduce the size of exposure areas (initially EBS parcels) so that estimates of human-health risks were conservative. Results of both the pre- and post-PAH TCRA calculations show a U.S. EPA and Cal/EPA total risk associated with PAHs in soil within the risk management range of 10^{-6} to 10^{-4}. The noncancer hazard values for all DAs are below 1. Reductions in risk for individual DAs subject to the PAH TCRA ranged from 0 to a factor of 5.

7.2 PAH AREAS CONCLUSIONS AND RECOMMENDATIONS

The RI was conducted using the seven-step DQO process (U.S. EPA 2000); DQOs developed for AOCs in the Work Plan for IR Site 35 cover PAHs in soil (BEI 2006). The RI has addressed these DQOs, as summarized in Table 7-1.

Data collected during previous investigations and the RI were sufficient to characterize the general occurrence and distribution of PAHs in soil at Transfer Parcel EDC-5 and support decisions on the necessity for additional remedial actions for PAHs in soil. Per the Work Plan, B(a)P equivalent concentrations in soil reported above the PSC within Transfer Parcel EDC-5 will be included in the FS for IR Site 35 to consider whether remedial action is needed to reduce or manage risk.

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FIGURES

OAKLAND INNER HARBOR

AOC 1
AOC 2
AOC 3
AOC 4
AOC 5
AOC 6
AOC 7
AOC 8
AOC 9
AOC 10
AOC 11
AOC 12
AOC 13
AOC 17
AOC 18
AOC 20
AOC 21
AOC 23
AOC 24
AOC 25

IR SITE 5
54
IR SITE 7
IR SITE 8
105
IR SITE 10
52
IR SITE 12
69
IR SITE 17
SEAPLANE
LAGOON
IR SITE 21
IR SITE 26
32
IR SITE 28
IR SITE 3
IR SITE 4
IR SITE 6

AST 016
AST 039
AST 152
AST 173A
AST 173B
AST 173C
AST 392
UST(R)-11

EBS PARCELS
78 AND 79
EBS
PARCEL
205

OWS-017

LEGEND

AOC AND DATA GAP BOUNDARIES WITHIN IR SITE 35
OTHER IR SITE BOUNDARIES
TRANSFER PARCEL EDC-5 BOUNDARY
ROAD
BUILDING OR STRUCTURE (PRESENT)
WATER
71 EBS PARCEL
PAH REMOVAL LOCATION
BUILDING 195 REMOVAL LOCATION
NTCRA REMOVAL LOCATION
ABOVEGROUND STORAGE TANK (PRESENT)
ABOVEGROUND STORAGE TANK (REMOVED)
SWMU LOCATION
CATCH BASIN
MANHOLE
OUTFALL
STORM DRAIN
SANITARY SEWER
INDUSTRIAL WASTE LINE
FUEL LINE (PRESENT)
FUEL LINE (REMOVED)

PAH SAMPLING LOCATIONS

BACKGROUND SOIL SAMPLING LOCATION WITH STATION ID
BUILDING 195 REMOVAL SOIL SAMPLING LOCATION WITH STATION ID
DATA GAP INVESTIGATION SOIL SAMPLING LOCATION WITH STATION ID
EBS SOIL SAMPLING LOCATION WITH SAMPLE ID
OU-5 ADDENDUM SOIL SAMPLING LOCATION WITH STATION ID
PAH STUDY SOIL SAMPLING LOCATION WITH STATION ID
PAH REMOVAL ACTION SOIL SAMPLING LOCATION WITH STATION ID
PHASES 2B AND 3 INVESTIGATION SOIL SAMPLING LOCATION WITH STATION ID
RI SOIL SAMPLING LOCATION WITH STATION ID

NOTES:

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION PROGRAM;
NTCRA – NON-TIME-CRITICAL REMOVAL ACTION
OWS – OIL/WATER SEPARATOR
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK

N

200 0 200 Feet

RI/FS Report for IR Site 35

Figure 1-1

Study Area and Sampling Locations – PAH Areas

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 1/18/07
File No.: 077L14466
Job No.: 23818-077
Rev No.: D

LEGEND

- AOC AND DATA GAP BOUNDARIES WITHIN IR SITE 35
- OTHER IR SITE BOUNDARIES
- TRANSFER PARCEL EDC-5 BOUNDARY
- ROAD
- BUILDING OR STRUCTURE (PRESENT)
- WATER
- 71 EBS PARCEL
- PAH REMOVAL LOCATION
- BUILDING 195 REMOVAL LOCATION
- NTCRA REMOVAL LOCATION
- ABOVEGROUND STORAGE TANK (PRESENT)
- ABOVEGROUND STORAGE TANK (REMOVED)
- SWMU LOCATION
- CATCH BASIN
- MANHOLE
- OUTFALL
- STORM DRAIN
- SANITARY SEWER
- INDUSTRIAL WASTE LINE
- FUEL LINE (PRESENT)
- FUEL LINE (REMOVED)
- HISTORICAL SOIL PAH SAMPLING LOCATION
- RI SOIL PAH SAMPLING LOCATION

SOIL SAMPLING LOCATION WITH BENZO(A)PYRENE EQUIVALENT CONCENTRATION ABOVE 620 µg/kg AT :

- 0–2 FEET BGS
- 2–4 FEET BGS
- 4–8 FEET BGS

STATION ID — DEPTH RANGE IN FEET BGS

R13	0–2	2–4	4–8
B(a)P EQ.	710	1,400	520

ANALYTE — CONCENTRATION in µg/kg

NOTES:

ANALYTES WITH REPORTED CONCENTRATIONS ABOVE PSC ARE SHOWN IN ***BOLD ITALICS***

AOC – AREA OF CONCERN
AST – ABOVEGROUND STORAGE TANK
BGS – BELOW GROUND SURFACE
B(a)P EQ. – BENZO(a)PYRENE EQUIVALENT
EBS – ENVIRONMENTAL BASELINE SURVEY
EDC – ECONOMIC DEVELOPMENT CONVEYANCE
IR – INSTALLATION RESTORATION (PROGRAM)
µg/kg – MICROGRAMS PER KILOGRAM
OWS – OIL/WATER SEPARATOR
NTCRA – NON-TIME-CRITICAL REMOVAL ACTION
PAH – POLYNUCLEAR AROMATIC HYDROCARBON
PSC – PRELIMINARY SCREENING CRITERION
RCRA – RESOURCE CONSERVATION AND RECOVERY ACT
RI/FS – REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SWMU – SOLID WASTE MANAGEMENT UNIT
UST(R) – RCRA-IDENTIFIED UNDERGROUND STORAGE TANK

N

200 0 200 Feet

RI/FS Report for IR Site 35

Figure 4-1

Soil Sampling Results for Analytes Above PSC PAH Areas

Alameda, California

Bechtel Environmental, Inc.
CLEAN 3 Program

Date: 1/18/07
File No.: 077L14543
Job No.: 23818-077
Rev No.: 0

TABLES

Table 1-1
Relative Toxicity Equivalency Factors for
Eight Carcinogenic PAHs, PAH Areas

Polynuclear Aromatic Hydrocarbon	Toxicity Equivalency Factor
benz(a)anthracene	0.1
benzo(b)fluoranthene	0.1
benzo(k)fluoranthene	0.01
benzo(a)pyrene	1
chrysene	0.001
dibenz(a,h)anthracene	1
indeno(1,2,3-cd)pyrene	0.1
naphthalene	0.001

Source: U.S. EPA 1993

Acronym/Abbreviation:
PAH – polynuclear aromatic hydrocarbon

Table 4-1
Benzo(a)pyrene Equivalents in Soil Above
Residential Soil Preliminary Screening Criterion, PAH Areas

AOC	Station ID[a]	Depth (feet bgs)	B(a)P Equivalent Concentration (µg/kg)[b,c]
2	32EDC-5-33	4 to 8	1,400
	32EDC-5-34[d]	0.5 to 2	3,900
	A02SB01	3 to 4	760
4	32EDC-5-89	4 to 8	2,200
	H29	4 to 8	1,200
	H30	4 to 8	2,400
	H31	2 to 4	4,400
		4 to 8	3,600
	H32	4 to 8	930
	H33	2 to 4	690
		4 to 8	1,400
	I26	2 to 4	640
		4 to 8	2,300
	J25	2 to 4	1,300
	J26	4 to 8	2,400
5	A05SB04	3 to 4	760
6	U33	0 to 0.5	760
		2 to 4	2,200
	U34	2 to 4	8,300
		4 to 8	690
	V33	2 to 4	1,800
	V34	0.5 to 2	810
		2 to 4	1,700
7	098-010	6 to 8	25,000
	BB30	1.5 to 2	780
	CC27	1 to 1.5	980
13	QQ25	0.5 to 2	740
17	B12-10	0 to 0.5	980
23	B06-09	8 to 9.5	5,000
		14 to 15.5	2,300
	B06-10	8 to 9.5	780
	A23SB02	4 to 8	660
	A23SB04	0 to 2	700
	A23SB04	4 to 8	6,300
	A23SB18	6.5 to 8	640
	A23SB22	1 to 2	840
	A23SB31	1 to 2	880
	A23SB33	6 to 7.5	1,000
	A23SB35	4 to 8	1,300

Table 4-1 (continued)

PAH Areas Outside of AOCs (DA/EBS Parcel)	Station ID[a]	Depth (feet bgs)	B(a)P Equivalent Concentration (µg/kg)[b,c]
DA 1	32EDC-5-42	2 to 4	1,100
DA 2	32EDC-5-49	4 to 8	940
	32EDC-5-73	4 to 8	5,200
	BB46	2 to 4	710
	CC46	2 to 4	3,200
	Y34	2 to 4	890
	Y36	4 to 8	1,900
	Y43	2 to 4	4,200
	Z34	0.5 to 2	970
		2 to 4	980
		4 to 8	1,100
	Z36	4 to 8	790
DA 4	098-005	4 to 6	2,900
		6 to 8	2,500
	32EDC-5-97	4 to 8	900
	R31	2 to 4	1,600
	S27	2 to 4	730
	S28	0.5 to 2	760
	S29	0.5 to 2	650
	T27	2 to 4	1,100
	T28	2 to 4	1,200
		4 to 8	750
	T31	2 to 4	1,200
	U23	0 to 0.5	670
		4 to 8	840
	U24	4 to 8	2,100
	U26	0 to 0.5	760
		0.5 to 2	780
	U27	2 to 4	1,000
	U28	2 to 4	1,800
		4 to 8	1,300
	U29	2 to 4	1,100
	U30	0.5 to 2	630
		2 to 4	910
	V23	4 to 8	5,800
	V24	4 to 8	8,700
	V25	0 to 0.5	800

Table 4-1 (continued)

PAH Areas Outside of AOCs (DA/EBS Parcel)	Station ID[a]	Depth (feet bgs)	B(a)P Equivalent Concentration (µg/kg)[b,c]
DA 4 (continued)	V27	0.5 to 2	1,000
		4 to 8	1,400
	V28	0.5 to 2	910
	V29	2 to 4	1,700
	V30	2 to 4	830
	V31	2 to 4	2,900
	W23	4 to 8	5,300
	W25	2 to 4	1,900
	W27	0.5 to 2	680
	W28	0.5 to 2	890
		2 to 4	1,400
		4 to 8	880
	W29	0.5 to 2	700
		2 to 4	2,000
	W31	0 to 0.5	670
	W32	2 to 4	2,400
	X27	2 to 4	1,300
	X28	2 to 4	810
	X29	4 to 8	2,600
	X30	4 to 8	2,300
	X31	2 to 4	750
DA 5	32EDC-5-108	2 to 4	13,000
		4 to 8	4,300
	N20	4 to 8	1,300
	N22	4 to 8	2,000
	O20	4 to 8	1,800
	P22	0.5 to 2	970
		4 to 8	3,100
	P23	4 to 8	2,800
	P24	2 to 4	1,100
	Q18	4 to 8	1,200
	Q21	0.5 to 2	800
		2 to 4	2,600
		4 to 8	4,300
	Q22	2 to 4	1,400
		4 to 8	680
	Q23	4 to 8	1,200
	R18	2 to 4	820

Table 4-1 (continued)

PAH Areas Outside of AOCs (DA/EBS Parcel)	Station ID[a]	Depth (feet bgs)	B(a)P Equivalent Concentration (µg/kg)[b,c]
DA 5 (continued)	R19	4 to 8	2,100
	R20	4 to 8	1,800
	S18	2 to 4	880
		4 to 8	880
	U20	2 to 4	660
	U21	4 to 8	2,500
	V21	4 to 8	2,400
DA 6	32EDC-5-126	0 to 0.5	950
		2 to 4	1,400
	M16	0 to 0.5	730
	O15	1 to 1.5	650
	P13	0.5 to 1	830
	R10	1.5 to 2	710
	R12	2 to 4	2,500
	R13	0 to 0.5	710
		2 to 4	1,400
	R15	0.5 to 2	730
	S12	2 to 4	3,400
	S13	0 to 0.5	640
		2 to 4	6,600
	S15	2 to 4	830
	S9C[e]	1.5 to 2	1,400
	T11	0 to 0.5	690
	T12	2 to 4	2,100
	T13	2 to 4	1,100
		4 to 8	690
	T14	2 to 4	5,700
		4 to 8	1,500
DA 7	099-008	4 to 6	1,300
	P8	0.5 to 1	660
	Q8	1 to 1.5	810
	R9	1 to 1.5	930
	S9[e]	1.5 to 2	1,800
	S9B	1.5 to 2	790
	U8	1 to 1.5	690
DA 8	32EDC-5-96	2 to 4	720
		4 to 8	990
	DD32	4 to 8	920

Table 4-1 (continued)

PAH Areas Outside of AOCs (DA/EBS Parcel)	Station ID[a]	Depth (feet bgs)	B(a)P Equivalent Concentration (µg/kg)[b,c]
DA 9	32EDC-5-86	4 to 8	2,000
	AA24	1 to 1.5	730
	AA28	1 to 1.5	960
	BB19	0.5 to 1	640
	W19	4 to 8	1,200
	W21	4 to 8	700
	Y21[e]	1 to 1.5	13,000
	Z31	4 to 8	6,200
	Z32	2 to 4	1,900
		4 to 8	830
DA 10	098-006	6 to 8	2,300
	AA13	4 to 8	1,200
	U14	2 to 4	870
	W15	4 to 8	2,900
	Z14	4 to 8	8,700
DA 11	32EDC-5-125	2 to 4	750
	32EDC-5-135[e]	0 to 0.5	1,400
		0.5 to 2	640
	AA8	1 to 1.5	870
	BB11	0 to 0.5	700
	CC11	4 to 8	880
	CC12	0.5 to 2	810
		4 to 8	720
	EE13	4 to 8	1,700
	FF12	4 to 8	860
	FF13	4 to 8	2,700
	GG13	4 to 8	1,400
	U11	2 to 4	1,700
	V11	2 to 4	1,100
		4 to 8	7,700
	Y11	0 to 0.5	680
		2 to 4	790
DA 12	32EDC-5-134	4 to 8	740
	BB5	0.5 to 1	730
	GG2	4 to 8	3,300
	GG5	2 to 4	1,500
	HH5	4 to 8	990
	II5	2 to 4	2,000
	LL4	4 to 8	3,400

Table 4-1 (continued)

PAH Areas Outside of AOCs (DA/EBS Parcel)	Station ID[a]	Depth (feet bgs)	B(a)P Equivalent Concentration (µg/kg)[b,c]
DA 13	JJ12	2 to 4	860
	JJ9	4 to 8	1,600
	KK10	4 to 8	630
DA 15	32EDC-5-122	2 to 4	640
	32EDC-5-132	0 to 0.5	1,200
DA 16	103-017	2 to 4	4,200
		4 to 6	11,000
	32EDC-5-103	0.5 to 2	950
	TT21	2 to 4	3,500
DA 17	WW27	0.5 to 1	710
	103-018	6 to 8	750
	UU19	2 to 4	740
	UU20	0.5 to 2	630
		4 to 8	6,400
	UU21	0.5 to 2	770
	VV17	4 to 8	25,000
	WW16	2 to 4	9,600
DA 18	RR13	0.5 to 2	1,000
	TT11	4 to 8	930
	32EDC-5-120	2 to 4	22,000
	VV7	2 to 4	1,100
		4 to 8	1,800
	VV8	2 to 4	1,000
	XX13	2 to 4	870
EBS 45	32EDC-5-7	2 to 4	990

Notes:
[a] sample ID used for EBS samples
[b] values above the residential soil screening criterion of 620 µg/kg
[c] B(a)P equivalent values from the SI Report (BEI 2005b) bound of 1,000 µg/kg
[d] not excavated because area is nonresidential (FWEC 2004)
[e] not excavated because area is asphalt-paved (FWEC 2004)

Acronyms/Abbreviations:
AOC – area of concern
B(a)P – benzo(a)pyrene
bgs – below ground surface
DA – decision area
EBS – environmental baseline survey
µg/kg – micrograms per kilogram
SI – site inspection

Table 4-2
Number of Samples With Benzo(a)pyrene Concentrations Above 620 µg/kg at AOCs and DAs, PAH Areas

Decision Area/ EBS Parcel	Number of Samples With Benzo(a)pyrene Concentrations Above 620 µg/kg		
	0–2 feet bgs	2–4 feet bgs	> 4 feet bgs
AOC 1	0	0	0
AOC 2	1	1	1
AOC 3	0	0	0
AOC 4	0	4	8
AOC 5	0	1	0
AOC 6	2	4	1
AOC 7	2	0	1
AOC 8	0	0	0
AOC 9	0	0	0
AOC 10	0	0	0
AOC 11	0	0	0
AOC 12	0	0	0
AOC 13	1	0	0
AOC 17	1	0	0
AOC 18	0	0	0
AOC 20	0	0	0
AOC 21	0	0	0
AOC 23	3	0	8
AOC 24	0	0	0
AOC 25	0	0	0
DA 1	0	1	0
DA 2	1	5	5
DA 3	0	0	0
DA 4	13	19	14
DA 5	2	7	15
DA 6	10	9	2
DA 7	6	0	1
DA 8	0	1	2
DA 9	4	1	5
DA 10	0	1	4
DA 11	6	4	7
DA 12	1	2	4
DA 13	0	1	2
DA 14	0	0	0
DA 15	1	1	0
DA 16	1	2	1
DA 17	3	2	3
DA 18	1	4	2
EBS 45	0	1	0
Total	**59** [a]	**71**	**86** [b]

Notes:

[a] 59 samples from within the 0 to 2 feet bgs interval at 57 boring locations

[b] 86 samples from the greater than 4 feet bgs interval at 84 boring locations

Acronyms/Abbreviations:

AOC – area of concern
bgs – below ground surface
DA – decision area
EBS – environmental baseline survey
µg/kg – micrograms per kilogram

Table 4-3
Benzo(a)pyrene Equivalent Concentrations by Decision Area

Area and Depth Interval (feet bgs)	Average B(a)P Equivalent Concentrations (µg/kg)
Decision Area 1	
0–2	506
0–4	461
0–8	417
Decision Area 2*	
0–2	99
0–4	234
0–8	250
Decision Area 3*	
0–2	121
0–4	165
0–8	256
Decision Area 4*	
0–2	242
0–4	338
0–8	428
Decision Area 5*	
0–2	81
0–4	174
0–8	276
Decision Area 6*	
0–2	149
0–4	262
0–8	251
Decision Area 7*	
0–2	189
0–4	195
0–8	196
Decision Area 8*	
0–2	108
0–4	129
0–8	397
Decision Area 9*	
0–2	199
0–4	188
0–8	240

Table 4-3 (continued)

Area and Depth Interval (feet bgs)	Average B(a)P Equivalent Concentrations (µg/kg)
Decision Area 10	
0–2	59
0–4	63
0–8	136
Decision Area 11*	
0–2	188
0–4	199
0–8	276
Decision Area 12	
0–2	118
0–4	155
0–8	215
Decision Area 13	
0–2	70
0–4	70
0–8	107
Decision Area 14	
0–2	99
0–4	100
0–8	105
Decision Area 15	
0–2	229
0–4	191
0–8	155
Decision Area 16*	
0–2	65
0–4	109
0–8	181
Decision Area 17*	
0–2	84
0–4	106
0–8	366
Decision Area 18*	
0–2	78
0–4	266
0–8	244
EBS 023F	
0–2	8
0–4	10
0–8	9

Table 4-3 (continued)

Area and Depth Interval (feet bgs)	Average B(a)P Equivalent Concentrations (µg/kg)
EBS 041	
0–2	26
0–4	34
0–8	38
EBS 043	
0–2	38
0–4	28
0–8	22
EBS 044	
0–2	35
0–4	38
0–8	40
EBS 045	
0–2	15
0–4	111
0–8	88
EBS 062	
0–2	28
0–4	30
0–8	85
EBS 063	
0–2	52
0–4	37
0–8	75
EBS 064	
0–2	25
0–4	19
0–8	19
EBS 065	
0–2	25
0–4	21
0–8	19
EBS 070	
0–2	6
0–4	7
0–8	7
EBS 071	
0–2	113
0–4	91
0–8	311

Table 4-3 (continued)

Area and Depth Interval (feet bgs)	Average B(a)P Equivalent Concentrations (µg/kg)
EBS 073	
0–2	8
0–4	7
0–8	17
EBS 077	
0–2	40
0–4	26
0–8	25
EBS 078	
0–2	7
0–4	9
0–8	8
EBS 079	
0–2	39
0–4	36
0–8	40
EBS 083	
0–2	23
0–4	74
0–8	61
EBS 084	
0–2	46
0–4	56
0–8	55
EBS 085	
0–2	150
0–4	113
0–8	108
EBS 088	
0–2	270
0–4	197
0–8	197
EBS 090	
0–2	415
0–4	430
0–8	430
EBS 091	
0–2	207
0–4	172
0–8	158

Table 4-3 (continued)

Area and Depth Interval (feet bgs)	Average B(a)P Equivalent Concentrations (µg/kg)
EBS 092	
0–2	34
0–4	61
0–8	72
EBS 093	
0–2	40
0–4	77
0–8	72
EBS 096	
0–2	37
0–4	50
0–8	47
EBS 106	
0–2	25
0–4	25
0–8	25
EBS 107	
0–2	25
0–4	25
0–8	25
EBS 108	
0–2	6
0–4	20
0–8	24
EBS 109	
0–2	11
0–4	12
0–8	14
EBS 110	
0–2	35
0–4	25
0–8	27
EBS 111	
0–2	194
0–4	179
0–8	152
EBS 115	
0–2	49
0–4	76
0–8	54

Table 4-3 (continued)

Area and Depth Interval (feet bgs)	Average B(a)P Equivalent Concentrations (µg/kg)
EBS 121	
0–2	7
0–4	17
0–8	21
EBS 123	
0–2	114
0–4	71
0–8	74
EBS 124	
0–2	127
0–4	84
0–8	143
EBS 125	
0–2	8
0–4	7
0–8	169
EBS 130	
0–2	28
0–4	29
0–8	37
EBS 132	
0–2	73
0–4	110
0–8	121
EBS 185	
0–2	144
0–4	115
0–8	94
EBS 189	
0–2	8
0–4	7
0–8	7
EBS 195	
0–2	9
0–4	8
0–8	7
EBS 197	
0–2	22
0–4	35
0–8	56

Table 4-3 (continued)

Area and Depth Interval (feet bgs)	Average B(a)P Equivalent Concentrations (µg/kg)
EBS 205	
0–2	6
0–4	6
0–8	6
EBS 206	
0–2	32
0–4	23
0–8	17
EDC-5	
0–2	116
0–4	164
0–8	221

Note:
* decision area subject to excavation during TCRA

Acronyms/Abbreviations:
B(a)P – benzo(a)pyrene
bgs – below ground surface
EBS – environmental baseline survey
EDC – economic development conveyance
µg/kg – micrograms per kilogram
TCRA – time critical removal action

Table 5-1
Estimates of Mobility and Persistence for
Carcinogenic PAHs, PAH Areas

Analyte	Molecular Weight Class	K_{oc} (L/kg)	f_{oc}	Percent Sorbed [a]	Half-Life in Soil [b] (in years)
benz(a)anthracene	High	1.38E+06	0.0016	100	1.86
benzo(b)fluoranthene	High	5.50E+06	0.0016	100	1.67
benzo(k)fluoranthene	High	5.50E+06	0.0016	100	1.67
benzo(a)pyrene	High	5.50E+06	0.0016	100	1.45
chrysene	High	2.00E+05	0.0016	99.7	2.72
dibenz(a,h)anthracene	High	3.31E+06	0.0016	100	2.57
indeno(1,2,3-cd)pyrene	High	1.58E+06	0.0016	100	2.0
naphthalene	Very Low	2.01E+03	0.0016	76.3	0.71

Notes:
[a] percent sorbed = $[K_{oc}f_{oc} / (1+K_{oc}f_{oc})] \times 100$
[b] for microbially mediated degradation in soil (Howard et al. 1991)

Acronyms/Abbreviations:
f_{oc} – fraction organic carbon; lowest organic carbon reported in soil samples from IR Site 35 was used to provide the most conservative estimate of the percent sorbed
IR – Installation Restoration (Program)
K_{oc} – organic carbon partition coefficient
L/kg – liters per kilogram
PAH – polynuclear aromatic hydrocarbon

Table 6-1
Pre-TCRA Results for PAHs, PAH Areas

Decision Area	Depth (feet bgs)	U.S. EPA Carcinogenic Risk	Cal/EPA Carcinogenic Risk	Hazard Index
Decision Area 2	0–2	4E-06	4E-06	0.0009
	0–4	6E-06	7E-06	0.002
	0–8	7E-06	7E-06	0.002
Decision Area 3	0–2	3E-06	4E-06	0.001
	0–4	6E-06	6E-06	0.001
	0–8	8E-06	9E-06	0.002
Decision Area 4	0–2	6E-06	7E-06	0.001
	0–4	7E-06	8E-06	0.002
	0–8	1E-05	1E-05	0.003
Decision Area 5	0–2	2E-06	2E-06	0.0005
	0–4	3E-06	3E-06	0.003
	0–8	9E-06	9E-06	0.003
Decision Area 6	0–2	2E-05	2E-05	0.003
	0–4	2E-05	2E-05	0.004
	0–8	1E-05	1E-05	0.003
Decision Area 7	0–2	1E-05	1E-05	0.004
	0–4	1E-05	1E-05	0.004
	0–8	1E-05	1E-05	0.004
Decision Area 8	0–2	2E-05	2E-05	0.006
	0–4	2E-05	2E-05	0.006
	0–8	4E-05	4E-05	0.007
Decision Area 9	0–2	1E-05	1E-05	0.003
	0–4	1E-05	1E-05	0.003
	0–8	1E-05	1E-05	0.004
Decision Area 11	0–2	7E-06	8E-06	0.003
	0–4	7E-06	7E-06	0.002
	0–8	9E-06	1E-05	0.003
Decision Area 16	0–2	3E-06	3E-06	0.0007
	0–4	5E-06	5E-06	0.001
	0–8	8E-06	8E-06	0.002
Decision Area 17	0–2	5E-06	5E-06	0.0008
	0–4	5E-06	5E-06	0.003
	0–8	2E-05	2E-05	0.02
Decision Area 18	0–2	3E-06	3E-06	0.001
	0–4	2E-05	2E-05	0.005
	0–8	1E-05	1E-05	0.004

Acronyms/Abbreviations:
bgs – below ground surface
Cal/EPA – California Environmental Protection Agency
PAH – polynuclear aromatic hydrocarbon
TCRA – time-critical removal action
U.S. EPA – United States Environmental Protection Agency

Table 6-2
Post-TCRA Risk Levels for PAHs at
Three Depth Intervals in Decision Areas, PAH Areas

Decision Area	0 TO 2 FEET BGS		0 TO 4 FEET BGS		0 TO 8 FEET BGS	
	Risk[a,b]	Hazard	Risk[a,b]	Hazard	Risk[a,b]	Hazard
1	7E-05	1E-02	7E-05	1E-02	7E-05	1E-02
2	3E-06	7E-04	6E-06	2E-03	7E-06	2E-03
3	3E-06	9E-04	4E-06	1E-03	9E-06	3E-03
4	5E-06	1E-03	7E-06	2E-03	1E-05	3E-03
5	2E-06	5E-04	8E-06	3E-03	9E-06	3E-03
6	4E-06	2E-03	9E-06	3E-03	9E-06	3E-03
7	6E-06	3E-03	6E-06	3E-03	6E-06	3E-03
8	4E-06	8E-04	4E-06	1E-03	3E-05	4E-03
9	1E-05	3E-03	1E-05	3E-03	1E-05	4E-03
10	2E-06	5E-04	2E-06	5E-04	6E-06	1E-03
11	5E-06	2E-03	5E-06	2E-03	8E-06	2E-03
12	3E-06	1E-03	4E-06	1E-03	7E-06	2E-03
13	2E-06	4E-04	2E-06	5E-04	2E-06	8E-04
14	3E-06	5E-04	3E-06	1E-03	2E-06	1E-03
15	2E-05	3E-03	2E-05	3E-03	2E-05	3E-03
16	2E-06	6E-04	5E-06	1E-03	8E-06	2E-03
17	2E-06	5E-04	3E-06	3E-03	2E-05	2E-02
18	2E-06	5E-04	2E-05	5E-03	2E-05	6E-03

Notes:
[a] shaded risk values exceed the target cancer risk for PAHs in soil, which is equivalent to 1×10^{-5}
[b] California-modified cancer risk

Acronyms/Abbreviations:
bgs – below ground surface
PAH – polynuclear aromatic hydrocarbon
TCRA – time-critical removal action

Table 7-1
Summary of RI Results and Recommendations, PAH Areas

DQO Problem	DQO Decision Questions	Nature and Extent	Risk Assessment	Recommendation
PAH Areas were added to IR Site 35 in response to comments from U.S. EPA and DTSC on the draft RI Work Plan. PAH Areas identified for inclusion in the FS address residual B(a)P equivalent concentrations that are above the Alameda Point screening criterion of 620 µg/kg but do not drive risk above 10^{-5}. Eighteen DAs were included in the PAH Areas along with PAHs in soil at AOCs with concentrations above the B(a)P equivalent concentration.	Have the nature and extent of contamination been defined?	Yes. The distribution of B(a)P equivalent concentrations in soil has been adequately characterized with over 1,500 samples.	NA	As agreed to with the regulatory agencies, PAHs in soil above the PSC are included in the FS to consider whether remedial action is needed to reduce or manage risk.
	Are contaminants present at concentrations that contribute to an unacceptable risk to potential future residents?	NA	As agreed upon with U.S. EPA on November 14, 2005, baseline risks were not calculated for the PAH Areas. However, post- and pre-TCRA risk associated with PAHs in soil were calculated in the SI and this RI, respectively. Results of both the pre- and post-PAH TCRA calculations show a U.S. EPA and Cal/EPA total risk associated with PAHs in soil within the risk management range of 10^{-6} to 10^{-4}. The noncancer hazard values for all DAs are below 1. Reductions in risk for individual DAs ranged from 0 to a factor of 5.	See above.
	Are contaminants present in groundwater at concentrations that could pose unacceptable risk to potential aquatic receptors in Oakland Inner Harbor or Seaplane Lagoon?		NA. The PAH Areas address residual concentrations in soil. Potential groundwater concerns were addressed as study areas.	NA

Acronyms/Abbreviations:

AOC – area of concern
B(a)P – benzo(a)pyrene
Cal/EPA – California Environmental Protection Agency
DA – decision area
DQO – data quality objective
DTSC – California Department of Toxic Substances Control
FS – feasibility study
IR – Installation Restoration (Program)
µg/kg – micrograms per kilogram
NA – not applicable
PAH – polynuclear aromatic hydrocarbon
PSC – preliminary screening criterion
RI – remedial investigation
SI – site inspection
TCRA – time-critical removal action
U.S. EPA – United States Environmental Protection Agency

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ATTACHMENT X

ACRONYMS/ABBREVIATIONS FOR ATTACHMENTS

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AOC	area of concern
APC	Alameda Point Collaborative
AST	aboveground storage tank
AVGAS	aviation gasoline
B(a)P	benzo(a)pyrene
BEI	Bechtel Environmental, Inc.
bgs	below ground surface
BHC	benzene hexachloride
BSU	Bay Sediment Unit
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAA	corrective action area
Cal/EPA	California Environmental Protection Agency
CCC	criterion continuous concentration
CLEAN	Comprehensive Long-Term Environmental Action Navy
COPC	chemical of potential concern
CTO	contract task order
CTR	California Toxics Rule
DA	decision area
DCA	dichloroethane
DCE	dichloroethene
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DNAPL	dense nonaqueous-phase liquid
DQO	data quality objective
DTSC	(Cal/EPA) Department of Toxic Substances Control
EBS	environmental baseline survey
EDC	economic development conveyance
EE/CA	engineering evaluation/cost analysis
EPC	exposure point concentration
ESL	environmental screening level
f_{oc}	fraction organic carbon
FS	feasibility study
GAP	generator accumulation point
g/mol	grams per mole

HHCO	human-health consumption of organisms only
HHRA	human-health risk assessment
HI	hazard index
HQ	hazard quotient
IR	Installation Restoration (Program)
JP-5	jet propellant grade 5
K_{oc}	organic carbon partition coefficient
LBP	lead-based paint
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MSL	mean sea level
MTBE	methyl tert-butyl ether
NADEP	Naval Aviation Depot
NAS	Naval Air Station
NFA	no further action
NRWQC	(U.S. EPA) National Recommended Water Quality Criteria
NTCRA	non-time-critical removal action
OU	operable unit
OWS	oil/water separator
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PEP	parcel evaluation plan
PID	photoionization detector
PRG	preliminary remediation goal
PSC	preliminary screening criterion
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
redox	oxidation-reduction
Res.	resolution
RI	remedial investigation
RME	reasonable maximum exposure
RWQCB	(California) Regional Water Quality Control Board

SI	site inspection
SVOC	semivolatile organic compound
SWMU	solid waste management unit
SWRCB	(California) State Water Resources Control Board
TCE	trichloroethene
TCRA	time-critical removal action
TDS	total dissolved solids
TPH	total petroleum hydrocarbons
TRPH	total recoverable petroleum hydrocarbons
U.S. EPA	United States Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compound
Water Board	San Francisco Bay Regional Water Quality Control Board

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ATTACHMENT Y

REFERENCES FOR ATTACHMENTS

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N00236.002712
ALAMEDA POINT
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ANALYTICAL DATA

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